

# STANFORD UNIVERSITY

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## STANFORD BULLETIN 2012-13



### **ACCREDITATION**

Stanford University is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges (WASC), 985 Atlantic Avenue, Suite 100, Alameda, CA 94501; (510) 748-9001. In addition, certain programs of the University have specialized accreditation. For information, contact the Office of the University Registrar.

### **STATEMENT OF NONDISCRIMINATORY POLICY**

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities; Stanford also prohibits unlawful harassment including sexual harassment and sexual violence. The following person has been designated to handle inquiries regarding this nondiscrimination policy including under Title IX: Rosa Gonzalez, Director of the Diversity and Access Office and Title IX Coordinator, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu) (email).

### **ADDITIONAL INFORMATION**

Additional information on Stanford University can be obtained through Stanford's web site at <http://www.stanford.edu>.

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Every effort is made to ensure that the degree requirement and course information, applicable policies, and other materials contained in the Stanford Bulletin are accurate and current. The University reserves the right to make changes at any time without prior notice. The Bulletin in the form as it exists online at Stanford Bulletin web site and ExploreCourses web site is therefore the governing document, and contains the then currently applicable policies and information.

# Table of Contents

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Academic Calendar .....	3	Management Science and Engineering .....	222
Stanford University .....	6	Materials Science and Engineering .....	232
Stanford's Mission .....	7	Mechanical Engineering .....	239
University Governance and Organization .....	9	School of Humanities and Sciences .....	249
University Requirements .....	12	African and African American Studies .....	249
Admission and Financial Aid .....	12	African Studies .....	254
Tuition, Fees, and Housing .....	17	American Studies .....	256
Undergraduate Degrees and Programs .....	23	Anthropology .....	261
Undergraduate Major Unit Requirements .....	32	Applied Physics .....	271
Coterminal Degrees .....	36	Archaeology .....	273
Graduate Degrees .....	38	Art and Art History .....	277
Transfer Work .....	49	Astronomy .....	291
Veteran's Affairs .....	50	Athletics, Physical Education, and Recreation .....	293
Academic Policies and Statements .....	51	Biology, Hopkins Marine Station .....	295
Nonacademic Regulations .....	62	Biology .....	295
Undergraduate Education .....	79	Biophysics .....	313
Stanford Introductory Studies .....	79	Chemistry .....	314
Overseas Studies .....	83	Classics .....	318
Undergraduate Advising and Research .....	85	Communication .....	329
Center for Teaching and Learning .....	87	Comparative Literature .....	335
ROTC .....	88	Comparative Studies in Race and Ethnicity (CSRE) .....	340
Graduate Education .....	90	Division of International, Comparative and Area Studies .....	353
Graduate School of Business .....	92	Division of Literatures, Cultures, and Languages .....	355
School of Earth Sciences .....	93	East Asian Languages and Cultures .....	357
Earth, Energy, and Environmental Sciences Graduate Program (EEES) .....	94	East Asian Studies .....	368
Earth Systems .....	95	Economics .....	374
Emmett Interdisciplinary Program in Environment and Resources (E-IPER) .....	100	English .....	381
Energy Resources Engineering .....	109	Ethics in Society Program .....	389
Environmental Earth System Science .....	116	Feminist Studies .....	391
Geological and Environmental Sciences .....	118	Financial Mathematics .....	398
Geophysics .....	125	French and Italian .....	400
School of Education .....	130	German Studies .....	413
School of Engineering .....	134	History and Philosophy of Science .....	418
Aeronautics and Astronautics .....	166	History .....	421
Bioengineering .....	172	Human Biology .....	436
Chemical Engineering .....	176	Iberian and Latin American .....	439
Civil and Environmental Engineering .....	183	Individually Designed Majors and Individually Designed Honors Program in Humanities .....	445
Computer Science .....	192	International Policy Studies .....	446
Electrical Engineering .....	211	International Relations .....	452
Institute for Computational and Mathematical Engineering .....	218	Jewish Studies .....	459
		Language Center .....	459
		Latin American Studies .....	464
		Linguistics .....	469

Mathematical and Computational Science .....	472	Centers, Laboratories, Institutes .....	620
Mathematics .....	475	Libraries and Computing .....	623
Medieval Studies .....	480	Continuing Studies .....	624
Modern Thought and Literature .....	480	Services and Programs .....	626
Music .....	482	Course Descriptions .....	631
Philosophy .....	491	Index .....	1362
Physics .....	503		
Political Science .....	511		
Psychology .....	516		
Public Policy .....	521		
Religious Studies .....	528		
Russian, East European and Eurasian Studies .....	532		
Science, Technology, and Society .....	536		
Slavic Languages and Literatures .....	542		
Sociology .....	550		
Statistics .....	557		
Symbolic Systems .....	561		
Theater and Performance Studies .....	574		
Urban Studies .....	581		
Stanford in Washington .....	586		
School of Law .....	587		
School of Medicine .....	589		
Biochemistry .....	590		
Biomedical Ethics .....	591		
Biomedical Informatics .....	592		
Cancer Biology .....	595		
Chemical and Systems Biology .....	597		
Comparative Medicine .....	598		
Developmental Biology .....	598		
Genetics .....	599		
Health Research and Policy .....	600		
Immunology .....	602		
Microbiology and Immunology .....	606		
Molecular and Cellular Physiology .....	607		
Neurobiology .....	608		
Neurosciences .....	608		
Obstetrics and Gynecology .....	609		
Pathology .....	609		
Radiation Oncology .....	610		
Radiology .....	610		
Stem Cell Biology and Regenerative Medicine .....	611		
Structural Biology .....	613		
Other Offices .....	615		
Student Affairs .....	615		

# Academic Calendar 2012-13

This calendar is also available at the University Registrar's web site (<http://studentaffairs.stanford.edu/registrar/academic-calendar>). All dates are subject to change at the discretion of the University.

## Autumn Quarter 2012-13

Date(s)	Day/Time	Description
August 1	Wed	Axess opens for course enrollment.
August 27	Mon	M.D. first-year students, first day of instruction.
August 30	Thu	M.D. second-year students, first day of instruction.
September 4	Tue	Law School instruction begins for 1st-year J.D. students.
September 14	Fri, 5:00 p.m.	At-status enrollment deadline in order to receive stipend or financial aid refund by first day of term.
September 17	Mon	MBA first-year instruction begins.
September 18	Tue	New undergraduates arrive; Convocation.
September 24	Mon	First day of quarter; instruction begins; Law School instruction begins for 2nd/3rd-year J.D. & Advanced Degree Students.
September 24	Mon, 5:00 p.m.	Preliminary Study List deadline. Students must be a "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8-9-10 units (graduate students only), or approved Special Registration Status. The late study list fee is \$200.
September 24	Mon, 5:00 p.m.	Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2012-13 for a full refund schedule.
September 26	Wed	Yom Kippur (classes held; some students will be observing Yom Kippur and are not expected to attend classes; some faculty will not be holding classes).
September 27	Thu	Conferral of degrees, Summer Quarter 2011-12.
September 28	Fri	GSB course add/drop deadline
October 12	Fri, 5:00 p.m.	Final Study List deadline. Last day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a "W" notation will appear on the transcript.
November 6	Tue, 5:00 p.m.	Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
November 16	Fri, 5:00 p.m.	Change of grading basis deadline.
November 16	Fri, 5:00 p.m.	Course withdrawal deadline.
November 16	Fri, 5:00 p.m.	Application deadline for Autumn Quarter degree conferral.

November 19-23	Mon-Fri	Thanksgiving Recess (no classes).
November 30	Fri	Last day of Law 2L/3L/Adv classes
December 3-9	Mon-Sun	End-Quarter Period.
December 3	Mon	Last day of Law 1L classes
December 7	Fri	Last day of classes (unless class meets on Sat).
December 7	Fri	Last opportunity to arrange incomplete in a course, at last class.
December 7	Fri, noon	University thesis, D.M.A. final project, or Ph.D. dissertation, last day to submit.
December 7	Fri, 5:00 p.m.	Late application deadline for Autumn Quarter degree conferral (\$50 fee).
December 7-14	Fri-Fri	Law School examinations.
December 10-14	Mon-Fri	End-Quarter examinations.
December 18	Tue, 11:59 p.m.	Grades due.
January 10	Thu	Conferral of degrees, Autumn Quarter.

## Winter Quarter 2012-13

Date(s)	Day/Time	Description
October 28	Sun	Axess opens for course enrollment.
December 28	Fri	At-status enrollment deadline in order to receive stipend or financial aid refund by first day of term.
January 7	Mon	First day of quarter; instruction begins for all students.
January 7	Mon, 5:00 p.m.	Preliminary Study List deadline. Students must be "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8-9-10 units (graduate students only), or approved Special Registration Status. The late study list fee is \$200.
January 7	Mon, 5:00 p.m.	Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
January 11	Fri	GSB course add/drop deadline
January 21	Mon	Martin Luther King, Jr., Day (holiday, no classes).
January 25	Fri, 5:00 p.m.	Final Study List deadline. Final day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a "W" notation will appear on the transcript.
February 18	Mon	Presidents' Day (holiday, no classes; Law does hold classes).
February 20	Wed, 5:00 p.m.	Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
March 1	Fri, 5:00 p.m.	Change of grading basis deadline.
March 1	Fri, 5:00 p.m.	Course withdrawal deadline.

March 1	Fri, 5:00 p.m.	Application deadline for Winter Quarter degree conferral.
March 11	Mon	Last day of Law classes
March 11-17	Mon-Sun	End-Quarter Period.
March 15	Fri	Last day of classes (unless class meets on Sat.)
March 15	Fri	Last opportunity to arrange Incomplete in a course, at last class.
March 15	Fri, noon	University thesis, D.M.A. final project, Ph.D. dissertation, last day to submit.
March 15	Fri, 5:00 p.m.	Late application deadline for Winter Quarter degree conferral (\$50 fee).
March 15-22	Fri-Fri	Law School examinations.
March 18-22	Mon-Fri	End-Quarter examinations.
March 26	Tue, 11:59 p.m.	Grades due.
April 4	Thu	Conferral of degrees, Winter Quarter.

June 3-7	Mon-Fri	Law School examinations.
June 5	Wed	Last day of classes.
June 5	Wed	Last opportunity to arrange Incomplete in a course, at last class.
June 5	Wed, noon	University thesis, D.M.A. final project, or Ph.D. dissertation, last day to submit.
June 5	Wed, 5:00 p.m.	Late application deadline for Spring Quarter degree conferral (\$50 fee).
June 6	Thu	Day before finals, no classes.
June 7-12	Fri-Wed	End-Quarter examinations.
June 13	Thu, noon	Grades for graduating students due.
June 15	Sat	Senior Class Day.
June 15	Sat	Baccalaureate Saturday.
June 16	Sun	Commencement. Conferral of degrees, Spring Quarter.
June 18	Tue, 11:59 p.m.	Grades for non-graduating students due.

## Spring Quarter 2012-13

Date(s)	Day/Time	Description
February 10	Sun	Axess opens for course enrollment.
March 22	Fri	At-status enrollment deadline in order to receive stipend or financial aid refund by first day of term.
April 1	Mon	First day of quarter; instruction begins for all students.
April 1	Mon, 5:00 p.m.	Preliminary Study List deadline. Students must be "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8-9-10 units (graduate students only), or approved Special Registration Status. The late study list fee is \$200.
April 1	Mon, 5:00 p.m.	Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
April 4	Thu	MBA first-year instruction begins.
April 9	Tue	GSB course add/drop deadline
April 12	Fri, 5:00 p.m.	Application deadline for Spring Quarter degree conferral.
April 19	Fri, 5:00 p.m.	Final Study List deadline. Last day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a "W" notation will appear on the transcript.
May 14	Tue, 5:00 p.m.	Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
May 24	Fri, 5:00 p.m.	Change of grading basis deadline.
May 24	Fri, 5:00 p.m.	Course withdrawal deadline, except GSB, Law, and M.D.
May 27	Mon	Memorial Day (holiday, no classes).
May 31	Fri	Last day of Law classes.
May 31-June	Fri-Thu	End-Quarter Period.

## Summer Quarter 2012-13

Date(s)	Day/Time	Description
April 14	Sun	Axess opens for course enrollment.
June 14	Fri	At-status enrollment deadline in order to receive stipend or financial aid refund by first day of term.
June 24	Mon	First day of quarter; instruction begins.
June 24	Mon, 5:00 p.m.	Preliminary Study List deadline.
June 24	Mon	Deadline to submit Leave of Absence for full refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
July 4	Thu	Independence Day (holiday, no classes).
July 5	Fri, 5:00 p.m.	Final Study List deadline. Final day to add or drop a class; last day to adjust units on a variable-unit course. Last day for tuition reassessment for dropped courses or units. Students may withdraw from a course until the Course Withdrawal deadline and a "W" notation will appear on the transcript.
July 26	Fri, 5:00 p.m.	Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. See Tuition and Refund Schedule: 2011-12 for a full refund schedule.
Aug 2	Fri, 5:00 p.m.	Change of grading basis deadline.
Aug 2	Fri, 5:00 p.m.	Course withdrawal deadline.
Aug 2	Fri, 5:00 p.m.	Application deadline for Summer Quarter degree conferral.
August 10-15	Sat-Thu	End-Quarter Period.
August 15	Thu	Last day of classes.
August 15	Thu	Last opportunity to arrange Incomplete in a course, at last class.
August 16-17	Fri-Sat	End-Quarter examinations.
August 20	Tue, 11:59 p.m.	Grades due.
August 30	Fri, noon	University thesis, D.M.A. final project, or Ph.D. dissertation, last day to submit.

August 30	Thu, 5:00 p.m.	Late application deadline for Summer Quarter degree conferral (\$50 fee).
September 26	Thu	Conferral of degrees, Summer Quarter.

## Academic Calendar 2013-14

First day of classes and last day of finals:

- Autumn 2013-14: September 23 and December 13
- Winter 2013-14: January 6 and March 21
- Spring 2013-14: March 31 and June 11 (Commencement June 15)
- Summer 2013-14: June 23 and August 16

# Stanford Bulletin 2012-13

The Stanford Bulletin is Stanford University's official catalog of courses, degrees, policies, and University and degree requirements.

- **ExploreDegrees** publishes degree requirements, University requirements, and academic and nonacademic policies and regulations, as well as information on Stanford's schools, departments, and interdisciplinary programs.
- **ExploreCourses** publishes courses and class scheduling for the entire University.

Use the links in the Table of Contents on the left to navigate through the bulletin. Or use the search box to look for specific material.

- The Access Guest Menu ([http://axess.stanford.edu/psp/pscspnd\\_1/EMPLOYEE/HRMS/c/COMMUNITY\\_ACCESS.CLASS\\_SEARCH.GBL](http://axess.stanford.edu/psp/pscspnd_1/EMPLOYEE/HRMS/c/COMMUNITY_ACCESS.CLASS_SEARCH.GBL)) allows staff, faculty, and guests to view course information in Access, Stanford's student information system.
- For degree requirements in the Graduate School of Business, see the GSB web site (<http://www.gsb.stanford.edu>).
- For M.D. programs in the School of Medicine, see the School of Medicine web site (<http://med.stanford.edu/education>).
- For Law degree programs, see the School of Law web site (<http://www.law.stanford.edu/program/degrees>).

The material presented here was published on August 1, 2012.

## New Navigation in ExploreDegrees

An entirely new and more user friendly navigation in ExploreDegrees, was released on August 1, 2012. If you were directed to this page as a result of clicking on an old Bulletin link, please use the menu on the left to find the material you are looking for. Or try the A-Z Index (<http://exploreddegrees.stanford.edu/azindex>).

We would appreciate reports of broken links either inside the Bulletin or on other web sites. Please submit such reports via the Old Bulletin Link form (<https://www.stanford.edu/dept/registrar/forms/old-bulletin-link.fb>). We'll try to fix broken links as quickly as we can. Webmasters should feel free to send a spreadsheet of old links to [reg-webmaster@stanford.edu](mailto:reg-webmaster@stanford.edu); we will find the replacement links and send them to you.

## Stanford Bulletins from Earlier Years

See the Previous Stanford Bulletins ([http://www.stanford.edu/dept/registrar/bulletin\\_past](http://www.stanford.edu/dept/registrar/bulletin_past)) page for Bulletins prior to 2012-13.

## Accreditation

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Stanford University is committed to complying with the following requirements enumerated by the Western Association of Schools and Colleges (WASC) in its accreditation process:

*"Core Commitment to Institutional Capacity*

"The institution functions with clear purposes, high levels of institutional integrity, fiscal stability, and organizational structures to fulfill its purposes.

*"Commitment to Educational Effectiveness*

"The institution evidences clear and appropriate educational objectives and design at the institutional and program level. The institution employs processes of review, including the collection and use of data, which ensure delivery of programs and learner accomplishments at a level of performance appropriate for the degree or certificate awarded."

For more information, see the University's WASC Accreditation (<http://wasc.stanford.edu>) web site.

Also, see President Hennessy's statement (<http://www.stanford.edu/dept/registrar/bulletin/pdf/institutional-stipulations.pdf>) (pdf) on Stanford's fulfillment of the Core Commitments to Institutional Capacity and Educational Effectiveness.

## Nondiscrimination Policy

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities; Stanford also prohibits unlawful harassment including sexual harassment and sexual violence. The following person has been designated to handle inquiries regarding this nondiscrimination policy including under Title IX: Rosa Gonzalez, Director of the Diversity and Access Office and Title IX Coordinator, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu) (email).

## Governing Document

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Courses of Instruction are available at the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site.

Your feedback is valuable. Send email to [reg-webmaster@stanford.edu](mailto:reg-webmaster@stanford.edu).

## Registrar's Office

The Stanford Bulletin is an online publication of the Office of the University Registrar (<http://registrar.stanford.edu>), Stanford University.

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Stanford University  
Stanford, California 94305-6032

Students with questions or issues should contact the Student Services Center (<http://studentservicescenter.stanford.edu>) or file a help ticket (<https://remedyweb.stanford.edu/helpsu/helpsu?pcat=ssc>) with Stanford's HelpSU system. Alumni, staff, or the general public may also file a help ticket (<https://remedyweb.stanford.edu/helpsu/helpsu?pcat=ssc>) to request the Registrar's Office assistance or to ask for information.

Additional information on Stanford University can be obtained through Stanford's (<http://exploreddegrees.stanford.edu/http://www.stanford.edu>) web site.

Telephone number for all University departments: Area code: (650) 723-2300.

## Stanford's Mission

The Stanford University Founding Grant (<https://wasc.stanford.edu/files/FoundingGrant.pdf>) (pdf), dated November 11, 1885, outlines the founding principles of the University. The Founding Grant describes the "Nature, Object, and Purposes of the Institution" founded by Leland Stanford and Jane Lathrop Stanford in these terms:

Its nature, that of a university with such seminaries of learning as shall make it of the highest grade, including mechanical institutes, museums, galleries of art, laboratories, and conservatories, together with all things necessary for the study of agriculture in all its branches, and for mechanical training, and the studies and exercises directed to the cultivation and enlargement of the mind;

Its object, to qualify its students for personal success, and direct usefulness in life;

And its purposes, to promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty, and the pursuit of happiness.

Each of Stanford's seven schools has its own mission statement and those can be found by following the links below:

- School of Earth Sciences Mission Statement (<http://pangea.stanford.edu/about>)
- Graduate School of Business Mission Statement (<http://www.gsb.stanford.edu/about/mission.html>)
- School of Humanities and Sciences Mission Statement (<http://www.stanford.edu/dept/humsci/external/about>)
- School of Engineering Mission Statement (<http://soe.stanford.edu/about>)
- School of Medicine Mission Statement ([http://medstrategicplan.stanford.edu/fullreport/mission\\_goals.html](http://medstrategicplan.stanford.edu/fullreport/mission_goals.html))
- School of Education Mission Statement (<http://ed.stanford.edu/suse/aboutsuse/mission.html>)
- Stanford Law School Mission Statement (<http://www.law.stanford.edu/school>)

## A Brief History of Stanford

On October 1, 1891, more than 400 enthusiastic young men and women were on hand for opening day ceremonies at Leland Stanford Junior University. They came from all over: many from California, some who followed professors hired from other colleges and universities, and some simply seeking adventure in the West. They came to seize a special opportunity, to be part of the pioneer class in a brand new university. They stayed to help turn an ambitious dream into a thriving reality. As a pioneer faculty member recalled, "Hope was in every heart, and the presiding spirit of freedom prompted us to dare greatly."

For Leland and Jane Stanford on that day, the University was the realization of a dream and a fitting tribute to the memory of their only son, who died of

typhoid fever weeks before his 16th birthday, at an age when many young men and women were planning their college education.

From the beginning, it was clear that Stanford would be different. It was coeducational at a time when single-sex colleges were the norm. It was non-sectarian when most private colleges were still affiliated with a church. And it offered a broad, flexible program of study while most schools insisted on a rigid curriculum of classical studies. Though there were many difficulties during the first months (housing was inadequate, microscopes and books were late in arriving from the East), the first year foretold greatness. As Jane Stanford wrote in the summer of 1892, "Even our fondest hopes have been realized."

What manner of people were this man and this woman who had the intelligence, the means, the faith, and the daring to plan a major university in Pacific soil, far from the nation's center of culture?

## Leland and Jane Stanford

Although he was trained as a lawyer, Leland Stanford came to California in 1852 to join his five brothers in their mercantile business in the gold fields; Jane Stanford followed in 1855. They established large-scale operations in Sacramento, where Mr. Stanford became a leading figure in California business and politics. One of the "Big Four" who built the western link of the first transcontinental railroad, he was elected Governor of California and later United States Senator. One of the founders of the Republican Party in California, he was an ardent follower of Abraham Lincoln and is credited with keeping California in the Union during the Civil War.

## The Case for a Liberal Education

Despite the enormous success they achieved in their lives, Governor and Mrs. Stanford had come from families of modest means and rose to prominence and wealth through a life of hard work. So it was natural that their first thoughts were to establish an institution where young men and women could "grapple successfully with the practicalities of life." As their thoughts matured, however, these ideas of "practical education" enlarged to the concept of producing cultured and useful citizens who were well prepared for professional success. In a statement of the case for liberal education that was remarkable for its time, Leland Stanford wrote, "I attach great importance to general literature for the enlargement of the mind and for giving business capacity. I think I have noticed that technically educated boys do not make the most successful businessmen. The imagination needs to be cultivated and developed to assure success in life. A man will never construct anything he cannot conceive."

## Stanford Lands and Architecture

The campus occupies what was once Leland Stanford's Palo Alto Stock Farm and the favorite residence of the Stanford family. The Stanfords purchased an existing estate in 1876 and later acquired much of the land in the local watershed for their stock farm, orchards, and vineyards.

The name of the farm came from the tree El Palo Alto, a coast redwood (*Sequoia sempervirens*), that still stands near the northwest corner of the property on the edge of San Francisquito Creek. Many years ago, one of the winter floods that periodically rushed down the arroyo tore off one of its twin trunks, but half of the venerable old tree lives on, a gaunt and time-scarred monument. Named in 1769 by Spanish explorers, El Palo Alto has been the University's symbol and the centerpiece of its official seal.

The Stanfords gave their farm to the University in the Founding Grant of 1885. They personally financed the entire cost of the construction and operation of the University until 1903, when surviving founder Jane Stanford, who performed heroically in keeping the University functioning



during difficult times following Leland Senior's death in 1893, turned over control to the Board of Trustees. The founding gift has been estimated at \$25 million, not including the land and buildings.

The general concept for the University grounds and buildings was conceived by Frederick Law Olmsted, the designer of Central Park in New York. A brilliant young Boston architect, Charles Allerton Coolidge, further developed the concept in the style of his late mentor, Henry Hobson Richardson. The style, called Richardsonian Romanesque, is a blend of Romanesque and Mission Revival architecture. It is characterized by rectilinear sandstone buildings joined by covered arcades formed of successive half-circle arches, the latter supported by short columns with decorated capitals.

More than one hundred years later, the University still enjoys 8,180 acres (almost 13 square miles) of grassy fields, eucalyptus groves, and rolling hills that were the Stanfords' generous legacy, as well as the Quadrangle of "long corridors with their stately pillars" at the center of campus. It is still true, as the philosopher William James said, during his stint as a visiting professor, that the climate is "so friendly . . . that every morning wakes one fresh for new amounts of work."

## Current Perspectives

In other ways, the University has changed tremendously on its way to recognition as one of the world's great universities. At the hub of a vital and diverse Bay Area, Stanford is less than an hour's drive or Caltrain trip south of San Francisco and just a few miles north of Silicon Valley, an area dotted with computer and high technology firms largely spawned by the University's faculty and graduates. On campus, students and faculty enjoy new libraries, modern laboratories, sports facilities, and comfortable residences. Contemporary sculpture, as well as pieces from the Iris and B. Gerald Cantor Center for Visual Arts (<http://museum.stanford.edu>) at Stanford University's extensive collection of sculpture by Auguste Rodin, can be found throughout the campus, providing unexpected pleasures at many turns.

The Cantor Center opened in January 1999. The center includes the historic Leland Stanford Junior Museum building, the Rodin Sculpture Garden and a new wing with spacious galleries, auditorium, cafe, and bookshop. At the Stanford University Medical Center (<http://stanfordmedicine.org>), world-renowned for its research, teaching, and patient care, scientists and physicians are searching for answers to fundamental questions about health and disease. Ninety miles down the coast, at Stanford's Hopkins Marine Station (<http://exploreddegrees.stanford.edu/stanfordsmission/http://hopkins.stanford.edu>) on the Monterey Bay, scientists are working to better understand the mechanisms of evolution and ecological systems.

The University is organized into seven schools: Earth Sciences, Education, Engineering, the Graduate School of Business, Humanities and Sciences, Law, and Medicine. In addition, there are more than 30 interdisciplinary centers, programs, and research laboratories including: the Hoover Institution on War, Revolution and Peace (<http://www.hoover.org>); the Freeman Spogli Institute for International Studies (<http://fsi.stanford.edu>); the Woods Institute for the Environment (<http://woods.stanford.edu>); the SLAC National Accelerator Laboratory (<http://www.slac.stanford.edu>); and the Stanford Program for Bioengineering, Biomedicine, and Biosciences (Bio-X) (<http://biox.stanford.edu>), where faculty from many fields bring different perspectives to bear on issues and problems. Stanford's Bing Overseas Studies Program (<http://bosp.stanford.edu>) offers undergraduates in all fields remarkable opportunities for study abroad, with campuses in Australia, Barcelona, Beijing, Berlin, Cape Town, Florence, Kyoto, Madrid, Moscow, Oxford, Paris, and Santiago.

## Stanford People

By any measure, Stanford's faculty, which numbers approximately 1,900, is one of the most distinguished in the world. It includes 16 living Nobel laureates, 4 Pulitzer Prize winners, 19 National Medal of Science winners,

135 members of the National Academy of Sciences, 251 members of the American Academy of Arts and Sciences, 88 members of the National Academy of Engineering, and 30 members of the National Academy of Education. Yet beyond their array of honors, what truly distinguishes Stanford faculty is their commitment to sharing knowledge with their students. The great majority of professors teach undergraduates both in introductory lecture classes and in small freshman, sophomore, and advanced seminars.

Enrollment in Autumn Quarter 2011 totaled 15,723, of whom 6,972 were undergraduates and 9,159 were graduate students. Like the faculty, the Stanford student body is distinguished. Approximately 17 people apply to Stanford for every student who enters the freshman class. 89 Stanford students have been named Rhodes Scholars and 76 have been named Marshall Scholars. The six-year graduation rate for freshmen who entered Stanford University full-time in 2004 was 94.7 percent. Stanford awarded 4,869 degrees in 2010-11, of which 1,670 were baccalaureate and 3,199 were advanced degrees.

Stanford students also shine in an array of activities outside the classroom, from student government to music, theater, and journalism. Through the Haas Center for Public Service, students participate in dozens of community service activities, such as tutoring programs for children in nearby East Palo Alto, the Hunger Project, and the Arbor Free Clinic.

In the athletic arena, Stanford students have enjoyed tremendous success as well. Stanford fields teams in 35 Division I varsity sports. Of Stanford's 103 NCAA Championships and 119 national championships overall, 85 have been captured since 1980, placing Stanford at the top among the nation's most title-winning schools during that time. In 2011-12, Stanford won national championships in women's water polo and women's water polo. In 1999-2000, Stanford became the first school in Pac-10 history to win conference championships in football, men's basketball, and baseball in the same year. Athletic success has reached beyond The Farm, as well, with 41 athletes in more than 15 sports with Cardinal ties bringing home 16 medals, 12 of them gold, the fourth-best gold medal haul for Stanford representatives at any Olympics. Intramural and club sports are also popular; over 1,000 students take part in the club sports program, while participation in the intramural program has reached 9,000 with many active in more than one sport.

Stanford graduates can be found in an extraordinary variety of places: in space (Sally Ride, '73, Ph.D. '78, was the first American woman in space); on the news (Ted Koppel, M.A. '62, created the successful program *Nightline*); Broadway (David Henry Hwang, '79, received a Tony Award for his celebrated work, *M. Butterfly*); in San Francisco live theater (Carey Perloff, '80, artistic director of the American Conservatory Theater); at the helm of major corporations (Scott McNealy, '80, founded Sun Microsystems, Sergey Brin, M.S. '95, and Larry Page, M.S. '98, founded Google, and Chih-yuan (Jerry) Yang, '94, and David Filo, '90, founded Yahoo); and on the U.S. Supreme Court (two Stanford graduates, Anthony Kennedy, '58, and Stephen Breyer, '59, currently sit on the high court; Sandra Day O'Connor, '50, J.D. '52, recently retired from the high court, and William Rehnquist, '48, J.D. '52, served until his death in 2005).

## Looking Ahead

In her address to the Board of Trustees in July 1904, Jane Stanford said, "Let us not be afraid to outgrow old thoughts and ways, and dare to think on new lines as to the future of the work under our care." Her thoughts echo in the words of Stanford President John Hennessy, who said in his message in the 2002 Annual Report, "Our bold entrepreneurial spirit has its roots in the founders and our location in the pioneering West. In 1904, Jane Stanford defined the challenge for the young University ... Each generation at Stanford has taken this to heart and boldly launched new efforts, from the classroom to the laboratory ... We will continue to innovate and invest in the future ... The pioneering spirit that led the founders and early leaders to 'dare to think on new lines' continues to guide us."

# University Governance and Organization

Web Site: <http://www.stanford.edu/about/administration/>

Stanford University is a trust with corporate powers under the laws of the State of California. The University is a tax-exempt entity under section 501(c)3 of the Internal Revenue Code. Under the provisions of the Founding Grant, the Board of Trustees (with a maximum membership of 35) is custodian of the endowment and all the properties of Stanford University. The board administers the invested funds, sets the annual budget and determines policies for operation and control of the university. Among the powers given to the trustees by the Founding Grant is the power to appoint a president. The board delegates broad authority to the president to operate the university and to the faculty on certain academic matters. The formal legal name is "The Board of Trustees of the Leland Stanford Junior University."

## Accreditation

Stanford University is accredited by the Accrediting Commission of Senior Colleges and Universities of the Western Association of Schools and Colleges (<http://www.wascenior.org/wasc>).

## Executive Officers

### Stanford Administration

- John Hennessy, President
- John Etchemendy, Provost
- David Demarest, Vice President for Public Affairs
- David A. Jones, Vice President for Human Resources
- Randall S. Livingston, Vice President for Business Affairs and Chief Financial Officer
- William J. Madia, Vice President, SLAC National Accelerator Laboratory
- Robert Reidy, Vice President for Land, Buildings and Real Estate
- Martin Shell, Vice President for Development
- Howard Wolf, Vice President for Alumni Affairs and President, Stanford Alumni Association
- Debra Zumwalt, Vice President and General Counsel

### Cabinet

- Ann Arvin, Vice Provost and Dean of Research
- Harry Elam, Vice Provost for Undergraduate Education
- Persis Drell, Director, SLAC National Accelerator Laboratory
- Patricia Gumpert, Vice Provost for Graduate Education
- Mary Elizabeth "Liz" Magill, Dean, School of Law
- Pamela Matson, Dean, School of Earth Sciences
- Philip Pizzo, Dean, School of Medicine
- James Plummer, Dean, School of Engineering
- John Raisian, Director, Hoover Institution on War, Revolution and Peace
- Richard Saller, Dean, School of Humanities and Sciences

- Garth Saloner, Dean, Graduate School of Business
- Claude Steele, Dean, School of Education

## The Board of Trustees

### Powers and Duties

The Board of Trustees is custodian of the endowment and all properties of the University. The Board administers the invested funds, sets the annual budget, and determines policies for the operation and control of the University. The powers and duties of the Board of Trustees derive from the Founding Grant, amendments, legislation, and court decrees. In addition, the Board operates under its own bylaws and a series of resolutions on major policy.

### Membership

Board membership is set at 35, including the President of the University who serves ex officio and with vote. Trustees serve a five-year term and are eligible for appointment to one additional five-year term. At the conclusion of that term, a Trustee is not eligible for reelection until after a lapse of one year. Eight of the Trustees are elected or appointed in accordance with the Rules Governing the Election or Appointment of Alumni Nominated Trustees. They serve a five-year term.

### Officers of the Board

The officers of the board are a chair, one or more vice chairs, a secretary, and an associate secretary. Officers are elected to one-year terms at the annual meeting in June, with the exception of the chair, who serves a two-year term. Their terms of office begin July 1.

### Committees

Standing committees of the Board are Academic Policy, Planning, and Management; Alumni and External Affairs; Audit and Compliance; Development; Finance; Land and Buildings; the Medical Center; and Trusteeship. Special committees include Athletics, Compensation, Investment Responsibility, and Litigation.

### Meetings

The Board generally meets five times each year.

### Members of the Board of Trustees as of October 1, 2012

- William R. Brody, President, Salk Institute for Biological Studies, La Jolla, CA
- Brook H. Byers, Partner, Kleiner Perkins Caufield & Byers, Menlo Park, CA
- James E. Canales, President and CEO, The James Irvine Foundation, San Francisco, CA
- RoAnn Costin, President, Wilderness Point Investments, Boston, MA
- James G. Coulter, Founding Partner, TPG Capital, LP, San Francisco, CA
- Deborah A. DeCotis, Private Investor, D Squared Holdings LLC, New York, NY
- Steven A. Denning, Chairman, General Atlantic LLC, Greenwich, CT
- Bruce W. Dunlevie, General Partner, Benchmark Capital, Menlo Park, CA
- Armando Garza, Chairman, Alfa, Garza Garcia, NL, MX
- John A. Gunn, Chairman Emeritus and Director, Dodge and Cox, San Francisco, CA

- Christine U. Hazy, Co-Founder and Managing Director, Sketch Foundation, Los Angeles, CA
- John L. Hennessy, President, Stanford University, Stanford, CA
- Laurene Powell Jobs, Founder/Chair, Emerson Collective, Palo Alto, CA
- Ronald B. Johnson, CEO, J.C. Penney, Plano, TX
- Ann H. Lamont, Managing Partner, Oak Investment Partners, Greenwich, CT
- Frank D. Lee, CEO, Dragonfly Sciences, Inc., Wellesley, MA
- Goodwin Liu, Associate Justice, California State Supreme Court, San Francisco, CA
- Susan R. McCaw, President, COM Investments, Santa Barbara, CA
- Hamid R. Moghadam, Chairman & Co-CEO, Prologis, Inc., San Francisco, CA
- Wendy Munger, South Pasadena, CA
- Paul A. Ormond, Chairman, President, CEO, HCR ManorCare, Inc., Toledo, OH
- Ruth M. Porat, Executive Vice President & Chief Financial Officer, Morgan Stanley, New York, NY
- Penny S. Pritzker, Chairman, Artemis Real Estate Partners, Chicago, IL
- Jeffrey S. Raikes, CEO, The Bill and Melinda Gates Foundation, Seattle, WA
- Miriam Rivera, Managing Partner, Ulu Ventures, Palo Alto, CA
- Victoria B. Rogers, President, Rose Hills Foundation, Los Angeles, CA
- Richard A. Sapp, Rancho Santa Fe, CA
- Kavitarik Ram Shriram, Founder, Sherpalo Ventures, Menlo Park, CA
- Ronald P. Spogli, Founding Partner, Freeman Spogli & Co., Los Angeles, CA
- Isaac Stein, President, Waverley Associates, Atherton, CA
- Thomas F. Steyer, Senior Managing Member, Farallon Capital Management, LLC, San Francisco, CA
- Vaughn C. Williams, Of Counsel, Skadden Arps Slate Meagher & Flom, New York, NY
- Jerry Yang, Comprehensive Financial Management, Los Gatos, CA

## The President

The Founding Grant prescribes that the Board of Trustees shall appoint the President of the University and that the Board shall give to the President the following powers:

- To prescribe the duties of the professors and teachers.
- To prescribe and enforce the course of study and the mode and manner of teaching.
- Such other powers as will enable the President to control the educational part of the University to such an extent that the President may justly be held responsible for the course of study therein and for the good conduct and capacity of the professors and teachers.

The President is also responsible for the management of financial and business affairs of the University, including operation of the physical plant.

The President is responsible for the safety of the campus and may take reasonable steps to protect the University including, but not limited to, barring people from campus who disrupt the normal business operations of the University or who present a threat to the safety of the University community. In extraordinary circumstances, the President may permanently discontinue students who present a threat to the health and safety of the University community.

The President appoints the following, subject to confirmation by the Board: Provost, Vice President for Business Affairs and Chief Financial

Officer, Chief Executive Officer of Stanford Management Company, Vice President for Alumni Affairs and President of Stanford Alumni Association, Vice President for Development, Vice President for Public Affairs, Vice President and General Counsel, Vice President for the SLAC National Accelerator Laboratory, and Vice President for Land, Buildings, and Real Estate.

For additional information, see the Office of the President web (<http://www.stanford.edu/dept/president>) site.

## Committees and Panels Appointed by the President

University Committees are appointed by and are primarily responsible to the President. Such committees deal with matters on which the responsibility for recommendation or action is clearly diffused among different constituencies of the University. In accordance with the Report on the Committee Structure of the University, Academic Council members are appointed to University Committees on nomination of the Senate Committee on Committees and student members on nomination of the Associated Students of Stanford University (ASSU) Committee on Nominations. The President takes the initiative in the appointment of staff members to such committees. Although immediately responsible to the President, University Committees may be called upon to report to the Senate of the Academic Council or the ASSU. Charges to such committees are set by the President on recommendation of the Committee on Committees and others. There are five University Committees, as follows:

- Advisory Panel on Investment Responsibility and Licensing (APIR-L)
- Committee on Athletics, Physical Education, and Recreation (C-APER)
- Committee on Environmental Health and Safety (C-EH&S)
- Committee on Faculty Staff Human Resources (C-FSHR)
- Panel on Outdoor Art (P-OA)

Additionally there are eleven standing administrative panels which are appointed by the Vice Provost and Dean of Research, and which report through him/her to the President:

- Administrative Panel on Biosafety
- Administrative Panel on Human Subjects in Medical Research-01
- Administrative Panel on Human Subjects in Medical Research-03
- Administrative Panel on Human Subjects in Medical Research-04
- Administrative Panel on Human Subjects in Medical Research-05
- Administrative Panel on Human Subjects in Medical Research-06
- Administrative Panel on Human Subjects in Medical Research-07
- Administrative Panel on Human Subjects in Medical Research-08
- Administrative Panel on Human Subjects in Non-Medical Research-02
- Administrative Panel on Laboratory Animal Care
- Administrative Panel on Radiological Safety

## The Provost

The Provost, as the chief academic and budget officer, administers the academic program (instruction and research in schools and other academic units) and University services in support of the academic program (including budgeting and planning, land and buildings, libraries and information resources, and student affairs). In the absence or inability of the President to act, the Provost becomes the Acting President of the University. The Provost shares with the President conduct of the University's relations with other educational institutions, groups, and associations.

# Schools of the University

The program of instruction in the University is organized into seven schools:

- Graduate School of Business
- School of Earth Sciences
- School of Education
- School of Engineering
- School of Humanities and Sciences
- Stanford Law School
- School of Medicine

The deans of the schools report to the Provost.

## The Academic Council

Stanford Academic Council (<http://academiccouncil.stanford.edu>) web site.

According to the Articles of Organization of the Faculty, originally adopted by the Board of Trustees in 1904 and revised in 1977, the powers and authority of the faculty are vested in the Academic Council consisting of:

1. the President of the University
2. tenure-line faculty: Assistant, Associate, and Full Professor
3. nontenure-line faculty: Associate and Full Professor followed by the parenthetical notation (Teaching), (Performance), (Applied Research), or (Clinical)
4. nontenure-line research faculty: Assistant Professor (Research), Associate Professor (Research), Professor (Research)
5. Senior Fellows in specified policy centers and institutes
6. certain specified officers of academic administration.

In the Spring of 1968, the Academic Council approved the charter for a Senate to be composed of 55 representatives elected by the Hare System of Proportional Representation and, as ex officio nonvoting members, deans of the academic schools and certain major officers of academic administration.

In the allocation of representation, each school constitutes a major constituency. The Senate may create from time to time other major constituencies as conditions warrant. Approximately one-half of the representatives are allocated to constituencies on the basis of the number of students in those constituencies and the remainder on the basis of the number of members of the Academic Council from each constituency.

## Committees of the Academic Council

Committees of the Academic Council are created by and responsible to the Senate of the Academic Council and are appointed by the Committee on Committees of the Senate. Such committees deal with academic policy matters on which the primary responsibility for action and decision lies with the Academic Council or, by delegation, the Senate. Pursuant to the Senate's acceptance on September 25, 1969 of the Report from the Committee on Committees on the Committee Structure of the University and subsequent Senate action, the Senate has established seven standing Committees of the Academic Council, as follows:

- Committee on Academic Computing and Information Systems (C-ACIS)
- Committee on Graduate Studies (C-GS)
- Committee on Libraries (C-Lib)
- Committee on Research (C-Res)
- Committee on Review of Undergraduate Majors (C-RUM)

- Committee on Undergraduate Admissions and Financial Aid (C-UAFA)
- Committee on Undergraduate Standards and Policy (C-USP)

The Senate has also created a Planning and Policy Board of the Senate to consider long-range strategic issues of concern to the faculty. Information regarding charges to these committees is available from the Office of the Academic Secretary to the University.

## Associated Students of Stanford University (ASSU)

Web Site: <http://assu.stanford.edu>

All registered undergraduates and graduate students are members of the ASSU. They are governed by the ASSU Constitution and Bylaws, which was last revised and approved by student vote in April 2007.

### Executive

The President and Vice President serve as the chief executives and representatives for the Association. The Financial Manager acts as business manager of the ASSU, CEO of Stanford Student Enterprises (SSE), and controller of the Students' Organizations Fund in which ASSU and student organization funds are deposited.

### Legislative

There are two legislative bodies, an Undergraduate Senate and a Graduate Student Council, that work together to determine the Association's budgetary, financial, investment, business, and operating policies. In addition, each entity provides funding for student organizations, participates in recommending student appointments to University Committees and advocates on behalf of its constituents. Each body has 15 elected representatives and an elected chair. Both meet regularly to conduct Association business and discuss and act on issues pertinent to student life at Stanford.

# University Requirements

## Nondiscrimination Policy

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities; Stanford also prohibits unlawful harassment including sexual harassment and sexual violence. The following person has been designated to handle inquiries regarding this nondiscrimination policy including under Title IX: Rosa Gonzalez, Director of the Diversity and Access Office and Title IX Coordinator, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email).

## Admission and Financial Aid

### Nondiscrimination Policy

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities; Stanford also prohibits unlawful harassment including sexual harassment and sexual violence. The following person has been designated to handle inquiries regarding this nondiscrimination policy including under Title IX: Rosa Gonzalez, Director of the Diversity and Access Office and Title IX Coordinator, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email).

### Visas

In order to register as students, Stanford University requires that all those who are not U.S. citizens or U.S. registered permanent residents must obtain and maintain an appropriate visa status for their stay in the United States. The types of student visas sponsored by Stanford include the following:

1. Student Visa (F-1), obtained with an I-20 Certificate of Eligibility issued by Stanford University. The graduate student on an F-1 visa must enroll in a full course of study. The accompanying spouse or child enters on an F-2 visa. F-2 visa holders may not hold employment or engage in business under any circumstances. The F-2 spouse of an F-1 student may not engage in full-time study, and the F-2 child may only engage if the study is in an elementary

or secondary school (kindergarten through twelfth grade). The F-2 spouse and child may engage in study that is avocational or recreational in nature.

2. Exchange Visitor Visa (J-1), obtained with a DS-2019 Certificate of Eligibility issued by Stanford University or a sponsoring agency. This visa is required for graduate students sponsored by certain agencies, foundations, and governments. In some cases, exchange visitors must leave the United States at the conclusion of their programs, may not change to non-student visa status, and may not apply for permanent residency in the United States until they have returned to their home countries for at least two years. The accompanying spouse or child of an exchange visitor enters on a J-2 visa and may, in some cases, obtain permission to work. J-2 dependents can apply for an Employment Authorization document from U.S. Citizenship and Immigration Services in order to be employed in the U.S. There is no regulatory restriction on study for J-2 dependents.

The Certificate of Eligibility (I-20/DS-2019) is issued to an admitted student after receipt of certification of adequate financial support. An F-1 student transferring from another U.S. school must obtain a new I-20 document from Stanford and complete a transfer process at the Bechtel International Center no later than 15 days after the effective date of the transfer. A J-1 student transferring from another U.S. school must obtain a new DS-2019 document from Stanford and complete a transfer process at the Bechtel International Center no later than 30 days after the effective date of the transfer.

## Holds and Rescission

By applying for admission to Stanford University academic programs, applicants certify that the information they provide in their applications is their own work and, to the best of their knowledge, is complete and accurate. As also noted in the application materials, Stanford reserves the right to withdraw an offer of admission under certain circumstances, including:

1. if there is a significant drop in academic performance, a failure to graduate (in the applicant's current program), or a failure to satisfy a prerequisite or condition of admission;
2. if there has been a misrepresentation in or a violation of any of the terms of the application process; or
3. if the University learns that an applicant has engaged in behavior prior to the first day of class that indicates a serious lack of judgment or integrity. Indeed (and for example), Stanford may rescind an applicant's admission at any time, including after attendance and after degree conferral, if it determines, for example, that an individual has been admitted to Stanford on the basis of having provided false information or has withheld requested information. The University further reserves the right to require applicants to provide additional information and/or authorization for the release of information about any such matter, and to place a hold on registration and/or the conferral of a degree during the investigation into any such matter.

Similarly, Stanford University awards degrees on the basis of successful completion of all program requirements in accordance with Stanford's Honor Code requiring academic honesty and integrity. The University reserves the right to rescind any degree or honors designation (even after conferral) if the program requirements have not been so completed, and to place a hold on issuing a degree during the investigation into any such matter.

Students with unmet financial (or other University) obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released; as a condition of attending Stanford, students accept this provision.

## Undergraduate Admission

Stanford's undergraduate community is drawn from throughout the United States and the world. It includes students whose abilities, intellectual interests, and personal qualities allow them to benefit from and contribute to the University's wide range of teaching and research programs in the humanities, natural sciences, social sciences, and engineering. The University admits students who derive pleasure from learning for its own sake; who exhibit energy, creativity, and curiosity; and who have distinguished themselves in and out of the classroom.

Stanford welcomes a diverse community that cuts across many dimensions. The University does not use quotas of any kind in its admission process: it does not favor particular schools or types of schools, nor any geographic region, nor does it have any racial, religious, ethnic, or gender-related quotas. The University believes that a student body that is both highly qualified and diverse in terms of culture, socioeconomic status, race, ethnicity, gender, work and life experiences, skills, and interests is essential to the educational process. Applications are encouraged from those who would take the initiative and responsibility for their own education and who would provide additional dimensions to the University and its programs.

In order to preserve the residential character of the University and to maintain a favorable student-faculty ratio, Stanford has a limited undergraduate enrollment. The anticipated size of the freshman class is approximately 1,600-1,700 students who are admitted for Autumn Quarter enrollment. Approximately 20-40 transfer students, entering either the sophomore or junior class, are also typically admitted for Autumn enrollment if space allows. Each year, the University receives many more applications from qualified students than there are places available.

Stanford is committed to meeting the University-computed financial need of each admitted student, and admission decisions are made without regard to the applicant's financial status, except in the case of international students who are neither U.S. citizens nor U.S. registered permanent residents.

Application procedures, requirements, and deadlines vary from year to year. See the Undergraduate Admission (<http://exploreddegrees.stanford.edu/admissionandfinancialaid/http://admission.stanford.edu>) web site for the most recent information and to begin an application online; or call the Office of Undergraduate Admission at (650) 723-2091.

## Nonmatriculated Study (Undergraduate)

Permission to enroll at Stanford as a nonmatriculated student during Autumn, Winter, and Spring quarters is not routinely approved except under extenuating circumstances. Nonmatriculated students authorized to enroll at Stanford University are not admitted to any Stanford degree program and are permitted to register for a specific period, usually one, two, or three quarters. Financial assistance from Stanford University is not available. Permission to enroll as a nonmatriculated student does not imply subsequent admission as a matriculated student.

Nonmatriculated status is a privilege and not a right. The University reserves the right, at its discretion, to withhold registration from, or require withdrawal for the program by, any student or applicant. In addition, nonmatriculated status may be revoked at the University's discretion (and after consideration of such factors as the University considers relevant in the particular case) at the end of any quarter of enrollment.

Students interested in nonmatriculated status during the Autumn, Winter, and Spring quarters should contact the Office of the University Registrar, not the Office of Undergraduate Admission. Note: newly admitted Stanford students (that is, those admitted to a Stanford degree program) are not eligible to enroll for nonmatriculated study for any quarter, except with the permission of the Vice Provost for Undergraduate Education (or his or her designee) under extenuating circumstances.

## High School Nonmatriculated Students

Local high school students are eligible to be considered to attend Stanford as nonmatriculated students on a limited basis when they have exhausted all of the courses in a given discipline offered by their high school.

Nonmatriculated high school students are permitted to enroll in one course per quarter and are required to pay the applicable tuition. Permission from the academic department and the University Registrar is required.

## Summer Session

Students wishing to enroll as nonmatriculated students during Summer Quarter should contact the

Summer Session Office (<http://summer.stanford.edu>) for more information about the Summer Visitor Program (<http://summer.stanford.edu/programs/overview.asp>). Admission to the Summer Visitor Program does not imply regular admission to Stanford for subsequent quarters or to one of Stanford's regular degree programs.

## Graduate Admission

### Matriculated Study (Graduate Students)

Applicants from colleges and universities of recognized standing who hold a U.S. bachelor's degree or its equivalent are eligible to be considered for admission for graduate study. Details regarding degrees offered in specific departments are given on the Graduate Admissions (<http://exploreddegrees.stanford.edu/admissionandfinancialaid/http://gradadmissions.stanford.edu>) web site. The number of applicants who can be admitted for work in a particular field of study at any time is limited by the facilities and programs of the school or department and by the number of matriculated students who continue their work in that field.

As with its undergraduate program, Stanford believes that a graduate student body that is both highly qualified and diverse in terms of culture, socioeconomic status, race, ethnicity, gender, work and life experience, skills, and interests is essential to the graduate educational process. It particularly welcomes applications from African Americans, Latinos, and Native Americans, as well as from others whose backgrounds and experiences would add additional dimensions to the University's educational programs.

### Honors Cooperative Program

The Honors Cooperative Program (HCP) is a part-time graduate program offered by Stanford University. It allows working professionals, who may be eligible for tuition support through their employer, an opportunity to earn a graduate degree in any of the engineering programs, applied physics, statistics, or biomedical informatics, on a part-time basis.

Prospective HCP students apply to the department in which they would like to pursue a graduate degree through the normal graduate admissions process, and compete with all other applicants for admission to the program. Once admitted, HCP students arrange their part-time status and tuition payment options through the Stanford Center for Professional Development (SCPD). Courses are delivered online and broadcast locally. HCP students are also welcome to attend classes on campus, and some on-campus attendance may be required depending on the degree track.

To participate, HCP students must have the support of their employer as a participating company of the Stanford Center for Professional Development. For more information, see <http://scpd.stanford.edu>, or phone (650) 725-3000.

## The Coterminal Degree Program

This program permits matriculated Stanford undergraduates to study for bachelor's and master's degrees simultaneously in the same or different departments. Application policies and procedures are established by each master's department. Applicants must have earned a minimum of 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. This includes allowable Advanced Placement (AP) and transfer credit. Applicants must submit their application no later than the quarter prior to the expected completion of their undergraduate degree. This is normally the Winter Quarter prior to Spring Quarter graduation. Interested Stanford undergraduates should contact directly the department in which they wish to pursue a master's degree and must adhere to the application deadlines. Students who decide to apply for admission to master's programs after these deadlines are not eligible for the coterminal program and must apply through the regular graduate admission process. For more information, see the Coterminal Degrees (<https://exploreddegrees-nextyear.stanford.edu/cotermddegrees>) section of this bulletin.

## Application Process

Specific information regarding test requirements, other application procedures and requirements, and closing dates for filing applications and supporting credentials for admission and financial aid are listed on the Graduate Admissions (<http://exploreddegrees.stanford.edu/admissionandfinancialaid/http://gradadmissions.stanford.edu>) web site.

Graduate fellowship funds and assistantships are generally committed in March for the entire period comprising Autumn, Winter, and Spring quarters of the next academic year. Awards are seldom made to students who enter the University in Winter, Spring, and Summer quarters; such applicants must meet the same financial aid application requirements as those entering in Autumn Quarter.

Applications are to be submitted electronically for graduate programs in the schools of Business, Earth Sciences, Education, Engineering, Humanities and Sciences, and the Biosciences (non-M.D. programs in Medicine). Application instructions may be found at the Graduate Admissions (<http://exploreddegrees.stanford.edu/admissionandfinancialaid/http://gradadmissions.stanford.edu>) web site.

For admission to the following programs, apply directly via the web sites below.

## Business

Admission information is available for the M.B.A., Sloan Master's Program, and Ph.D. programs at the Stanford Admissions (<http://www.gsb.stanford.edu/admissions>) web site. All applications must be submitted electronically.

## Law

Applicants for the JD degree should see the Law School Admissions ([http://www.law.stanford.edu/program/degrees/jd/jd\\_application](http://www.law.stanford.edu/program/degrees/jd/jd_application)) web site. Applicants for LL.M., J.S.M., J.S.D., and M.L.S. degrees can find instructions at the Advanced Degree Programs (<http://www.law.stanford.edu/program/degrees/advanced/application>) web site. These applications are submitted to the Director of Admissions, School of Law, Stanford University, Stanford, CA 94305-8610. The Law School Admissions Test is required.

## M.D. Program

Applicants should see the M.D. admissions (<http://med.stanford.edu/md/admissions>) web site or, for additional information about the M.D. program, write to Stanford University School of Medicine, Office of M.D. Admissions, 251 Campus Drive, MSOB X3C01, Stanford, CA 94305-5404. The American Medical College Application Service (AMCAS) application is available at the AMCAS (<http://exploreddegrees.stanford.edu/admissionandfinancialaid/http://aamc.org>) web site. Applications and

transcripts must be received by AMCAS by October 15. The Medical College Admissions Test is required.

## Holds and Rescission

By applying for admission to Stanford University academic programs, applicants certify that the information they provide in their applications is their own work and, to the best of their knowledge, is complete and accurate. As also noted in the application materials, Stanford reserves the right to withdraw an offer of admission under certain circumstances, including:

1. if there is a significant drop in academic performance, a failure to graduate (in the applicant's current program), or a failure to satisfy a prerequisite or condition of admission;
2. if there has been a misrepresentation in or a violation of any of the terms of the application process; or
3. if the University learns that an applicant has engaged in behavior prior to the first day of class that indicates a serious lack of judgment or integrity. Indeed (and for example), Stanford may rescind an applicant's admission at any time, including after attendance and after degree conferral, if it determines, for example, that an individual has been admitted to Stanford on the basis of having provided false information or has withheld requested information. The University further reserves the right to require applicants to provide additional information and/or authorization for the release of information about any such matter, and to place a hold on registration and/or the conferral of a degree during the investigation into any such matter.

Similarly, Stanford University awards degrees on the basis of successful completion of all program requirements in accordance with Stanford's Honor Code requiring academic honesty and integrity. The University reserves the right to rescind any degree or honors designation (even after conferral) if the program requirements have not been so completed, and to place a hold on issuing a degree during the investigation into any such matter.

Students with unmet financial (or other University) obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released; as a condition of attending Stanford, students accept this provision.

## Nonmatriculated Study (Graduate Students)

Eligibility for consideration for nonmatriculated enrollment is restricted to two groups of applicants:

1. Stanford alumni who wish to return to Stanford to take courses that are prerequisites for Medical School admission, such as undergraduate Biology or Chemistry courses, are eligible to apply for nonmatriculated status. An application form, application fee, statement of purpose, and three letters of recommendation are required. The decision to admit or deny is made by the Director of Graduate Admissions on the basis of relevant factors, including a 3.0 GPA and positive letters of recommendation.
  - A. Applicants who graduated from other universities are not eligible to take the prerequisites for Medical School at Stanford.
2. Individuals who hold a bachelor's degree or equivalent and wish to take courses in a specific department that allows non-degree students are eligible to apply for nonmatriculated status. An application form, application fee, statement of purpose, original transcripts, and three letters of recommendation are required. The decision to admit or deny

is made by the chair of the department in which they wish to take courses and conveyed in writing to the Graduate Admissions Office. Applicants are notified of the decision by Graduate Admissions in the Office of the University Registrar.

Students who are granted nonmatriculated status are charged the 8-10 unit rate for each quarter in which they are enrolled, and may enroll for a maximum of a total of one academic year. Nonmatriculated status is a privilege and not a right; the nonmatriculated status may be revoked at the University's discretion (and after consideration of such factors as the University considers relevant in the particular case) at the end of any quarter of enrollment.

Nonmatriculated students are not permitted to enroll in certain courses, such as those in the following departments or programs: film and broadcasting courses in Art; all courses in Computer Science, Economics, Electrical Engineering, International Policy Studies, and the School of Medicine. Nonmatriculated students must limit their enrollment to classes in the department in which they have been admitted. Nonmatriculated students receive academic credit for courses satisfactorily completed and may obtain an official transcript. As a general proposition, they may use University facilities and services. In classes of limited enrollment, students in degree programs have priority. Nonmatriculated students may apply for housing but have a low priority for assignment and are not guaranteed housing. No fellowships, assistantships, or Stanford loans are available for nonmatriculated students. Nonmatriculated students are not eligible for a leave of absence.

Nonmatriculated students who later apply for admission to a degree program must meet the standard admission requirements and should not anticipate special priority because of work completed as a nonmatriculated student, subject to the approval of the degree granting department. Students who are admitted to a degree program may apply a maximum of 15 units of nonmatriculated study toward the residency requirement for a master's degree and 30 units for the Engineer or Ph.D. degree, subject to the approval of the degree granting department.

Application forms for nonmatriculated status during the regular academic year are available from Graduate Admissions, Office of the University Registrar, 630 Serra Street, Suite 120, Stanford, CA 94305-6032. Deadlines for applying are included with the forms and are generally required two months before the start of the quarter.

Applicants interested in nonmatriculated student status for the Summer Quarter only should contact the Summer Session Office, 482 Galvez Mall, Stanford, CA 94305-6079.

## Non-Degree-Granting Programs

Stanford University has established a limited number of formal non-degree-granting programs within individual departments. These include the Knight Fellowship Program for mid-career journalists (Communication Department), and the Stegner Fellows Program for selected authors (Creative Writing Program, within the English Department).

Individuals may apply to these programs directly. Application requirements, admissions decisions, tuition requirements and financial support are all handled by the specific program. Individuals who are admitted to these programs will be registered at Stanford as nonmatriculated graduate students in the appropriate program. Upon completion of their program, they will receive a transcript and certificate of program completion.

## Stanford Center for Professional Development

Qualified individuals may pursue graduate and professional certificates or take individual graduate and professional courses through the Stanford Center for Professional Development. Nonmatriculated students taking individual graduate courses for credit, or towards earning a graduate certificate, are charged tuition on a per-unit basis. For more information on

available courses, applications, and deadlines visit <http://scpd.stanford.edu> or phone (650) 725-3000.

## Postdoctoral Scholars

Postdoctoral scholars are trainees in residence at Stanford University pursuing advanced studies beyond the doctoral level in preparation for an independent career. Postdoctoral scholars are appointed for a limited period of time and may participate in Stanford research projects and/or may be supported by external awards or fellowships. In all cases, their appointment at Stanford is for the purpose of advanced studies and training under the sponsorship of a Stanford faculty member.

Postdoctoral appointments require initial full-time engagement in the designated research or study and are generally restricted to those who have earned a terminal degree such as Ph.D. or J.D. within the last three years or a medical degree such as M.D., M.B.B.S., or D.D.S. within the last six years. Requests for exceptions for individuals who are beyond these limits, or have not been actively engaged in research as their primary effort, must include a written statement from the sponsoring faculty member indicating what additional training outside the primary area of effort the individual plans to receive, and the reasons for which the exception is requested. Postdoctoral scholars are appointed at Stanford for fixed terms, typically one year but that may eventually total up to four years, and are subject to a strict five-year rule (that is, that the total postdoctoral appointment period is not to exceed a total of five years of postdoctoral research experience at all institutions combined). In cases of combined training, only the years of active research at the postdoctoral level are counted for salary and other purposes. Postdoctoral scholars who begin a second postdoctoral appointment in a new field may have training extended to a maximum total of up to six years. Postdoctoral scholars may request temporary reductions in effort and pay due to temporary family or other conditions.

All postdoctoral scholars appointed at Stanford must be supported by Stanford grants and contracts, training grants, departmental or school fellowship funds, or external fellowships, or by a combination of these sources. Scholars may not be self-supporting. In addition, all postdoctoral scholars are eligible for a benefits package including medical, dental, life, and disability insurance. Postdoctoral scholars are normally appointed for 100% time.

Postdoctoral scholars must be registered at Stanford during every academic quarter of their appointment. Registration entails payment of a quarterly postdoctoral fee by the academic department or school appointing the scholar.

Prospective postdoctoral scholars should write directly to the department in which they wish to study or check for postdoctoral openings at <http://postdocs.stanford.edu/prospects/index.html>. For more information, see <http://postdocs.stanford.edu>.

## Visiting Student Researchers

In limited instances, it is to the benefit of Stanford faculty to permit graduate students who have not yet obtained a Ph.D. (or its foreign equivalent) to engage in research on the Stanford campus. This could include students from other universities who are engaged in graduate-level research in a field of interest to the faculty member, or students doing a research rotation as part of a larger research study or grant.

These students must be registered as Visiting Student Researchers if they are in residence at Stanford for more than 30 days; they may be registered as Visiting Student Researchers if they are in residence for fewer than 30 days in order to receive the services available to Visiting Student Researchers. Visiting Student Researcher appointments are limited to one year in duration. Invited persons must be qualified to conduct research at a level comparable to that of other Stanford graduate students, and the research must be of benefit to Stanford as well as to the visitor. Forms for the appointment of Visiting Student Researchers are submitted to Graduate Admissions, Office of the University Registrar by the department issuing the invitation.



Under limited circumstances, the faculty sponsor may request an extension of the Visiting Student Researcher's appointment beyond one year. Such extensions require the concurrence of the student's home institution. Extensions beyond the second year are extremely rare, and require approval in advance from the office of the Vice Provost for Graduate Education

Visiting Student Researchers are charged a monthly Visiting Student Researcher fee for each month in which they hold this appointment at Stanford, including partial months. They may waive the University's student medical insurance plan only if they have comparable coverage with another carrier and submit proof of the comparable coverage prior to the term start date. Visiting Student Researchers are not entitled to any financial support from Stanford University. They may not be appointed to any assistantship positions nor hold any named Stanford fellowships. Funds intended for the support of matriculated Stanford students may not be used to support Visiting Student Researchers. Stanford cannot certify visiting researchers for deferment of U.S. educational loans.

Visiting Student Researchers are not permitted to enroll in or audit any courses, but in quarters in which they are registered as Visiting Student Researchers, they are eligible for the usual student benefits of nonmatriculated student status. Students in this status are eligible for graduate on-campus housing on a space-available basis. They are also eligible for participation in the programs offered by the Graduate Life Office.

Visiting Student Researchers are subject to the rules and regulations of Stanford University. These include:

- *Intellectual Property*—Visiting Student Researchers are required to sign an SU-18 Stanford Patent and Copyright Agreement
- *The Honor Code and Fundamental Standard*—Visiting Student Researchers who commit violations of these behavioral standards as reasonably determined by the sponsoring department are subject to termination of their Stanford appointment
- *Required Training*—The faculty member who invited the Visiting Student Researcher is responsible to assure that they receive any required training in order to be able to carry out their research at Stanford, including appropriate health and safety training, instruction in the protection of human subjects, or any other instruction required by the work that the student will do here.

Citizens of other countries who enter the United States to be Visiting Student Researchers at Stanford must have a DS-2019 Certificate (to apply for a J-1 visa) issued by the Bechtel International Center and must be registered each quarter, including Summer Quarter, to maintain their visa status.

See also the Graduate Academic Policies and Procedures Handbook, Activating Nonmatriculated Graduate Students (GAP 2.3), at <http://gap.stanford.edu/2-3.html>.

## Students of New Faculty

Faculty who are being hired by Stanford University, and who are currently advising doctoral students in advanced stages of degree completion at their home university, may appoint one or more of these students as Students of New Faculty, a nonmatriculated graduate status, for the purpose of facilitating the completion of the student's doctoral research with their faculty advisor. To be eligible for this status, the student must:

- have completed at their home institution all degree requirements equivalent to those required for Stanford's TGR status (i.e., completed all curricular requirements, candidacy, and residency), and
- be in good academic standing at their home institution, and remain so while at Stanford, and
- demonstrate agreement to the terms and conditions for this appointment by signing the Students of New Faculty Representations.

Appointment of these students into nonmatriculated Stanford graduate status requires the approval of the incoming faculty member, that faculty

member's Stanford department chair and school dean, and Stanford's office of the Vice Provost for Graduate Education, as well as of the appropriate office at the student's home institution.

Approval for these appointments is documented by means of an Affiliation Agreement between Stanford and the student's home institution, identifying the student(s) and describing the arrangements for their appointment at Stanford. Attachments to this agreement specify the timing of the appointment and the sources of financial support, if any, for each student.

Students are appointed into this status for one year at a time, up to a limit of three years. The Stanford department may request extensions beyond the third year. Approval for extensions requires the concurrence of the Stanford school dean's office and the Vice Provost for Graduate Education, along with the appropriate office(s) at the student's home institution.

Students of New Faculty must enroll in the appropriate TGR course during each quarter of the academic year while they are at Stanford, and will be charged TGR tuition during each enrolled quarter. Summer enrollment is optional subject to the relevant policies of Stanford and of the home institution. Students of New Faculty may be appointed and paid as Research Assistants. For more information, see <http://gap.stanford.edu/2-4.html> and the Research Policy Handbook, Section 9.7 (<http://rph.stanford.edu/9-7.html>).

## Honors Cooperative Program

The Honors Cooperative Program (HCP) is a part-time graduate program offered by Stanford University. It allows working professionals, who may be eligible for tuition support through their employer, an opportunity to earn a graduate degree in any of the engineering programs, applied physics, statistics, or biomedical informatics, on a part-time basis.

Prospective HCP students apply to the department in which they would like to pursue a graduate degree through the normal graduate admissions process, and compete with all other applicants for admission to the program. Once admitted, HCP students arrange their part-time status and tuition payment options through the Stanford Center for Professional Development (SCPD). Courses are delivered online and broadcast locally. HCP students are also welcome to attend classes on campus, and some on-campus attendance may be required depending on the degree track.

To participate, HCP students must have the support of their employer as a participating company of the Stanford Center for Professional Development. For more information, see <http://scpd.stanford.edu>, or phone (650) 725-3000.

## Undergraduate Financial Aid

The University has a comprehensive need-based financial aid program for its undergraduates who meet various conditions set by federal and state governments, the University, and other outside agencies. Students are admitted without consideration of their financial circumstances, except in the case of international students.

In awarding its own funds, the University assumes that students and their parents accept the first and primary responsibility for meeting educational costs. Stanford's policy generally is to exclude undergraduates from being considered financially independent of their parents for University-administered scholarship aid unless a student is an orphan, a ward of the court, or at least 25 years of age. Spouses of married undergraduate students share in the responsibility to meet educational costs.

Stanford expects financial aid applicants to apply for and use resources from state, federal, and private funding sources, contribute from their earnings during nonenrollment periods (for example, summer), and use earnings from part-time employment during the academic year to meet educational expenses. If Stanford determines that an applicant and his or her

family cannot meet these expenses, the University may offer financial aid funds to help meet these costs.

The amount of scholarship or grant funds offered to students is determined by the difference between the comprehensive cost of attendance (including tuition, fees, room, board and allowances for books, supplies, personal expenses, and travel) and the amount the student and parents can reasonably be expected to contribute toward educational costs based on family financial circumstances. Scholarships from outside sources may change the University's financial aid award. When a student receives outside scholarships, these funds reduce or eliminate the student's responsibility to contribute from job earnings. If the total in outside scholarships exceeds the student's responsibility, the University then reduces institutional scholarship, dollar for dollar, by any additional amount.

Students are considered for University scholarship eligibility during their first four years of undergraduate enrollment. The Financial Aid Office (FAO) considers applicants for University scholarship eligibility beyond the twelfth quarter only if enrollment is essential in order to complete the minimum requirements for the first baccalaureate degree or major. Students who enroll for a fifth year in pursuit of a coterminal program, a minor, a second major, a second degree, or the B.A.S. degree are not eligible for University scholarship consideration but may apply for student loans and federal grants. Eligibility for federal student aid is limited to the equivalent of 18 quarters of full-time undergraduate enrollment, including course work taken at other colleges and universities. Students must also maintain satisfactory academic progress to retain financial aid eligibility.

For additional detailed information, refer to the FAO (<http://exploreddegrees.stanford.edu/admissionandfinancialaid/http://financialaid.stanford.edu>) web site.

## Graduate Financial Aid

Graduate students at Stanford receive funding from a variety of sources. University fellowships, research assistantships, and teaching assistantships are offered primarily to doctoral students. In some cases, master's students also may receive fellowships and assistantships. In addition, outside agencies provide fellowships to many graduate students at Stanford. Students without fellowships or assistantships, and those whose funding does not cover all of their costs, may need to use student loans, savings, other personal assets, a spouse's earnings, or parental support to meet their educational expenses.

## Veterans' Educational Benefits

The Office of the University Registrar serves as the liaison between the University, its students, and the various federal, state, and local agencies concerned with veterans' benefits. Stanford certifies enrollment for students in degree seeking programs and students in one of 24 VA approved certificate programs offered through the Stanford Center for Professional Development. Other non-matriculated and certificate programs are not eligible. All students eligible to receive veterans' benefits while attending the University are urged to complete arrangements with the appropriate agency in advance of enrollment.

Stanford University is required to certify only those courses that meet minimum graduation requirements. Courses not directly related to a student's degree program or courses beyond those required for a specific degree program are not certified. Undergraduates should meet with an advisor to develop a course enrollment plan. Graduate students should have their departments approve their study lists as meeting graduation requirements on a quarterly basis.

To comply with federal regulations concerning credit for previous training (38 CFR 21.4253), Stanford University is required to evaluate all previous education and training completed elsewhere to determine what credit, if any, should be granted to students eligible to receive Veterans Affairs

(VA) educational benefits. Stanford is required to complete an evaluation; credit is granted when appropriate. Credit is evaluated toward the degree program registered with Veterans Affairs as determined by the Office of the University Registrar in conjunction with the relevant academic department(s) or program(s). All relevant policies regarding transfer credit apply. In addition, this evaluation occurs each time a student's degree program is changed.

Subject to current federal and University guidelines, students eligible for receipt of VA educational benefits have their prior education and training evaluated up to the credit limits outlined in the "Residency Policy for Graduate Student (p. 45)s" section of this bulletin. As an exception to that policy, students in master's programs in the schools of Earth Sciences, Education, Engineering, Humanities and Sciences, Law, Medicine, and Graduate Business are allowed a maximum of 6 transfer (quarter) units.

Stanford participates in the Yellow Ribbon provision of the Post 9/11 GI Bill (Ch. 33). If a matriculated student qualifies for Chapter 33 benefits at the 100% level, the student may be eligible to receive additional funding through the Yellow Ribbon Program. Under this program, Stanford provides an annual award of \$3,000 to undergraduate students to supplement the Chapter 33 base tuition benefit. The VA matches Stanford's Yellow Ribbon contribution, so the student receives a combined total of \$6,000 in additional funds. Certain matriculated graduate students may be eligible for the Yellow Ribbon provision, and the amount of institutional contribution varies by school and program at the graduate level. Refer to the Veterans' Benefit page of the Registrar's web site (<http://studentaffairs.stanford.edu/registrar/students/vet-benefits>) for the Yellow Ribbon benefit breakdown by school and program.

# Tuition, Fees, and Housing

## University Communication with Students

Stanford University uses electronic means (such as email and the Internet) as a primary method of communication and of providing billing, payment, and enrollment services. Signatures or acknowledgments provided by the student electronically to Stanford via Stanford systems and/or @stanford.edu email are valid and legally binding. Additionally, by accepting Stanford's offer of admission and enrolling in classes, each student accepts responsibility for paying all debts to the University, including tuition and fees, for which he or she is liable. An individual's registration as a Stanford student constitutes his or her agreement to make timely payment of all amounts due.

Regular quarterly tuition for the 2012-13 academic year, payable Autumn, Winter, and Spring quarters, is as follows:

Type	Fee
Undergraduate	\$13,750
Graduate 11-18 units	\$13,750
Graduate 8-10 units	\$8,940
Graduate Engineering 11-18 units	\$14,650
Graduate Engineering 8-10 units	\$9,520
Graduate School of Business, first year MBA	\$19,100
Graduate School of Business, second year MBA	\$18,400
School of Medicine (M.D. Program—FY 2011 and beyond) 1	\$15,781

School of Medicine (M.D. Program—FY 2010 and earlier) \$16,637

1

Stanford Law School \$16,290

<sup>1</sup> Ph.D. students in the Biomedical Sciences and in the Graduate School of Business are assessed the regular graduate tuition rate.

For complete tuition information, see the Registrar's tuition ([http://studentaffairs.stanford.edu/registrar/students/tuition-fees\\_11-12](http://studentaffairs.stanford.edu/registrar/students/tuition-fees_11-12)) web site.

Regular tuition fees apply to the undergraduate Overseas Studies and Stanford in Washington programs. For Summer Quarter tuition rates and policies, see the Registrar's summer tuition ([http://studentaffairs.stanford.edu/registrar/students/summer-tuition\\_11-12](http://studentaffairs.stanford.edu/registrar/students/summer-tuition_11-12)) web site.

A coterminal student is subject to graduate tuition assessment and adjustment policies once graduate standing is reached. Coterminal students should see the student policies and procedures for tuition assessment, as described under "Residency and Unit Requirements in Coterminal Programs (<http://www.stanford.edu/dept/registrar/bulletin/4907.htm>)" in the "Graduate Degrees" section of this bulletin.

Eligibility for registration at reduced tuition rates is described below. Tuition exceptions may also be made for illness, disability, pregnancy, new-parent relief, or other instances at the discretion of the University. No reduction in tuition charges is made after the first two weeks of the quarter.

All students are advised, before registering at less than the regular full-tuition rate, to consider the effects of that registration on their degree progress and on their eligibility for financial aid and awards, visas, deferment of student loans, and residency requirements.

The University reserves the right to change at any time, without prior notice, tuition, room fees, board fees, or other charges.

## Undergraduate Student Tuition

During Autumn, Winter, and Spring quarters, undergraduates are expected to register at the regular full-tuition rate.

During Summer Quarter, Stanford undergraduates may register on a unit-basis (minimum 3 units). For Summer Quarter tuition rates and policies, see the Registrar's summer tuition (<http://registrar.stanford.edu/students/finances/summer.htm>) web site.

The following reduced-tuition categories can be requested by matriculated undergraduate students in the final stages of their degree program:

### 1. Permit to Attend for Services Only (PSO)

Undergraduates completing honors theses, clearing incompletes, or requiring a registration status, and who meet the PSO conditions listed in the "Special Registration Statuses (Undergraduate) (<http://www.stanford.edu/dept/registrar/bulletin/21573.htm>)" section of this Bulletin, may petition for PSO status one time only in their terminal quarter. The PSO tuition is \$4,158 per quarter in 2012-13.

### 2. 13th Quarter

Undergraduates who meet the 13th Quarter conditions listed in the "Special Registration Statuses (Undergraduate) (<http://www.stanford.edu/dept/registrar/bulletin/21573.htm>)" section of this Bulletin may petition one time only to register for a minimum of eight units. For per-unit tuition rates, see the Registrar's tuition (<http://registrar.stanford.edu/students/finances>) web site.

## 3. Graduation Quarter

Undergraduates may petition to register for Graduation Quarter registration status in the quarter in which they are receiving a degree if they are not using any University resources (including housing), have completed all University requirements, and meet the Graduation Quarter conditions listed in the "Special Registration Statuses (Undergraduate) (<http://www.stanford.edu/dept/registrar/bulletin/21573.htm>)" section of this bulletin. Graduation Quarter may be permitted one time only. The tuition per quarter is \$100 in 2012-13.

## Graduate Student Tuition

Matriculated graduate students are expected to enroll for at least eight units during the Autumn, Winter, and Spring quarters. Schools and departments may set a higher minimum. During the Autumn, Winter, and Spring quarters, matriculated graduate students in most departments may register at the reduced 8-, 9-, or 10-unit tuition rate if their enrollment plans are accepted by their departments. Students in the Stanford Law School, the MBA program in the Graduate School of Business, or the M.D. program in the School of Medicine, should consult appropriate school officers about tuition reduction eligibility.

Graduate students who are enrolled in more than one graduate degree at Stanford, where each program charges a different tuition, are charged:

1. the tuition associated with a degree in the doctoral/professional category, if the other degree is in the master's category. Those degrees in the doctoral or professional category for tuition purposes are the Ph.D., D.M.A., J.S.D., M.D., and J.D. degrees. Those degrees in the master's category for tuition purposes are the Engineer, M.A., M.S., M.P.P., M.B.A., M.F.A., L.L.M., M.L.S., and J.S.M. degrees.
2. the higher tuition rate, if both degrees are in the same category.
3. a University-approved tuition rate if the student is in a special program for which specific tuition agreements have been approved by the Faculty Senate (e.g., all joint degree programs (JDPs) or the Master of Science in Medicine program).

During the Summer Quarter registration is not required by Stanford University and does not substitute for registration during the academic year. Students are required to be enrolled Summer Quarter if, during that quarter, they will meet any of the criteria listed in the "Enrollment Requirements (<http://www.stanford.edu/dept/registrar/bulletin/4903.htm>)" section of the "Graduate Degrees" section of this bulletin. Graduate students who do enroll Summer Quarter may reduce their enrollment to a minimum of one unit (charged on a per-unit basis, with a minimum tuition charge at the 1-3 unit rate) unless the terms of a fellowship or other financial support, or of their particular degree program, require a higher level of enrollment. TGR students who enroll in summer pay the TGR rate and must enroll in the required zero-unit course. Students in the schools of Law, Business, or the M.D. program should consult appropriate school officers regarding summer enrollment requirements. Students possessing an F1 or J1 student visa may be subject to additional course enrollment requirements in order to retain their student visas.

Honors Cooperative students register at the per-unit rate. Graduate students who are faculty spouses, regular Stanford employees, or full-time educators in the Bay Area may also register at the per-unit rate.

Nonmatriculated graduate students pay the same tuition rates as matriculated students, but must register for at least 8 units. Visiting Student Researchers pay a monthly fee; they may not enroll in or audit courses. Within certain restrictions, postdoctoral scholars may enroll in courses if the appropriate unit rate for tuition is paid.

The following reduced-tuition categories can be requested by matriculated graduate students in the final stages of their degree programs:

## 1. Terminal Graduate Registration (TGR)

Doctoral students, master's students, and students pursuing Engineer degrees who have completed all degree requirements other than the University oral exam and dissertation (doctoral students) or a required project or thesis (Engineer or master's students) and meet the conditions listed in the "TGR (<http://www.stanford.edu/dept/registrar/bulletin/21502.htm>)" section of this bulletin may request Terminal Graduate Registration tuition status.

Each quarter, TGR students must enroll in the 801 (for master's and Engineer students) or 802 (for doctoral students) course in their department for zero units, in the appropriate section for their adviser. TGR students register at a special tuition rate: \$2,682 per quarter in 2012-13. TGR students may enroll in up to 3 units of course work per quarter at this tuition rate. Within certain restrictions, TGR students may enroll in additional courses at the applicable unit rate. The additional courses cannot be applied toward degree requirements since all degree requirements must be complete in order to earn TGR status.

## 2. Graduate Tuition Adjustment

Graduate students who need only 3 to 7 remaining units to complete degree requirements or to qualify for TGR status may apply to register for one quarter only on a unit basis (3 to 7 units) to cover the deficiency. Students with disabilities covered under the Americans with Disabilities Act that have an approved reduced course load (RCL) recommended by the Office of Accessible Education (OAE) (<http://studentaffairs.stanford.edu/oae>) may also request a tuition adjustment for *each* quarter in which they take a RCL. For per-unit tuition rates, see the Registrar's tuition (<http://registrar.stanford.edu/students/finances>) web site.

## 3. Graduation Quarter

Registration is required for the term in which a student submits a dissertation or has a degree conferred. Students who meet the conditions listed in the "Graduation Quarter (<http://www.stanford.edu/dept/registrar/bulletin/4941.htm>)" section of this bulletin are eligible to be assessed a special tuition rate of \$100 for the quarter in which they are receiving a degree.

## International Students

F-1 or J-1 visas are required by the U.S. Department of Homeland Security. International students must be registered as full-time students during the academic year. Summer Quarter registration is not required unless the I-20/DS-2019 notes the Summer Quarter as the start date. International graduate students comply with immigration regulations while enrolled for partial tuition if their Stanford fellowships or assistantships require part-time enrollment, if they are in TGR status, or if they are in the final quarter of a degree program. Nonmatriculated international students must register for at least 8 units.

## Application Fee

Contact the Undergraduate Admission Office (<http://admission.stanford.edu>) for information about the undergraduate application fee and the Graduate Admission (<http://gradadmissions.stanford.edu>) section of the Office of the University Registrar for the current graduate application fee. Application fees for the School of Law, the School of Medicine, and the Graduate School of Business vary by program. Fees are payable at the time of application and are not refundable.

## ASSU Fees

The Associated Students of Stanford University (ASSU) fees are established by student vote in Spring Quarter. Fees directly fund activities of student organizations and not operations of ASSU. The 2012-13 fees are:

- Undergraduates—\$140 per quarter
- Graduate Students—\$32 per quarter

ASSU fees are assessed each term and can be waived subject to certain conditions. Waivers can be requested during the first two weeks of each quarter on the ASSU waiver (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://waivers.stanford.edu>) web site. Waivers granted result in a credit to the student's University bill.

## Document Fee

Stanford charges a one-time Document Fee to all students admitted to new degree or non-degree programs. The fee is paid once only, regardless of the number of degrees a student may ultimately pursue. It covers the cost of a variety of University administrative services such as enrollment and degree certification, course drops and adds done in Axess before published deadlines, diplomas, and official transcripts and their production.

The document fee for students admitted to new degree or non-degree programs in 2012-13 is \$200.

## Campus Health Service Fee

All students enrolled on the main Stanford campus are required to pay the Campus Health Service Fee. The Campus Health Service Fee covers most of the services provided by Vaden Health Center, including primary care medical visits, psychological evaluation and short-term therapy at Counseling and Psychological Services (CAPS), and health and wellness programs. The services provided by Vaden Health Center are not covered by Cardinal Care or a student's private health insurance. More information and answers to questions about the fee can be found at the Campus Health Service Fee (<http://vaden.stanford.edu/fees/index>) web site. The fee for 2012-13 is \$179 per quarter.

## Health Insurance

The University requires all registered students to carry medical insurance to provide coverage for services not provided by Vaden Health Center. Students are enrolled in and charged for the Stanford student health insurance plan, Cardinal Care, unless they have completed waiver procedures by the waiver deadline.

For complete information on health insurance, see the Vaden Health Center Insurance (<http://vaden.stanford.edu/insurance>) web site.

Those who carry medical insurance through an alternate carrier are generally eligible for waiver of the Stanford student health insurance plan. For information on waiver procedures, see the Vaden Health Center Insurance Waiver ([http://vaden.stanford.edu/insurance/using\\_your\\_own.html#wave](http://vaden.stanford.edu/insurance/using_your_own.html#wave)) web site.

## Special Fees

### New Student Orientation Fee

A fee is charged to all entering undergraduates for the costs of orientation, including room and board, and for the cost of class dues to provide funds for later activities of the class.

## Law Student Services Fee

A fee is charged each quarter to School of Law students for supplementary course materials.

## Graduate School of Business M.B.A. Course Reader Fee

A fee is charged each quarter to M.B.A. students in the Graduate School of Business to cover the cost of in-class handouts and licensing fees.

## Late Study List Fees

Charges are imposed for late submission of study lists. The amount is \$200.

## Laboratory Fee

Students in chemistry laboratory courses are charged a nonrefundable fee.

## Music Practice; Athletics, Physical Education, Recreation; and Dance

Courses for which special fees are charged are indicated in the notes of the scheduled class on Axess (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://axess.stanford.edu>) or ExploreCourses (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://explorecourses.stanford.edu>).

## Dissertation Fee

Each Ph.D. and D.M.A. candidate has the option to either submit electronically or on paper. Electronic submission is free. Students who choose to submit on paper are charged a fee to cover the cost of microfilming and binding the dissertation and the cost of publishing the abstract.

## International Scholar Service Fee

A one-time fee for visa authorization documents is charged to international postdoctoral and visiting scholars.

## Housing

University housing is available to enrolled Stanford students as space permits and according to policies described on the R&DE Student Housing (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/housing>) web site. Student Housing, a division of Residential and Dining Enterprises, is responsible for: managing, maintaining, and cleaning the physical plant of student residences; assigning students to housing; and operating the regional housing front desks. Information on University housing assignments, options, policies, application procedures, and deadlines may be obtained from R&DE Student Housing online at the R&DE Student Housing (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://studenthousing.stanford.edu>) web site, by mail or in person at 630 Serra Street, Suite 110, Stanford University, Stanford, CA 94305-6034, by telephone at (650) 725-2810, or by email at [studenthousing@stanford.edu](mailto:studenthousing@stanford.edu). Current and prospective students may also contact Student Housing by filing a HelpSU request. Information regarding off-campus housing may be obtained from Community Housing on the R&DE Student Housing (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://offcampus.stanford.edu>) web site, by mail or in person at 630 Serra Street, Suite 110, Stanford University, Stanford, CA 94305-6034, by telephone at (650) 723-3906, or by email at [communityhousing@lists.stanford.edu](mailto:communityhousing@lists.stanford.edu). For other housing related information, email [studenthousing@lists.stanford.edu](mailto:studenthousing@lists.stanford.edu) or phone the main student housing office at (650) 725-1600.

The department of Residential Education (<http://www.stanford.edu/dept/resed>) (650-725-2800) and the Graduate Life Office (<http://www.stanford.edu/group/glo>) (650-723-1171) are responsible for educational programs, counseling, and crisis intervention. In addition, Residential Education is responsible for the administration of regional undergraduate residence offices.

## Housing Rates

Complete information on housing is available on the R&DE Student Housing (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/housing>) web site. Campus housing rates are generally below local area market rents.

- See undergraduate housing (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/housing/apply/apply-housing>) to apply for 2012-13 housing; rates are available on the undergraduate resident rate (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/housing/charts/undergraduate-residences-rates-chart-2012-13>) page.
- See graduate housing (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/housing/apply/apply-housing>) to apply for 2012-13 housing; rates are available on the graduate resident rate ([http://www.stanford.edu/dept/rde/shs/pdfs/2012-13\\_Grad\\_RatesChart.pdf](http://www.stanford.edu/dept/rde/shs/pdfs/2012-13_Grad_RatesChart.pdf)) page.

All rates are per student and include utilities and coinless laundry. Room rates are charged quarterly on the University bill. Information on payment options and procedures is discussed in assignment information sent out by R&DE Student Housing and in the Payments section of the Stanford Bulletin.

A quarterly house dues fee for students is generally determined by the local residence staff and/or residents of the house and may be included with room and board charges on the University bill.

Students who live in housing are automatically assessed a communications fee on their University bill that covers in-room network connections and a land-line phone with basic telephone service.

## Undergraduate Residences

Approximately 96 percent of undergraduates live in University housing, not counting students studying abroad during the academic year. All freshmen and transfers are required to live in University residences for educational reasons and are automatically assigned housing following admission. Because freshmen must live in campus housing, losing eligibility for University housing will also likely lead to a loss of student status until the student has returned to University housing, unless an extraordinary exemption is granted from the office of the Vice Provost for Undergraduate Education.

Residence assignments for continuing undergraduates are made on the basis of an annual lottery, called the Draw, and quarterly waiting lists. Undergraduates are guaranteed four years of University housing (two or three years for transfer students based on their entering class standing) if:

1. they are in compliance with the University housing agreement and University policies;
2. they apply by the appropriate Draw deadlines; and,
3. they are willing to live anywhere on campus.

Undergraduate residences include traditional residence halls, language and culture theme houses, cross-cultural theme houses, student-managed and cooperative houses, apartments, suites, fraternities, and sororities.

## Graduate Residences

Approximately 56 percent of matriculated graduate students live in R&DE Student Housing at Stanford. Residence assignments are made on the basis of an annual lottery and quarterly waiting lists. New matriculated students are guaranteed University housing if:

1. they are in compliance with the University housing agreement and University policies;

2. they apply by the first round application deadline for the Autumn term; and
3. they are willing to live in any residence for which they are eligible

At Stanford University, new matriculated students are students who are in a graduate program for the first time. Students starting a second graduate degree are not considered new students and therefore are not guaranteed housing.

After the first year, continuing matriculated graduate students are given priority for housing for a specified number of years based on their academic degree program. Graduate students are given five additional years of limited priority for housing. Limited priority years are not automatically cumulative, so students do not receive additional years of limited priority for subsequent degrees. Students who live in residences that are open year-round and who remain in continuous occupancy in their rooms or apartments may renew their contracts annually if they meet certain eligibility requirements. Students who live in residences that are open only during the academic year, or who want to change residences, re-enter the lottery each year. Stanford also offers subsidized off-campus apartments as part of the first year guarantee. Students apply for these through the graduate housing application process.

Single graduate students may request assignment to furnished graduate apartments in a variety of configurations. Studios, efficiency two-bedroom units (shared kitchen and bath), two-, three- and four-bedroom apartments are available.

Couples without children may request assignment to either furnished or unfurnished one-bedroom apartments. Couples housing is available to students who are married and to students who have a same-sex or opposite-sex domestic partner. At Stanford University, a domestic partnership is defined as an established, long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare.

One-, two-, and three-bedroom apartments (furnished and unfurnished) are provided for students with children, based on the number of dependents. Housing for students with children is available to married couples, domestic partners, and single parents who have dependent children living with them. Housing is not provided for extended families, including the parents and siblings of students, or live-in day care staff.

## Community Housing

Community Housing maintains computerized listings of private rooms, houses, and apartments in surrounding communities that are available to students who want to live off-campus. Students must make rental arrangements directly with landlords. An online listing service (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/housing/community-housing/>) facilitates the process of making connections. Information on community housing may be obtained from the Community Housing web site (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/> <http://offcampus.stanford.edu>), by mail or in person at 630 Serra Street, Suite 110, Stanford University, Stanford, CA 94305-6034, by telephone at (650) 723-3906, or by email at [communityhousing@lists.stanford.edu](mailto:communityhousing@lists.stanford.edu).

During mid-August to mid-September, temporary accommodations are available in student residence halls at a modest charge for students searching for off-campus housing for Autumn Quarter. Contact Stanford Conferences (<http://www.stanford.edu/dept/rde/cgi-bin/drupal/conferences>) for more information at (650) 725-1429.

## Meal Plans

For information on 2012-13 meal plans, see the Stanford Dining web site (<http://dining.stanford.edu>) and its meal plan rate page ([http://www.stanford.edu/dept/rde/dining/meal\\_plans.htm](http://www.stanford.edu/dept/rde/dining/meal_plans.htm)).

Stanford University's Residential Education program promotes the philosophy that living and learning are integrated and that formal teaching,

informal learning, and personal support in residences are integral to a Stanford education. Meals play a key role in this mission of community building, leading, and learning. Therefore, residents of specially designated University residence halls (Branner, Crothers/ Crothers Memorial, Florence Moore, Lakeside, Manzanita, Murray, Ricker, Stern, Toyon, Wilbur, and Yost) are required to participate in a Stanford Dining meal plan. Stanford Dining is committed to excellence by providing meal plans that offer significant value, the highest quality, and maximum flexibility of dining across campus.

## Payments

By accepting Stanford's offer of admission and enrolling in classes, each student accepts responsibility for paying all debts to the University, including tuition and fees, for which he or she is liable. An individual's registration as a Stanford student constitutes his or her agreement to make timely payment of all amounts due.

Charges and credits from offices within the University are aggregated in a student's individual account and presented on the University bill. Student Financial Services sends the University bill electronically to students monthly via Stanford ePay. Students may designate 'Authorized Payers' via Stanford ePay to allow others to view the student account and make payment. Students and Authorized Payers may view the student account online 24 hours a day, seven days a week, via Stanford ePay (<http://studentaffairs.stanford.edu/sfs/bill/resources-epay>). Payments should be made online through Stanford ePay. If necessary, the student or Authorized Payer may print a bill or receipt from Stanford ePay.

Term fees, such as tuition, fees, room, board, health insurance, and Campus Health Service Fee are due and must be received by the 15th of the month. For undergraduates, term fees are due the 15th of the month prior to the start of the quarter. For graduate students, term fees are due the 15th of the month after the start of the quarter. A list of payment due dates throughout the academic year is available on the Student Financial Services website (<http://studentaffairs.stanford.edu/sfs/bill/overviews-bill/#due>). To avoid late payment penalties, online payments via Stanford ePay can be made up to midnight PST on the 15th of the month; mailed payments must be postmarked by 5:00 p.m. on the 15th of the month.

After the start of the term, adding units may result in additional tuition charges. Other fees, such as room damage repair charges, petition fees, late fees, lab fees, library fees, and other miscellaneous fees or charges are due on the 15th of the month after which they are billed.

## Forms of Payment

Stanford's standard method of payment is electronic check (eCheck) using the online service, Stanford ePay. No fee is associated with ePay. See the ePay payment instructions (<http://studentaffairs.stanford.edu/sfs/bill/steps-view-print-pay>) web site. Wire transfers (recommended for foreign students) should be sent following the instructions on the wire transfer instructions (<http://studentaffairs.stanford.edu/sfs/bill/overviews-payment/#transfer>) web site. If electronic payment is impossible, Stanford will accept personal checks, cashier's checks, money orders, travelers checks in U.S. funds drawn on U.S. banks, and cash and students may mail or deliver these payments to the Student Services Center (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://studentservicescenter.stanford.edu>). Stanford does not accept credit cards or postdated checks.

## Credit Balances

Stanford uses Direct Deposit to refund credit balances (resulting from financial aid or overpayment) to students. See the Direct Deposit enrollment instructions (<http://studentaffairs.stanford.edu/sfs/bill/steps-direct-deposit>) web site. Students who do not enroll in Direct Deposit will experience delays in receiving their funds due to the processing and mailing time required for paper checks.

## Account Fees and Actions

### Late Payment Fees

The University must receive the full amount due on or before the due date indicated on the bill. If full payment is not received by the due date, a late fee of 1.0% of the amount past due may be assessed. Anticipated aid (aid that has been accepted but not disbursed and is shown on the student account) reduces the total amount due prior to late fees being applied.

### Holds

Accounts that become past due more than 30 days are subject to financial holds. A financial hold blocks transcripts, diplomas, and enrollment eligibility.

### Insufficient Funds

A non-refundable \$25.00 administrative fee is assessed for checks or eCheck payments returned due to insufficient funds. In addition, student accounts are subject to holds, and late payment penalties may apply.

### Delinquent Accounts

Delinquent accounts may be reported to one or more of the national credit reporting agencies. Severely delinquent accounts may be referred to a collection agency and/or placed in litigation in accordance with state and federal laws. Students with delinquent accounts may be held responsible for collection costs, attorney fees, and court costs. Stanford may consider past delinquent accounts in determining whether to provide Stanford loans.

## Refunds

Students who withdraw from the University before the end of a term may be eligible to receive refunds of portions of their tuition under certain limited circumstances.

See the Registrar's Tuition page for 2012-13 for a schedule of refunds ([http://studentaffairs.stanford.edu/registrar/students/tuition-fees\\_12-13](http://studentaffairs.stanford.edu/registrar/students/tuition-fees_12-13)).

### Annulled Registration

Students who take a leave of absence or summer annulment from the University voluntarily before the first day of instruction may have their registrations annulled. Tuition is refunded in full if the student never attended. Such students are not included in University records as having registered for the term and new students do not secure any privileges for admission for any subsequent quarter as returning students. A leave of absence or summer annulment does not automatically cancel health coverage (both Cardinal Care and the Campus Health Services Fee) unless the leave of absence or summer annulment is granted before the first day of instruction. Financial aid recipients should be aware that a proportion of any refund is returned to the various sources of aid.

### Cancellation of Registration or Suspension

Students who have their registrations canceled or are suspended from the University generally receive refunds on the same basis as those receiving leaves of absence unless otherwise specified. A student whose registration is canceled less than one week after the first day of instruction for an offense committed during a preceding quarter receives a full refund of tuition fees.

## Institutional Interruption of Instruction

It is the University's intention to avoid the necessity of taking the actions described in this paragraph. However, should the University determine that continuation of some or all academic and other campus activities is impracticable, or that their continuation involves a high degree of physical danger to persons or property, activities may be curtailed and students requested or required to leave the campus. In such an event, arrangements are made as soon as practical to offer students the opportunity to complete their courses, or substantially equivalent work, so that appropriate credit may be given. Alternatively, the University may determine that students receive refunds on the same basis as those receiving leaves of absence, or on some other appropriate basis.

### Leaves of Absence

A student in good standing who desires or is required to take a leave of absence from the University after the first day of instruction, but before the end of the first 60 percent of the quarter (term withdrawal deadline), may file a petition for a leave of absence and tuition refund. Graduate students submit the completed leave of absence form to the Student Services Center (<http://studentservicescenter.stanford.edu>). Undergraduates who wish to withdraw from the current quarter, or from a quarter for which they have registered in advance and do not wish to attend, must file a Leave of Absence Petition (<http://studentaffairs.stanford.edu/sites/default/files/registrar/files/leaveofabsence.pdf>) with and receive approval from the office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall. A voluntary leave of absence after the first 60 percent of the quarter (term withdrawal deadline) is only granted for approved health and emergency reasons. For more information on leaves of absence, undergraduates should see the "Leaves of Absence and Reinstatement (Undergraduate) (p. 31)" section of this bulletin, and graduate students should see the "Leaves of Absence (Graduate) (p. 46)" section of this bulletin.

### Room and Meal Plan Refunds

Students assigned to a University residence are subject to the terms of the University Residence Agreement, and are required to live in University Housing for the full duration of their signed contract. The text of the University Residence Agreement is available at the Resident Agreement ([http://www.stanford.edu/dept/rde/shs/res\\_agree.htm](http://www.stanford.edu/dept/rde/shs/res_agree.htm)) web site.

Room refunds are made only when students move out of the residence system and graduate from or cease to be enrolled at the University. Eligibility for refunds is listed in the Residence Agreement and in the online Termination Form (<http://exploreddegrees.stanford.edu/tuitionfeesandhousing/http://onlinetoc.stanford.edu>). Filing a termination of occupancy form and moving out of Student Housing does not necessarily entitle a student to a refund. Students in all-male fraternities or all-female sororities are billed directly by the fraternity or sorority, and refunds are arranged between the student and the fraternity or sorority.

A meal plan refund is based on the date when a student moves out of University residence and is approved under conditions as specified in the Residence Agreement. If a student uses the meal plan after that date, an additional daily charge incurs.

Any decision to refund prepaid room and meal plan charges or to waive liability for deferred charges is made at the sole discretion of the University. Students with questions about refunds should contact Housing Assignments for room refunds or the central office of Stanford Dining for residential meal plan refunds.

# Undergraduate Degrees and Programs

## Degree Requirements

### A Liberal Education

As do all major universities, Stanford provides the means for its undergraduates to acquire a liberal education, an education that broadens the student's knowledge and awareness in each of the major areas of human knowledge, that significantly deepens understanding of one or two of these areas, and that prepares him or her for a lifetime of continual learning and application of knowledge to career and personal life.

The undergraduate curriculum at Stanford allows considerable flexibility. It permits each student to plan an individual program of study that takes into account personal educational goals consistent with particular interests, prior experience, and future aims. All programs of study should achieve some balance between depth of knowledge acquired in specialization and breadth of knowledge acquired through exploration. Guidance as to the limits within which that balance ought to be struck is provided by the University's General Education Requirements and by the requirements set for major fields of study.

These educational goals are achieved through study in individual courses that bring together groups of students examining a topic or subject under the supervision of scholars. Courses are assigned credit units. To earn a bachelor's degree, the student must complete at least 180 allowable units and, in so doing, also complete the Writing Requirement, the General Education Requirements, the Language Requirement, and the requirements of a major.

The purpose of the Writing Requirement is to promote effective communication by ensuring that every undergraduate can write clear and effective English prose. Words are the vehicles for thought, and clear thinking requires facility in writing and speech.

The Language Requirement ensures that every student gains a basic familiarity with a foreign language. Foreign language study extends the student's range of knowledge and expression in significant ways, providing access to materials and cultures that otherwise would be out of reach.

The General Education Requirements provide guidance toward the attainment of breadth and stipulate that a significant share of a student's work must lie outside an area of specialization. These requirements ensure that every student is exposed to different ideas and different ways of thinking. They enable the student to approach and to understand the important ways of knowing how to assess their strengths and limitations, their uniqueness, and, no less important, what they have in common with others.

Depth, the intensive study of one subject or area, is provided through specialization in a major field. The major relates more specifically to a student's personal goals and interests than do the general requirements outlined above. Stanford's curriculum provides a wide range of standard majors through its discipline-oriented departments, a number of interdisciplinary majors in addition to department offerings, and the opportunity for students to design their own major programs.

Elective courses, which are not taken to satisfy requirements, play a special role in tailoring the student's program to individual needs. For most students, such courses form a large portion of the work offered for a degree.

Within the limitations of requirements, students may freely choose any course for which previous studies have prepared them.

This section provides more detailed descriptions of these various requirements and the rationales upon which they are based.

## Bachelor of Arts (B.A.), Bachelor of Science (B.S.)

Stanford University confers the degree of Bachelor of Arts (B.A.) or the degree of Bachelor of Science (B.S.) on those candidates who have been recommended by the Committee on Undergraduate Standards and Policy (C-USP), who have applied in advance for conferral of the degree, and who have fulfilled the following requirements:

1. A minimum of 180 units of allowable University work. (As described below, units above the allowable limits for activity courses and for courses taken on a satisfactory/no credit and credit/no credit basis cannot be counted towards the 180-unit minimum.)
2. The Writing, General Education, and Language Requirements (see below).
3. Curricular requirements of at least one major department or program and the recommendation of the department(s). (Descriptions of curricular and special degree requirements are included in each department's section of this bulletin.)
4. Students admitted as freshmen—A minimum of 135 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 135 units in resident work may petition for a waiver of the last quarter-in-residence requirement for up to 15 units.
5. Students admitted as transfers—A minimum of 90 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 90 units in resident work may petition for a waiver of the last quarter-in-residence requirement.

Stanford confers the Bachelor of Science degree on candidates who fulfill these requirements in the School of Earth Sciences, in the School of Engineering, or in the departments of Applied Physics, Biology, Chemistry, Mathematics, or Physics in the School of Humanities and Sciences. The University also awards B.S. degrees to candidates in the Program in Science, Technology, and Society; in the Program in Mathematical and Computational Science; in the Program in Symbolic Systems; and, when appropriate, in the Program for Individually Designed Majors. Candidates who fulfill these requirements in other schools or departments receive the Bachelor of Arts degree.

Students who complete the requirements for two or more majors, which ordinarily would lead to the same degree (B.A. or B.S.), should review "The Major" section of this bulletin to ensure that they have an understanding of the requirements for multiple or secondary majors.

## Bachelor of Arts and Science (B.A.S.)

The University confers the degree of Bachelor of Arts and Science (B.A.S.) on candidates who have completed the following:

1. with no overlapping courses, the curricular requirements of two majors which ordinarily would lead to different bachelor's degrees (that is, a Bachelor of Arts degree and a Bachelor of Science).
2. These students must have applied in advance for graduation with the B.A.S. degree instead of the B.A. or B.S. degree, been recommended by the Committee on Undergraduate Standards and Policy (C-USP),
3. Fulfilled a minimum of 180 units of University work described in point 1 of the "Bachelor of Arts (B.S.), Bachelor of Science (B.S.)" section.



4. The requirements of each major without applying any course towards the requirements of more than one major, according to "Multiple Majors" section of this bulletin. The Major-Minor and Multiple Major Course Approval Form is required for graduation for students with the B.A.S degree.
5. The Writing, General Education, and Language requirements.
6. Students admitted as freshmen—A minimum of 180 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 180 units in resident work may petition for a waiver of the last quarter-in-residence requirement for up to 15 units.
7. Students admitted as transfers—A minimum of 135 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 135 units in resident work may petition for a waiver of the last quarter-in-residence requirement with no overlapping courses.

Students who cannot meet the requirements for both majors without overlapping courses are not eligible for the B.A.S., but may apply to have a secondary major recorded on their transcripts. (See "The Major" in the "Undergraduate Degrees and Programs" section of this bulletin.)

## Dual Bachelor's Degrees (Concurrent B.A. and B.S.)

A Stanford undergraduate may work concurrently toward both a B.A. and a B.S. degree. To qualify for both degrees, a student must complete:

1. A minimum of 225 units of University work. Units above the allowable limits for activity courses and for courses taken on a satisfactory/no credit and credit/no credit basis cannot be counted towards the 225 minimum.
2. The requirements of each major without applying any course towards the requirements of more than one major, according to "Multiple Majors" section of this bulletin. The Major-Minor and Multiple Major Course Approval Form is required for graduation for students with dual degrees.
3. The Writing, General Education, and Language requirements.
4. The curricular requirements of two majors (one of which leads to a Bachelor of Arts degree and the other to a Bachelor of Science degree).
5. Students admitted as freshmen—A minimum of 180 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 180 units in resident work may petition for a waiver of the last quarter-in-residence requirement for up to 15 units.
6. Students admitted as transfers—A minimum of 135 units (including the last quarter in residence) at Stanford. In special cases, students who have earned at least 135 units in resident work may petition for a waiver of the last quarter-in-residence requirement.

A student interested in dual bachelor's degrees should declare them in Axxess no later than two quarters in advance of completing the program.

Students who do not meet the higher unit and residence requirements of the dual degree option may be eligible instead for the B.A.S. degree as described above.

## Second Bachelor's Degree

Stanford does not award a second Bachelor of Arts degree to an individual who already holds a Bachelor of Arts, nor a Bachelor of Science degree to an individual who already holds a Bachelor of Science degree. However, the holder of a Bachelor of Arts degree from Stanford may apply to the C-USP Subcommittee on Academic Standing for admission to candidacy for a Bachelor of Science degree, and the holder of a Bachelor of Science degree from Stanford may apply for candidacy for a Bachelor of Arts degree.

The C-USP Subcommittee on Academic Standing determines whether the application for a second degree may be approved and/or the conditions a student must meet in order to be allowed to earn a second degree. A recommendation of the major department for the second bachelor's degree must accompany the application.

Generally, a holder of a B.A. or B.S. degree may not apply for the Bachelor of Arts and Sciences degree, although a student may submit a petition for exception. The office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall, reviews these petitions. A student approved for this program may register as an undergraduate and is subject to the current rules and regulations affecting undergraduates. Requirements for a second Stanford bachelor's degree are the same as those described above for dual bachelor's degrees.

## Coterminal Bachelor's and Master's Degrees

See the "Coterminal Degrees (p. 36)" section of this Bulletin.

## The Major

The primary purpose of the major is to encourage each student to explore a subject area in considerable depth. This in-depth study complements the breadth of study promoted by the General Education Requirements and, in many cases, by a student's choice of electives. Work in depth permits practice in critical analysis and the solving of problems. Because of its depth, such study also provides a sense of how knowledge grows and is shaped by time and circumstances.

The structure of a major should be a coherent reflection of the logic of the discipline it represents. Ideally, the student should be introduced to the subject area through a course providing a general overview, and upper-division courses should build upon lower-division courses. The course of study should, if feasible, give the student the opportunity and responsibility of doing original, creative work in the major subject. Benefits of the major program are greatest when it includes a culminating and synthesizing experience such as a senior seminar, an undergraduate thesis, or a senior project.

## Degree Requirements

Undergraduates must select a major by the end of their sophomore year. All undergraduate major programs listed in this bulletin, except for certain honors degree programs that require application and admission in advance, are open to all students. Students may use Axxess to declare, drop, or change a major. In some departments or programs, though, a late change could easily result in extending the period of undergraduate study. Students who have applied to graduate or who wish to declare an individually designed major must use the Declaration or Change of Undergraduate Major, Minor, Honors, or Degree Program ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change\\_UG\\_program.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change_UG_program.pdf)) to select or change a major. Students requiring assistance should contact the Student Services Center (<http://www.stanford.edu/group/student-services-center>). For academic advising regarding majors, students should consult the office ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual)) of Undergraduate Advising and Research (UAR).

Check individual department or program listings in this bulletin for the undergraduate degrees offered and for specific major requirements. If an area of study has no baccalaureate degree, that discipline is not available as a regular undergraduate major.

Faculty set the minimum requirements for the major in each department. These requirements usually allow latitude for tailoring a major program to a student's specific educational goals. The responsibility for developing a

major program within department or program requirements lies ultimately with the individual student working in consultation with the major adviser.

## Limits of the Major

In order to achieve the values of study in depth, a well-structured major should constitute at least one-third of a student's program (55-65 units). To ensure the values of breadth, a major should comprise no more than two-thirds of a student's program (115-125 units); and, to avoid intellectual parochialism, a major program should not require a student to take more than about one-third of his or her courses from within a single department.

Major requirements in cognate subjects essential to the structure of a given major should be counted as part of the major program in applying these guidelines. Department or school requirements designed to provide extra disciplinary breadth should not be counted.

For a limited number of qualified students, many departments and programs offer special programs leading to degrees with honors. A student may apply to the major department or program for acceptance into the honors program. Demands on the student may vary, but all honors programs encourage creative, independent work at an advanced level in addition to the major requirements.

The guidelines set forth here are deliberately general; implementation must take into account the specific needs of a student's program and the nature of the discipline or disciplines involved. The exercise of responsibility in achieving the desired educational balance belongs first with the student, who, after all, has the strongest interest in the value of his or her education. It belongs secondarily to departments and major programs, which must set the requirements of competence in the many majors offered.

## Multiple Majors

Although most students declare only one major, a student may formally declare more than one major within a single bachelor's degree (B.A., B.S., or B.A.S.) program. The student may do that either at the time of initial major declaration or, as may be more advisable given the planning required to complete more than one major, by amending the original declaration. The student's major departments or programs have access routinely to all information pertinent to that student's academic record (for example, course and grade information), and each is expected to provide advising and other assistance. Students may pick up appropriate information regarding major declarations from the Student Services Center (<http://www.stanford.edu/group/studentervicescenter>). To be awarded a bachelor's degree with multiple majors, the student must fulfill the following requirements:

1. Formally declare all majors through Axxess to the Office of the University Registrar.
2. Satisfy the requirements of each major without applying any course towards the requirements of more than one major or any minor unless:
  - A. overlapping courses constitute introductory skill requirements (for example, introductory math or a foreign language);
  - B. overlapping courses enable the student to meet school requirements (for example, for two majors within the School of Engineering). Currently, only the School of Engineering has school requirements for its undergraduate majors.

Students pursuing multiple majors must complete a multiple major program form indicating which courses they plan to apply toward each major and any minor(s). Departments must certify that the plan of study meets all requirements for the majors and any minor(s) without unallowable overlaps in course work; the School of Engineering Dean's office certifies this information in any case involving an Engineering major or minor. To facilitate advance planning, multiple major program forms are available at any time from the Registrar's forms web site (<http://studentaffairs.stanford.edu/registrar/forms>). The Major-Minor and Multiple Major Course Approval Form ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/MajMin\\_MultMaj.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/MajMin_MultMaj.pdf)) is required for

graduation for students with multiple majors or a minor. The form should be submitted to the Student Services Center (<http://www.stanford.edu/group/studentervicescenter>) by the Final Study L1st deadline of the quarter of intended graduation.

If the pursuit of multiple majors unduly delays an undergraduate's progress through Stanford, the University reserves the right to limit a student to a single major.

When students cannot meet the requirements of multiple majors without overlaps, the secondary major (<http://stanford.edu/dept/registrar/bulletin/4894.htm>), may be relevant.

## Secondary Major

In some cases, students may complete course requirements for more than one major, but they may not meet the requirements outlined for the multiple major option. For example, the student may develop a course plan in which courses requisite for one major overlap with requirements for another. In these cases, the student may declare a secondary major which results in the transcript bearing an annotation that the course requirements for that major have also been met. Secondary majors are not listed on the diploma. Students declare secondary majors through the Declaration or Change of Undergraduate Major, Minor, Honors, or Degree Program . ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change\\_UG\\_program.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change_UG_program.pdf))

## Foreign Language Proficiency

The notation "proficiency in (language)" appears on the official transcripts of those students whose levels of achievement are found by procedures established by the Language Center to be roughly equivalent to knowledge an excellent student can be expected to demonstrate late in the third quarter of the third year of study in that language.

## Undergraduate Minor

Students completing a bachelor's degree may elect to complete one or more minors in addition to the major. Minors must be officially declared by students no later than the deadline for their application(s) to graduate, according to declaration procedures developed and monitored by the Registrar. Earlier deadlines for declaration of the minor may be set by the offering school or department. Satisfactory completion of declared minors is noted on the student's transcript after degree conferral.

A minor is a coherent program of study defined by the department or degree program. It may be a limited version of a major concentration or a specialized subset of a field. A minor consists of no fewer than six courses of 3 or more units to a maximum of 36 units of letter-graded work, except where letter grades are not offered. Departments and degree programs establish the structure and requirements of each minor in accordance with the policy above and within specific guidelines developed by the deans of schools. Programs which do not offer undergraduate degrees may also make proposals to their cognizant deans to establish a minor. Requirements for each minor are described in the individual department or program listings in this bulletin.

Students may not overlap (double-count) courses for completing major and minor requirements, unless:

1. Overlapping courses constitute introductory skill requirements (for example, introductory math or a foreign language), or
2. Overlapping courses enable the student to meet school requirements (for example, for a major within the School of Engineering and a minor). Currently, only the School of Engineering has school requirements for its undergraduate majors.

Undergraduates use Axxess to declare or drop a minor. The Major-Minor and Multiple Major Course Approval Form ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change\\_UG\\_program.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change_UG_program.pdf)) is required

for graduation for students with a minor. The form should be submitted to the Student Services Center (<http://www.stanford.edu/group/studentervicescenter>) by the final study list deadline of the quarter of intended graduation.

Students with questions about declaring minors or double-counting courses towards combinations of majors and/or minors should consult with the departments or programs involved or the Student Services Center. For academic advising regarding minors, students should consult the Undergraduate Advising and Research Office ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_uar](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_uar)) (UAR).

## Baccalaureate Honors With Distinction

In recognition of high scholastic attainment, the University, upon recommendation of a major department or program, awards the Bachelor's Degree with Distinction. Distinction is awarded to 15% of the graduating class based on cumulative grade point averages. Distinction is calculated at the end of the Winter Quarter for each graduating class.

Students are also urged to consider the departmental honors programs that may give depth to their major study and to consider, as well, how the interdisciplinary honors programs might contribute to the quality of their undergraduate education.

## Departmental Honors Programs

In recognition of successful completion of special advanced work, departments may recommend their students for honors in the major. Departmental honors programs demand independent creative work at an advanced level in addition to major requirements. If approved for departmental honors, the student should declare the Honors degree through Axess.

## Interdisciplinary Honors Programs

In recognition of successful completion of honors program requirements, the following interdisciplinary programs can recommend students majoring in any field for honors in their program:

- Comparative Studies in Race and Ethnicity
- Democracy, Development, and the Rule of Law
- Education
- Environmental Science, Technology, and Policy
- Ethics in Society
- Feminist Studies
- International Security Studies
- Latin American Studies

The interdisciplinary honors programs are designed to complement study in a department major. The requirements for these honors programs are described in the department sections of this bulletin. If approved for interdisciplinary honors, the student should submit the Declaration or Change of Undergraduate Major, Minor, Honors, or Degree Program form ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change\\_UG\\_program.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/change_UG_program.pdf)) to the Student Services Center (<http://www.stanford.edu/group/studentervicescenter>) to declare the Interdisciplinary Honors Program.

# General Education Requirements

## Purpose

The General Education Requirements are an integral part of undergraduate education at Stanford. Their purpose is:

1. to introduce students to a broad range of fields and areas of study within the humanities, social sciences, natural sciences, applied sciences, and technology; and
2. to help students prepare to become responsible members of society.

Whereas the concentration of courses in the major is expected to provide depth, the General Education Requirements have the complementary purpose of providing breadth to a student's undergraduate program. The requirements are also intended to introduce students to the major social, historical, cultural, and intellectual forces that shape the contemporary world.

Fulfillment of the General Education Requirements in itself does not provide a student with an adequately broad education any more than acquiring the necessary number of units in the major qualifies the student as a specialist in the field. The major and the General Education Requirements are meant to serve as the nucleus around which the student is expected to build a coherent course of study by drawing on the options available among the required and elective courses.

Information regarding courses that have been certified to fulfill the General Education Requirements, and regarding a student's status in meeting these requirements, is available at the Student Services Center. Course planning and advising questions related to the General Education Requirements should be directed to Undergraduate Advising and Research.

It is the responsibility of each student to ensure that he or she has fulfilled the requirements by checking in Axess. This should be done at least two quarters before graduation.

Students should be very careful to note which set of General Education Requirements apply to them. The date of matriculation at Stanford determines which requirements apply to an individual student.

## Area Requirements

The following structure for General Education Requirements, including Thinking Matters, Disciplinary Breadth, and Education for Citizenship became effective with the 2012-13 entering freshman and transfer class. Undergraduates matriculating prior to 2012-13 should consult the relevant Bulletin from the year in which they began study at Stanford ([http://www.stanford.edu/dept/registrar/bulletin\\_past](http://www.stanford.edu/dept/registrar/bulletin_past)) to determine the requirements applying to them.

## Thinking Matters

This requirement is satisfied by completing a one quarter, 4-unit courses for freshmen under the subject THINK.

Taught by faculty from a wide range of disciplines and fields, Thinking Matters (THINK) courses express Stanford's commitment to liberal education and emphasize rigorous critical inquiry through exploration of significant and enduring questions. These courses satisfy the one quarter freshman Thinking Matters requirement that recognizes the importance of developing students' skills in interpretation, reasoning, and analysis as a solid foundation for undergraduate study. Multiple Thinking Matters courses may also be taken as electives.

- THINK courses for 2012-13

## Disciplinary Breadth

This requirement is satisfied by completing five courses of which one course must be taken in each subject area.

Disciplinary Breadth gives students educational breadth by providing experience in the following areas. Each area is linked to a comprehensive list of courses on ExploreCourses.

- Engineering and Applied Science (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERDBEngrAppSci=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)
- Humanities (<https://explorecourses.stanford.edu/search?filter-term-Autumn=on&filter-term-Summer=on&page=0&q=%25&filter-ger-GERDBHum=on&filter-coursestatus-Active=on&view=catalog&filter-term-Spring=on&collapse=%2c5%2c&filter-term-Winter=on&catalog=71>)
- Mathematics (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERDBMath=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)
- Natural Sciences (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERDBNatSci=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)
- Social Sciences (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERDBSocSci=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)

## Education for Citizenship

This requirement is requirement satisfied by completing two courses in different subject areas; or completing two Disciplinary Breadth courses which also satisfy different Education for Citizenship subject areas.

Education for Citizenship provides students with some of the skills and knowledge that are necessary for citizenship in contemporary national cultures and participation in the global cultures of the 21st century.

Education for Citizenship is divided into four subject areas. Each area is linked to a comprehensive list of courses on ExploreCourses. Further explanation of the purposes of Education for Citizenship requirements follows below.

- Ethical Reasoning (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERCEthicReas=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)
- Global Community (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERECGlobalCom=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)
- American Cultures (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERECAmerCul=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)

- Gender Studies (<https://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-ger-GERECGender=on&filter-coursestatus-Active=on&collapse=%2C5%2C>)

## Ethical Reasoning

Courses introduce students to the pervasiveness, complexity, and diversity of normative concepts and judgments in human lives, discuss skeptical concerns that arise about normative practices, review ways in which people have engaged in ethical reflection, and consider ethical problems in light of diverse ethical perspectives.

## The Global Community

Courses address the problems of the emerging global situation. They may compare several societies in time and space or deal in depth with a single society, either contemporary or historical, outside the U.S. Challenges of note: economic globalization and technology transfer; migration and immigration; economic development, health; environmental exploitation and preservation; ethnic and cultural identity; and international forms of justice and mediation.

## American Cultures

Courses address topics pertaining to the history, significance, and consequences of racial, ethnic, or religious diversity in the culture and society of the U.S. Challenges of note: equity in education; employment and health; parity in legal and social forms of justice; preserving identity and freedom within and across communities.

## Gender Studies

Courses address gender conceptions, roles, and relations, and sexual identity in a contemporary or historical context; they critically examine interpretations of gender differences and relations between men and women. Challenge of note: changing sexual and physiological realities in contemporary and historical perspective.

Courses certified as meeting the General Education Requirements must be taken for a letter grade and a minimum of 3 units of credit. A single course may be certified as fulfilling only one subject area within the General Education Requirements; the one exception is that a course may be certified to fulfill an Education for Citizenship subject area in addition to a Disciplinary Breadth subject area.

## Notational Symbols

Courses that have been certified as meeting the requirements are identified throughout ExploreCourses with the notational symbols listed below.

Notational symbol	Area
Thinking Matters	
THINK	Freshman Year
Disciplinary Breadth	
DB-EngrAppSci	Engineering and Applied Sciences
DB-Hum	Humanities
DB-Math	Mathematics
DB-NatSci	Natural Sciences
DB-SocSci	Social Sciences
Education for Citizenship	
EC-AmerCul	American Cultures
EC-GlobalCom	Global Communities
EC-Gender	Gender Studies
EC-EthicReas	Ethical Reasoning

## Credit Transfer

Students may propose that work taken at another college or university be accepted in fulfillment of a General Education Requirement. In such cases, the Office of the University Registrar determines, after appropriate faculty consultation, whether the work is comparable to any of the specifically certified courses or course sequences. To fulfill GER requirements through transfer work, the course must match a specific Stanford course that fulfills the same GER requirement, be a minimum of three quarter units, and be taken for a letter grade.

## Language Requirement

To fulfill the Language Requirement, undergraduates are required to complete one year of college-level study or the equivalent in a foreign language. Students may fulfill the requirement in any one of the following ways:

1. Complete three quarters of a first-year, 4-5 units language course at Stanford or the equivalent at another recognized post-secondary institution subject to current University transfer credit policies. Language courses at Stanford may be taken with the Credit/No Credit grading basis, if so offered, to fulfill the requirement.
2. Score 4 or 5 on the Language Advanced Placement (AP) test in one of the following languages: Chinese, French, German, Japanese, Latin, or Spanish. Advanced Placement (AP) tests in foreign literature do not fulfill the requirement.
3. Achieve a satisfactory score on the SAT II Subject Tests in the following languages taken prior to college matriculation:

4. Test Subject	Score
Chinese	630
French	640
German	630
Latin	630
Spanish	630
Italian	630
Japanese	620
Korean	630
Hebrew	540

5. Take a diagnostic test in a particular language which either:
  - A. Places them out of the requirement, or
  - B. Diagnoses them as needing one, two, or three additional quarters of college-level study. In this case, the requirement can then be fulfilled either by passing the required number of quarters of college-level language study at Stanford or the equivalent elsewhere, or by retaking the diagnostic test at a later date and placing out of the requirement.

Written placements are offered online throughout the summer in Chinese, French, German, Italian, Japanese, Russian, Spanish, and Spanish for home background speakers.

For a full description of Language Center offerings, see the "Language Center" section of this bulletin under the school of Humanities and Sciences.

## Writing and Rhetoric Requirement

All instructors at Stanford University expect students to express themselves effectively in writing and speech. The Writing and Rhetoric requirement helps students meet those high expectations.

All candidates for the bachelor's degree, regardless of the date of matriculation, must satisfy the Writing and Rhetoric requirement. Transfer students are individually reviewed at the time of matriculation by the Office of the University Registrar's Degree Progress section and, if necessary, the Program in Writing and Rhetoric (PWR) as to their status with regard to the requirement.

The Writing and Rhetoric requirement includes courses at three levels. The first two levels are described in more detail below. Writing-intensive courses that fulfill the third level, the Writing in the Major (WIM) requirement, are designated under individual department listings.

All undergraduates must satisfy the first-level Writing and Rhetoric requirement (WR 1) in one of four ways:

1. PWR 1: a course emphasizing writing and research-based argument.
2. SLE: writing instruction in connection with the Structured Liberal Education program.
3. ESF: writing instruction in connection with the Education as Self-Fashioning Thinking Matters course.
4. Transfer credit approved by the Office of the University Registrar for this purpose.

All undergraduates must satisfy the second-level Writing and Rhetoric Requirement (WR 2) in one of four ways:

1. PWR 2, a course emphasizing writing, research, and oral presentation of research.
2. SLE: writing and oral presentation instruction in connection with the Structured Liberal Education program.
3. A course offered through a department or program certified as meeting the WR 2 requirement by the Writing and Rhetoric Governance Board. These courses are designated as Write-2.
4. Transfer credit approved by the Office of the University Registrar for this purpose.

A complete listing of PWR 1 courses is available each quarter on the UAL ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html)) web site, and at the PWR office in Sweet Hall, Third Floor. Complete listings of PWR 2 and Write-2 courses are available to students on the UAL ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html)) web site the quarter before they are scheduled to complete the WR 2 requirement.

For a full description of the Program in Writing and Rhetoric (PWR), see the "Writing and Rhetoric (p. 80)" section of this bulletin under the Vice Provost of Undergraduate Education.

Students who matriculated prior to Autumn 2003 should consult previous issues of the Stanford Bulletin or the PWR office to determine what requirements apply.

## Credit

### Activity Courses

For undergraduates, a maximum of 8 units of credit earned in activity courses, regardless of the offering department or if accepted as transfer units, count towards the 180 (225 if dual degrees are being pursued) units required for the bachelor's degree. All activity courses are offered on a satisfactory/no credit basis.

### Courses Taken on Satisfactory/No Credit or Credit/No Credit Basis

A maximum of 36 units of credit (including activity courses) taken at Stanford or its overseas campuses for a "CR" or "S" grade may be applied

towards the 180 (225 if dual degrees are being pursued) units required for the bachelor's degree. The maximum for transfer students is 27 units.

Departments may also limit the number of satisfactory or credit courses accepted towards the requirements for a major. Satisfactory/Credit courses applied towards a minor may be similarly limited. Courses not letter-graded are not accepted in fulfillment of the General Education Requirements. Writing in the Major courses are usually offered letter grade only. In those instances where the course is offered for a letter grade or CR/NC, the course must be taken for a letter grade to fulfill the Writing in the Major requirement.

## Internship Guidelines

Undergraduate internships should not by themselves carry any credit. However, an individual student may arrange with a faculty member for a research or other academic project to be based on the internship. Arrangements between students and faculty regarding credit are expected to be made well in advance of the internship. Credit should be arranged within departmental rules for directed reading or independent study and should meet the usual department standards. No transfer credit is awarded for internships.

## Last Units out of Residence

Students may petition to complete their final 15 units out of residence to complete their degree requirements. The final 15 units of transfer credit must meet the criteria in the undergraduate "Transfer Work (<https://exploreddegrees-nextyear.stanford.edu/undergraduatedegreesandprograms/#transferworktext>)" section of this bulletin. Students must submit the Request for Last Units Out of Residence Petition (<http://studentaffairs.stanford.edu/registrar/forms>) to determine eligibility and to request pre-approval of the transfer work. A registration status is required to graduate. Students should select either the Graduation Quarter or the Permit for Services Only special registration status on the Last Units Out of Residence petition. Refer to the Special Registration Status section of the bulletin for a description of these statuses. An application to graduate should be submitted through Axxess.

## Concurrent Enrollment

Students may enroll concurrently at Stanford and at another college or university. The following policies apply to concurrent enrollment:

1. Students may not exceed 20 quarter units between both schools. This is the same unit maximum for undergraduates at Stanford. (One semester credit or hour generally equals 1.5 quarter units.)
2. Satisfactory academic progress is determined only by Stanford courses and units. Transfer work completed at other institutions is not considered in this calculation.
3. Students are expected to submit a Request for Transfer Credit Evaluation (<http://studentaffairs.stanford.edu/registrar/forms>) for pre-approval of transfer credit prior to enrolling in the transfer institution.

## Advanced Placement

Stanford University allows up to 45 units of external credit (90 units for transfer students) toward graduation including work completed in high school as part of the College Board Advanced Placement curriculum. The awarding of such credit is based on Advanced Placement test scores and is subject to University and department approval.

The faculty of a given department determine whether any credit toward the 180-unit requirement can be based on achievement in the College Board Advanced Placement Program in their discipline. Stanford departments electing to accept the Advanced Placement (AP) credit are bound by these University policies:

1. Credit is usually granted for an AP score of 4 or 5. Usually, 10 quarter units are awarded (but occasionally fewer than 10). No more than 10 quarter units may be given for performance in a single examination.
2. Whether credit is to be given for an AP score of 3 is a matter for departmental discretion; up to 10 units may be awarded.
3. No credit may be authorized for an AP score lower than 3.

Performance on an AP exam can indicate the appropriate placement for continuing course work in that subject at Stanford. If students enroll in courses at Stanford for which they received equivalent AP credit, the duplicating AP credit will be removed. The chart below shows the current AP credit and placement policies.

A maximum of 45 quarter units of Advanced Placement (AP), transfer credit, and/or other external credit (such as International Baccalaureate) may be applied toward the undergraduate degree. More than 45 units of AP, transfer, and other external credit may appear on the Stanford University transcript; however, only 45 units can be applied to the minimum units required for the undergraduate degree. Once credit has been posted it cannot be removed from the student record. Stanford University policies on AP and other external credit are subject to review and change on an annual basis. Subjects not listed on this chart are not eligible for AP credit at Stanford University.

Further information is available from the Student Services Center (<http://www.stanford.edu/group/student-services-center>) or at the Registrar's (<http://studentaffairs.stanford.edu/registrar/students/ap>) web site.

## AP Scores and Placement

Test Subject	Score	Placement	Quarter Units
Calculus AB (or AB subscore)	5	MATH 51	10
Calculus AB (or AB subscore)	4	MATH 42	5
Calculus BC	4,5	MATH 51	10
Calculus BC	3	MATH 42	5
Chemistry	5	CHEM 33 or above	4
Chinese (Language and Culture)1	5	Take placement exam if continuing in this language	10
Computer Science A	4,5	CS 106B or 106X	5
Computer Science AB	4,5	CS 106B, 106X, or 107	5
French (Language)1	5	Take placement exam if continuing in this language	10
German (Language)1	5	Take placement exam if continuing in this language	10
Japanese (Language and Culture)1	5	Take placement exam if continuing in this language	10
Latin (Literature or Virgil)1	4,5	Take placement exam if continuing in this language	10
Physics B	5	PHYSICS 25	8
Physics B	4	PHYSICS 23 and 25	4
Physics C Mechanics only	4,5	PHYSICS 43 and 45 or PHYSICS 23 and 25	5

Physics C Mechanics only	3	PHYSICS 41,43 and 45 or PHYSICS 23 and 25	4
Physics C E&M only	4,5	PHYSICS 41 and 45 or PHYSICS 21 and 25	5
Physics C E&M only	3	PHYSICS 41,43 and 45 or PHYSICS 21 and 25	4
Physics C Both Parts	4,5	PHYSICS 45 or PHYSICS 25	10
Physics C Both Parts	3	PHYSICS 41,43 and 45 or PHYSICS 25	8
Spanish (Language) <sup>1</sup>	5	Take placement exam if continuing in this language	10

<sup>1</sup> A score of 4 or 5 on this test fulfills the Language Requirement. A score of 5 is required to receive 10 units of credit.

Stanford University awards advanced placement credit for certain International Baccalaureate and international advanced placement subject examinations. The international test subjects must match the content of the College Board Advanced Placement test subjects that receive advanced placement credit.

## Undergraduate Transfer Work

Academic credit for work done elsewhere may be allowed toward a Stanford bachelor's degree under the following rules and conditions:

1. Credit may be granted for work completed at institutions in the U.S. only if the institutions are accredited.
2. Study in institutions outside the U.S., when validated by examination results, tutorial reports, or other official evidence of satisfactory work, may be credited toward a Stanford bachelor's degree, subject to the approval of the credit evaluator and the appropriate departments.
3. Credit is officially allowed only after the student has been unconditionally admitted to Stanford.
4. Credit is allowed for work completed at institutions in the U.S. only on the basis of an official transcript received by the Registrar at Stanford directly from the institution where the credit was earned.
5. Credit from another institution may be transferred for courses which are substantially equivalent to those offered at Stanford University on the undergraduate level, subject to the approval of the credit evaluator. A maximum of 20 quarter units may represent courses which do not parallel specific undergraduate courses at Stanford, again, subject to the approval of the credit evaluator as to quality and suitability.
6. Course work cannot duplicate, overlap, or regress previous work.
7. Transfer course work cannot count towards secondary school diploma and/or graduation requirements.
8. To fulfill GER requirements through transfer work, the course must match a specific Stanford course that fulfills the same GER requirement, be a minimum of three quarter units, and be taken for a letter grade.
9. Transfer work can be used to satisfy a department major or minor requirement. The transfer work must first be officially accepted into the University through the Office of the University Registrar. Departments determine if approved transfer work can be used to satisfy a department major or minor requirement.

10. The credit allowed at Stanford for one quarter's work may not exceed the number of units that would have been permissible for one quarter if the work had been done at Stanford; for work done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.
11. Credit is allowed at Stanford for work graded 'A,' 'B,' 'C,' or 'Pass' (where 'Pass' is equivalent to a letter grade of 'C' or above), but not for work graded 'D' or below.
12. No more than 45 (90 for transfer students) quarter units of credit for work done elsewhere may be counted toward a bachelor's degree at Stanford (including advance placement test credit).
13. Credit earned in extension, correspondence, and online courses is transferable only if the university offering the courses allows that credit toward its own bachelor's degree. Such credit is limited to a maximum of 45 quarter units for extension courses, a maximum of 15 quarter units for correspondence and online study, and a maximum of 45 quarter units for the combination of extension, correspondence, and online courses.
14. Credit earned in military training and service is not transferable to Stanford, unless offered by an accredited college or university in the U.S. and evaluated as above by the credit evaluator.

## Special Registration Statuses (Undergraduate)

The following reduced-tuition categories can be requested by undergraduates in the final stages of their degree program:

### Permit to Attend for Services Only (PSO)

Undergraduates in their terminal quarter who are completing honors theses, clearing incomplete grades, or have completed all requirements and are requiring a registration status to utilize university resources, may petition one time only for PSO status. PSO does not permit any course enrollment. Students should apply to graduate through Axess if applying for the PSO special registration status. The deadline for the completed PSO petition (<http://studentaffairs.stanford.edu/registrar/forms>) is the Preliminary Study List (<http://studentaffairs.stanford.edu/registrar/students/prelim-study-list>) deadline of the applicable quarter.

### 13th Quarter

Undergraduates who have completed at least twelve full-time quarters may petition to register for 13th Quarter registration status at a reduced tuition rate for their final quarter, but must register for at least eight units. Undergraduate dual degree students must complete at least fifteen full-time quarters before petitioning for reduced tuition in their final quarter. Undergraduates should apply to graduate through Axess if applying for the 13th-quarter special registration status.

### Graduation Quarter

Undergraduates may petition one time only for Graduation Quarter in their terminal quarter only if:

1. filing a Request for Last Units Out of Residence (<http://studentaffairs.stanford.edu/registrar/forms>) in order to complete up to 15 final units at another institution; or
2. returning from a discontinued status and filing a Request to Return and Register in Undergraduate Study ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/RR\\_petitions\\_returningtostanford.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/RR_petitions_returningtostanford.html)) in order to confer their degree; or

- if all degree requirements have been completed and student requires a registration status to graduate, but will not be using University resources or housing.

Coterm students are only eligible for the Graduation Quarter special registration status if they are conferring both the undergraduate and graduate degree in the same quarter. Undergraduates may be eligible for Graduation Quarter status in these three situations only if the student has completed all graduation requirements and will not be utilizing University resources, including housing. The deadline for the completed Graduation Quarter petition (<http://studentaffairs.stanford.edu/registrar/forms>) is the Preliminary Study List (<http://studentaffairs.stanford.edu/registrar/students/prelim-study-list>) deadline of the applicable quarter.

## Minimum Progress for Undergraduates

Undergraduates are expected to finish their degree requirements in a timely fashion. In addition to maintaining academic standing obligations, students are expected to take courses to progress towards a Bachelor of Arts or a Bachelor of Science. If after 12 quarters, an undergraduate is not on track to complete degree requirements and graduate within the next two quarters, the University may impose requirements with deadlines on a student's course of study. Further, if a student fails to meet those imposed requirements and/or has not after 18 quarters completed all degree requirements, the University may discontinue the student for failure to progress.

## Leaves of Absence and Reinstatement (Undergraduate)

Undergraduates are admitted to Stanford University with the expectation that they will complete their degree programs in a reasonable amount of time, usually within four years.

Students on leave of absence are not registered at Stanford and, therefore, do not have the rights and privileges of registered students. They cannot fulfill any official department or University requirements during the leave period. Students on leave may complete course work for which an 'Incomplete' grade was awarded in a prior term and are expected to comply with the maximum one-year time limit for resolving incompletes; a leave of absence does not stop the clock on the time limit for resolving incompletes.

Leaves of absence for undergraduates may not exceed a cumulative total of two years (eight quarters including Summer Quarters).

### Voluntary Leave

Students have the option of taking a voluntary leave of absence for up to one year upon filing a petition to do so with the Office of the University Registrar and receiving approval. The leave may be extended for up to one additional year provided the student files (before the end of the initial one-year leave) a petition for the leave extension with the Office of the University Registrar and receives approval. Undergraduates who take an approved leave of absence while in good standing may enroll in the University for the subsequent quarter with the privileges of a returning student. However, the University may condition its approval of a petition for leave of absence on the student's meeting such requirements as the University deems appropriate in the individual case for the student to be eligible to return (such as, in the case of a leave for medical reasons, proof of treatment and/or an interview with a provider at Vaden Health Center

(<http://vaden.stanford.edu>) or Counseling and Psychological Services (<http://vaden.stanford.edu/caps>) or its designee).

New freshmen and transfers are required to register in Autumn Quarter and may not take a leave of absence prior to or during to their first quarter, except with the permission of the Vice Provost for Undergraduate Education (or his or her designee) under extenuating circumstances. However, new Stanford students may request a deferment from the Office of Undergraduate Admission.

Undergraduates who wish to withdraw from the current quarter, or from a quarter for which they have registered in advance and do not wish to attend, must file a leave of absence petition (<http://studentaffairs.stanford.edu/sites/default/files/registrar/files/leaveofabsence.pdf>) with and receive approval from the office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall. Information on tuition refunds is available in the "Refunds (<https://exploreddegrees-nextyear.stanford.edu/tuitionfeesandhousing/#refundstext>)" section of this bulletin.

### Involuntary Leave

An involuntary leave of absence can be imposed in circumstances in which a student:

- presents a substantial risk of harm to self or others or is failing to carry out substantial self-care obligations; or
- significantly disrupts the educational or other activities of the University community; or
- is unable to participate meaningfully in educational activities; or
- requires a level of care from the University community that exceeds the resources and staffing that the University can reasonably be expected to provide for the student's well-being.

Students whose circumstances warrant a review under the Involuntary Leave of Absence Policy, will be apprised, in writing, of University concerns by the Dean of Student Life and will be provided an opportunity to respond to concerns in writing or in person or via telephone before a review committee convened by the Dean of Student Life. Students placed on involuntary leave of absence can appeal an unfavorable decision to the Vice Provost for Student Affairs. The University can condition a student's return to registered student status on such requirements as the University deems appropriate in the individual case (such as, in the case of a leave for medical reasons, proof of treatment of an interview with a health care professional at Vaden Health Center (<http://vaden.stanford.edu>) or Counseling and Psychological Services (<http://vaden.stanford.edu/caps>) or its designee). The Dean of Student Life publishes the full Involuntary Leave of Absence Policy (<http://studentaffairs.stanford.edu/studentlife/involuntary-leave>) on its web site.

When a student is granted or placed on a leave of absence after the beginning of the term, courses in which the student was enrolled after the final study list deadline appear on the student's transcript and show the symbol 'W' (withdraw). For additional information regarding satisfactory academic progress, refer to the "Academic Standing" section of this bulletin. Information on tuition refunds is available in the "Refunds (<https://exploreddegrees-nextyear.stanford.edu/tuitionfeesandhousing/#refundstext>)" section of this bulletin.

### Reinstatement

Students who have exceeded their eight quarters of approved leave, or who fail to submit a Leave of Absence petition by the published deadline and otherwise do not submit a study list, must apply for reinstatement through the Request to Return and Register in Undergraduate Study. The University is not obliged to approve reinstatements of students. Applications for reinstatement are reviewed by the Vice Provost for Undergraduate Education and are subject to the approval of the Faculty Senate Committee on Undergraduate Standards and Policy or its designees. The Committee or its designees may determine whether the application for reinstatement will



be approved or not, and/or the conditions a student must meet in order to be reinstated. Reinstatement decisions may be based on the applicant's status when last enrolled, activities while away from campus, the length of the absence, the perceived potential for successful completion of the program, as well as any other factors or considerations regarded as relevant to the Vice Provost for Undergraduate Education or the Committee.

Applications for reinstatement, through the Request to Return and Register in Undergraduate Study, must be submitted eight weeks prior to the start of the term in which the student seeks to enroll in classes. Information and instructions may be obtained by contacting the office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising Research (UAR), Sweet Hall.

Students who have been expelled from Stanford University are not permitted to apply for reinstatement.

Leaves of absence for and reinstatements of graduate students are addressed in the "Graduate Degrees (<https://exploreddegrees-nextyear.stanford.edu/graduatedegrees>)" section of this bulletin.

## Conferral of Degrees

Upon recommendation to the Senate of the Academic Council by the faculty of the relevant departments or schools and the Committee on Undergraduate Standards and Policy, degrees are awarded four times each year, at the conclusion of Autumn, Winter, Spring, and Summer quarters. All diplomas, however, are prepared and distributed after degree conferral in accordance to the distribution dates listed on the Registrar's Office (<http://studentaffairs.stanford.edu/registrar/students/diplomas>) web site.

Students must apply for conferral of an undergraduate or graduate degree by filing an Application to Graduate by the deadline for each

term. The deadlines are published in the Academic Calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>). A separate application must be filed for each degree program and for each conferral term. Applications are filed through Axess, the online service which allows students to update their administrative/academic records.

Requests for conferral are reviewed by the Office of the University Registrar and the student's department, to verify completion of degree requirements. Registration is required in the conferral term. Students with unmet financial or other University obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released. An academic record where no other degree objective is being pursued is permanently frozen after the final degree conferral, and all subsequent grade change requests will be denied.

Students are typically expected to apply to graduate during the term in which they expect to be awarded a degree. The University, however, reserves the right to confer a degree on a student who has completed all of the requirements for a degree even though the student has not applied to graduate; such an individual would then be subject to the University's usual rules and restrictions regarding future enrollment or registration.

Students who wish to withdraw a request for conferral or make changes to the Application to Graduate should notify the Student Services Center (<http://www.stanford.edu/group/studentservicescenter>) in writing through the Withdrawal of Application to Graduate Form (<http://studentaffairs.stanford.edu/registrar/forms>) by the late application to graduate deadline on the academic calendar. Students who withdraw their graduation applications or fail to meet degree requirements must reapply to graduate in a subsequent term.

Stanford University awards no honorary degrees.

# Undergraduate Major Unit Requirements

## Undergraduate Major Unit Requirements

*The WIM courses listed below reflect courses, offered in past or present years, which satisfy the Writing in the Major (WIM) requirement for majors applying to graduate in the current academic year. Such WIM courses may or may not be offered in the current year. Consult the applicable department section of the Bulletin or ExploreCourses for more information.*

### School of Earth Sciences

Major Department	Units required outside the dept./program	Units required within the dept./program	Total # of units	Notes/Special Requirements	WIM Course
Earth Systems	66-110	24	90-134	internship, senior seminar	EARTHSYS 195, EARTHSYS 200
Energy Resources Engineering	76-83	34	110-117	-	ENERGY 199
Geological & Environmental Sciences	36-53	54-68	93-110	advanced summer field experience	GES 150, GEOPHYS 199
Engineering Geology & Hydrogeology	55-81	19-31	85-101	-	GES 150, GEOPHYS 199
Geophysics	43-45	15	min. 58	-	GES 150, GEOPHYS 199

### School of Engineering

Major Department	Units required outside the dept./program	Units required within the dept./program	Total # of units	Notes/Special Requirements	WIM Course
Aeronautics and Astronautics	56-58	39	95-97	-	AA 190
Architectural Design	40	60	100	-	CEE 100
Atmosphere/Energy	50	51-53	101-103	-	STS 110

Bioengineering	54	62-64	116-118	-	BIOE 131
Biomechanical Engineering	42-63	49-64	103-116	-	ME 203 with ENGR 102M or ENGR 199W with directed research units
Biomedical Computation	51-65	47-56	109-114	Two quarters guided research	ENGR 199W with directed research units (preferred) or CS 272 / BIOMEDIN 212
Chemical Engineering	min. 70	50	min. 120	-	CHEMENG 185A
Civil Engineering	min. 57	min. 59	min. 116	-	CEE 100
Computer Science	min. 29	min. 36	96-106	senior project	CS 181W, CS 191W, CS 194W, CS 210B, CS 294W
Electrical Engineering	45	68	113	Taking EE 191W as WIM requires either 10 units Honors Thesis, 6 units as project work during the academic year, or 3 units after completing a summer REU project. Written report with adviser-supported revision required; adviser from the Writing Center recommended.	EE 109, EE 133, EE 134, EE 168, EE 191W, CS 194W
Engineering Physics	min. 45	min. 48	min. 93	at least 45 units in Engineering Fundamentals and Depths must be engineering units	BIOE 131 (for Biophysics specialty only), CS 181W (for Computational Science specialty only), EE 134, ME 203 with ENGR 102M, MATSCI 161, MATSCI 164, PHYSICS 107
Environmental Engineering	min. 57	min. 59	min. 116	-	CEE 100
Individually Designed Major	41	40	90-107	-	see adviser
Management Science and Engineering	46-79	45-60	96-134	senior project	MS&E 152W, MS&E 193W
Material Science and Engineering	min. 53	min. 50	min 103	-	MATSCI 161, MATSCI 164
Mechanical Engineering	48	68	116	-	ME 203 with ENGR 102M
Product Design	60	53	113	-	ME 203 with ENGR 102M

## School of Humanities and Sciences

Major Department	Units required outside the dept./program	Units required within the dept./program	Total # of units	Notes/Special Requirements	WIM Course
African and African American Studies	50	10	60	AAAS thesis seminar	AFRICAAM 200X
American Studies	20-25	35-40	60	-	AMSTUD 160
Anthropology	15	50	65	foreign language 1st qtr. at 2nd-year level	ANTHRO 90A, ANTHRO 90B, ANTHRO 90C
Archaeology	45	20	65		ARCHLGY 103
Art History	-	61	61	library orientation, junior seminar	ARTHIST 1

Asian American Studies	40	20	60	core curriculum, foundational course, senior research	CSRE 200X
Biology	min. 41	min. 49	90-105	fields of study have different unit ranges	BIO 137, BIO 145, BIO 196A, BIO 197WA, BIO 199W; BIOHOPK 44Y, BIOHOPK 184H
Chemistry	34	52	86	-	CHEM 134
Chicana/o Studies	40	20	60	core curriculum, foundational course, senior research	CSRE 200X
Chinese	0-16	29-44	min. 45	Capstone course: CHINGEN 198	CHINGEN 133
Classics	-	-	60-65	majors seminar (CLASSGEN 176)	CLASSGEN 176
Communication	5	min. 60	65	-	COMM 104W, COMM 120W, COMM 137W
Comparative Literature	-	min. 40	65	Gateway course: 101, Core: 121, 122, 123, Capstone course: 199, 3 electives in COMPLIT	COMPLIT 101
Comparative Studies in Race & Ethnicity	45	15	60	core curriculum, thematic concentration, senior research	CSRE 200X
East Asian Studies	75	1	76	Capstone course; overseas studies in E. Asian country 1 qtr; senior essay	CHINGEN 133; JAPANGEN 138
Economics	-	80	80	-	ECON 101
English	-	68-80	68-80	-	ENGLISH 160; ENGLISH 164; ENGLISH 196A
English w/ Creative Writing	-	73-75	73-75	dept. approval	ENGLISH 160; ENGLISH 164; ENGLISH 196A
English w/ Interdisciplinary Emphasis	15	58-60	73-75	dept. approval and interdisciplinary paper	ENGLISH 160; ENGLISH 164; ENGLISH 196A
English w/ Interdepartmental Emphasis	16-20	53-55	69-75	16-20 units in foreign lang. lit.; dept. approval	ENGLISH 160; ENGLISH 164; ENGLISH 196A
English w/ Philosophy	20-25	57-59	77-84	-	ENGLISH 160; ENGLISH 164; ENGLISH 196A
Feminist Studies	45	18 core	63	focus statement; practicum	FEMST 105, FEMST 153
Film and Media Studies	-	65	65	library orientation, senior seminar	FILMSTUD 101
French	-	32	56	-	FRENCH 130, FRENCH 131, FRENCH 132, FRENCH 133
French and Philosophy	min. 21	32 above #100	65	Gateway course; capstone	FRENCH 130, FRENCH 131, FRENCH 132, FRENCH 133
German	0-25	35-60	60	3 above #130	GERMAN 116; GERMAN 123; GERMAN 123N; GERMAN 127A; GERMAN 135; GERMAN 190

German and Philosophy	min. 21	min. 39	65	Gateway course; capstone	GERMAN 116; GERMAN 123; GERMAN 123N; GERMAN 127A; GERMAN 135; GERMAN 190
History	-	63-65	63-65	3 from #200-298	HISTORY 209S
Human Biology	min. 10	min. 39	min. 87	Internship	HUMBIO 4B
Iberian and Latin American Cultures	0	40	60	core courses	ILAC 120, ILAC 159
Individually Designed Major	-	75	all above #100	honors thesis	see adviser
International Relations	55-70	0-15	70	2 yr. foreign lang; Overseas studies 1 qtr.	POLISCI 110C; POLISCI 110D; POLISCI 148; POLISCI 247R; INTNLREL 130, INTNLREL 140A, INTNLREL 140C; STS 110
Italian	-	32	60	-	ITALIAN 127, ITALIAN 128, ITALIAN 129
Italian and Philosophy	min. 21	32 above #100	65	Gateway course; capstone	ITALIAN 127, ITALIAN 128, ITALIAN 129
Japanese	0-20	25-44	min. 45	Capstone course: JAPANGEN 198-	JAPANGEN 138
Jewish Studies (Individually Designed)	75-77	-	75-77	-	CSRE 200X
Linguistics	-	50	50	foreign language at 6th-quarter level	LINGUIST 150
Mathematical & Computational Science	-	-	73-78	-	CS 181W; MATH 109; MATH 110; MATH 120; MATH 171; STATS 166
Mathematics	up to 15 units	49	64	-	MATH 109; MATH 110; MATH 120; MATH 171
Music	-	62-76	62-76	Total units dependent upon selected, optional concentration area	3 from the following: MUSIC 140, MUSIC 141, MUSIC 142, MUSIC 143, MUSIC 144, MUSIC 145, MUSIC 146, MUSIC 147, MUSIC 147A, MUSIC 148, MUSIC 149, MUSIC 190, MUSIC 251
Native American Studies	40	20	60	core curriculum, foundational course, senior research	CSRE 200X
Philosophy	-	55	55	course in 194 series	PHIL 80
Philosophy and Literature	min. 15	min. 47	65	Gateway course; 194	PHIL 80
Philosophy and Religious Studies	-	60	60	3 seminars; 20 units in each dept. + 20 advanced units from both depts.	PHIL 80 or RELIGST 290
Physics	21-23	58-59	79-82	-	PHYSICS 107

Political Science	0	70	70	Introductory course in primary and secondary concentration, advanced seminar (200 or 300 level)	POLISCI 3P/136S; POLISCI 110C; POLISCI 110D; POLISCI 120C; POLISCI 124R; POLISCI 132S; POLISCI 148; POLISCI 215; POLISCI 224T; POLISCI 236; POLISCI 240J; POLISCI 243R
Psychology	10	60	70	-	PSYCH 55; PSYCH 70; PSYCH 110; PSYCH 138
Public Policy	54	30	84	min. 15 concentration units; senior seminar	PUBLPOL 106
Religious Studies	-	60	60	introductory course, majors' seminar, senior essay or honors thesis, senior colloquium	RELIGST 290
Science, Technology, & Society (B.A.)	62-70	10	72-80	Must take 50+ units in a single concentration area.	ANTHRO 90C; STS 110; CS 181W; COMM 120; HISTORY 140A; MS&E 193W
Science, Technology, & Society (B.S.)	62-70	10	72-80	Must take 50+ units in a single concentration area.	ANTHRO 90C; STS 110; CS 181; COMM 120; HISTORY 140A; MS&E 193W
Slavic Languages and Literatures	-	-	-	-	SLAVIC 146
Russian Language & Literature	0-10	46-56	56	1st- and 2nd- year Russian	SLAVIC 146
Russian Language, Culture, & History	12-20	36-39	56	1st- and 2nd- year Russian	SLAVIC 146
Russian Literature & Philosophy	21	40	67	Gateway course; capstone	SLAVIC 146
Sociology	-	45-60	60	-	SOC 200, SOC 202
Spanish	0	35	60	Spanish Proficiency Notation required	ILAC 120
Studio Art	-	65	65	library orientation, advanced seminar	ARTHIST 1
Symbolic Systems	66-81	4	70-85	-	PHIL 80
Theater and Performance Studies	-	60	60	-	TAPS 1, TAPS 160, TAPS 168H
Urban Studies	41	min. 32	73	25 units in concentration; capstone courses	URBANST 203; SOC 202

# Coterminal Bachelor's and Master's Degrees

## Coterminal Degrees

The coterminal degree program allows undergraduates to study for a master's degree while completing their bachelor's degree(s) in the same or a different department. Undergraduates with strong academic records may apply for admission to a coterminal master's program upon completion of

120 units, but no later than the quarter prior to the expected completion of the undergraduate degree. Full-time enrollment during Summer Quarters, as well as allowable undergraduate transfer credit, are also counted towards quarters of undergraduate study. Students who wish to apply for a master's program after these deadlines must apply through the regular graduate admissions process.

The specific University residency, unit requirement, and additional policies for a bachelor's/master's program are described under the Graduate Degrees section of this bulletin. For University application forms, see the Coterminal Forms (<http://studentaffairs.stanford.edu/registrar/forms/coterm>) web page.

# Coterminal Programs Residency Requirement

The University minimum requirements for the coterminal bachelor's/master's program are as follows:

1. 180 units for the bachelor's degree plus 45 (or higher departmental requirement, as determined by each graduate department) unduplicated units for the master's degree.
2. The requirements for the coterminal program with dual undergraduate degrees are 225 units for the two bachelor's degrees, and 45 units for the master's degree.

For the 45-unit University minimum for the master's degree, all courses must be at or above the 100 level and 50 percent must be courses designated primarily for graduate students (typically at least at the 200 level). Department requirements may be higher. Units for a given course may not be counted to meet the requirements of more than one degree, that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree.

## Application and Admission

### Application

Applications for admission to a coterminal program must fulfill the following conditions:

- Applicants must have earned a minimum of 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. This includes allowable Advanced Placement (AP) and transfer credit.
- Applicants must submit their application and, if admitted, respond to the offer of admission no later than the quarter prior to the expected completion of their undergraduate degree. This is normally the Winter quarter prior to Spring quarter graduation.
- Applicants must meet the requirements and deadlines established by the department or program to which they are applying.
- Applicants are only permitted to apply to one coterminal program per term.
- Coterminal students must have the bachelor's degree conferred before adding a second advanced degree program.

To apply for admission to a coterminal master's program, students must submit to the prospective graduate department the following:

- Application for Admission to Coterminal Masters' Program (<http://registrar.stanford.edu/pdf/CotermApplic.pdf>),
- statement of purpose,
- preliminary program proposal,
- two letters of recommendation from Stanford professors,
- and a current Stanford transcript.

Graduate Record Examination (GRE) scores or other requirements may be specified by the prospective department.

### Admission

Each master's department is responsible for admissions/acceptance decisions for coterminal applicants. Departments or programs must admit coterminal applicants and submit the completed and approved application for admission to the Office of the Registrar no later than the quarter prior to

the expected completion of the undergraduate degree. This is normally the last day of classes in Winter quarter prior to Spring quarter graduation.

Students may defer admission to the coterminal program to a later quarter as long as they still meet all University and departmental requirements for coterminal admission, and the coterminal application has not yet been processed. This may require postponement of conferral of the undergraduate degree.

Admitted students must have one quarter of overlap in the undergraduate and graduate career prior to conferring their undergraduate degree. For example, if the admit term for the coterminal program is Autumn quarter then the earliest that the undergraduate degree can be conferred is Autumn quarter.

## Tuition

For coterminal students, the quarter following completion of 12 full-tuition undergraduate quarters is identified as the first graduate quarter for tuition assessment. Beginning with this quarter (13th quarter), coterminal students are subject to graduate student policies and procedures (including those described in the "Graduate Degrees" section of this bulletin) in addition to undergraduate minimum progress standards. These policies include continuous registration or leaves of absence for quarters not enrolled and minimum progress guidelines. Tuition and Fee information for 2012-13 ([http://studentaffairs.stanford.edu/registrar/students/tuition-fees\\_12-13](http://studentaffairs.stanford.edu/registrar/students/tuition-fees_12-13)) is available on The Office of the University Registrar web site.

### Undergraduate Tuition Assessment

Students will normally remain in the undergraduate coterminal student group until the completion of 12 undergraduate quarters.

- Students in the undergraduate coterminal student group are assessed the undergraduate tuition rate, and are subject to the 20-unit maximum enrollment per quarter.
- Students in the undergraduate coterminal group who have fewer than 12 quarters at Stanford but who want to enroll at the 8, 9, 10 unit graduate or graduate Engineering tuition rate may request to be moved to the graduate coterminal student group under the following conditions
  - They must have completed 180 undergraduate units. This includes transfer credit but not AP and other external test credit.
  - Once students have moved to the graduate coterminal student group, they may not move back to the undergraduate coterminal student group.

### Graduate Tuition Assessment

For coterminal students, the quarter following completion of 12 full-tuition undergraduate quarters is identified as the first graduate quarter for tuition assessment. Thus, coterminal students are changed from the undergraduate to the graduate coterminal student group in the 13th quarter and are then assessed either the regular graduate tuition rate or the graduate Engineering tuition rate.

- Students in the graduate coterminal student group are assessed the graduate tuition rate, and are subject to the 24-unit maximum enrollment per quarter.
- For coterminal students with two undergraduate degrees, the quarter following completion of 15 full-tuition undergraduate quarters is identified as the first graduate quarter for tuition assessment. Thus, coterminal students are changed from the undergraduate to the graduate coterminal student group in the 16th quarter and are then assessed either the regular graduate tuition rate or the graduate Engineering tuition rate.

- Beginning with the first graduate coterminal student group quarter, coterminal students are subject to graduate student policies and procedures (including those described in the “Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4902.htm>)” section of the *Stanford Bulletin*) in addition to undergraduate minimum progress standards. These policies include continuous registration or leaves of absence for quarters not enrolled and minimum progress guidelines.
- Once students have moved to the graduate coterminal student group, they may not move back to the undergraduate student group.
- Coterminal students are not eligible for reduced graduate tuition rates below 8 units prior to conferral of the undergraduate degree.
- Students in the graduate coterminal student group are assessed additional graduate or Engineering tuition on a per-unit basis beginning with the 19th unit.

## Assistantships

Students who receive Research Assistant (RA) or Teaching Assistant (CA/TA) appointments from the department prior to the 13th quarter (or 16th quarter for students completing two undergraduate degrees) are changed to the graduate coterminal student group and assessed the applicable graduate tuition rate for the quarter in which they hold the assistantship appointment. Student or department must notify Student Services Center through a HelpSU ticket to change to graduate or graduate Engineering tuition. The following conditions must apply:

- Students must have completed 180 undergraduate units (or 225 for students completing two undergraduate degrees) to be eligible for research or teaching assistantships. Advanced placement and transfer units may be used towards the 180 units (or 225 for students completing two undergraduate degrees), subject to university policies regarding the acceptance of external credit.
- Once students have moved to the graduate coterminal student group, they may not move back to the undergraduate coterminal student group even if they no longer hold an assistantship appointment.
- Student or department should submit a HelpSU (<https://remedyweb.stanford.edu/helpsu/helpsu?pcat=StuAcct&dtag=10772>) ticket to request to be moved to graduate billing.

## Graduate Tuition Option

Students who have fewer than 12 quarters at Stanford but who want to enroll at the 8, 9, 10 unit graduate or graduate Engineering tuition rate may request to the Student Services Center to be moved to the graduate coterminal student group under the following conditions:

- They must have completed 180 units. This includes transfer credit but not AP and other external test credit.
- Once students have moved to the graduate coterminal student group, they may not move back to the undergraduate coterminal student group.
- Coterminal students should submit a HelpSU (<https://remedyweb.stanford.edu/helpsu/helpsu?pcat=StuAcct&dtag=10772>) ticket to request to be moved to graduate billing.

## Degree Progress

### Academic Progress

Once the student is in the Graduate Coterminal Student Group (for tuition purposes), coterminal students are subject to graduate student policies and procedures, as described in the “Graduate Degrees” section of the *Stanford Bulletin*, in addition to undergraduate minimum progress standards.

Up until the conferral of the undergraduate degree(s), coterminal students’ academic progress is monitored by the Undergraduate Advising & Research Office ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/NBY\\_Coterm.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/NBY_Coterm.html)) (UAR, part of the office of the Vice Provost for Undergraduate Education) in conjunction with the graduate department. After the conferral of the undergraduate degree, the students’ degree progress is evaluated using the graduate degree progress standards and monitored by the advisor and graduate department.

Once the coterminal student is subject to graduate degree progress standards, all courses taken during a quarter, whether enrolled in the undergraduate or graduate career, are used to evaluate graduate minimum progress.

## Coterminal Course Transfer

Coterminal students are permitted to count coursework taken in the two quarters immediately prior to their first graduate quarter toward their graduate degree (Summer quarter is not included in the two quarter back count). However, if a student is on an approved leave of absence in the two quarters prior to the admit term, the course transfer option may not be applicable. All course transfer requests should be submitted no later than the quarter prior to intended conferral quarter as course work cannot be transferred once the undergraduate degree is conferred.

## Advising and Time Limit

In the first graduate quarter, a coterminal student is assigned an adviser in the master’s department for assistance in planning a program of study to meet the requirements for the master’s degree. The plan is outlined on the Program Proposal for a Master’s Degree, which is approved by the master’s department by the end of the first graduate quarter. Authorizations for master’s programs expire three calendar years from the first graduate quarter. An extension requires review of academic performance by the department.

## Degree Conferral

Conferral of each degree is applied for separately by the deadlines given in the Academic Calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>) web site. The master’s degree must be conferred simultaneously with, or after, the bachelor’s degree.

Coterminal students must have the bachelor’s degree conferred before adding a second advanced degree program. Courses may not be transferred between undergraduate and graduate careers once the undergraduate degree is conferred.

# Graduate Degrees

## General Requirements

For each Stanford advanced degree, there is an approved course of study which meets University and department requirements. The University’s general requirements, applicable to all graduate degrees at Stanford, are described below. University requirements pertaining to only a subset of advanced degrees are described in the “Degree-Specific Requirements, Master’s Degrees (p. 39)” and “Degree-Specific Requirements, Doctoral Degrees (p. 40)” sections.

See the “Graduate Programs” section of each department’s listing for specific department degree requirements. Additional information on professional school programs is available in the bulletins of the Graduate School of Business, the School of Law, and the School of Medicine.

## Enrollment Requirements

Graduate students must enroll in courses for all terms of each academic year (Autumn, Winter, and Spring quarters) from the admission term until conferral of the degree. The only exception to this requirement occurs when the student is granted an official leave of absence. Failure to enroll in courses for a term during the academic year without taking a leave of absence (<http://stanford.edu/dept/registrar/bulletin/4904.htm>) results in denial of further enrollment privileges unless and until reinstatement to the degree program is granted and the reinstatement fee paid. Registration in Summer Quarter is not required and does not substitute for registration during the academic year. Students possessing an F-1 or J-1 student visa may be subject to additional course enrollment requirements in order to retain their student visas.

In addition to the above requirement for continuous registration during the academic year, graduate students are required by the University to be registered:

1. In each term during which any official department or University requirement is fulfilled, including qualifying exams or the University oral exam. The period between the last day of final exams of one term and the day prior to the first day of the following term is considered an extension of the earlier term, with the option of considering the two weeks preceding the start of Autumn Quarter as part of Autumn Quarter (rather than as part of Summer Quarter). See details below.
2. In any term in which a University dissertation/thesis is submitted or at the end of which a graduate degree is conferred.
3. Normally, in any term in which the student receives financial support from the University.
4. In any term for which the student needs to use University facilities.
5. For international students, in any term of the academic year (summer may be excluded) for which they have non-immigrant status (i.e., a J-1 or F-1 visa).

Individual students may also find themselves subject to the registration requirements of other agencies (for example, external funding sources such as federal financial aid). Course work and research are expected to be done on campus unless the department gives prior approval.

Degree programs have the option to include the two weeks before the start of Autumn Quarter as part of Autumn Quarter for the purposes of completing milestones and departmental requirements. The following considerations apply to this exception:

1. The student must enroll in the subsequent Autumn Quarter in the applicable standard enrollment category prior to the completion of the milestone; a leave of absence is not permitted for that Autumn Quarter.
2. A student exercising this option will not be eligible for Graduation Quarter status until the following Winter Quarter at the earliest.
3. This exception is permitted only for milestones administered by the department, such as qualifying examinations or University oral examinations.
4. This exception does not apply to deadlines administered through Stanford University, such as filing the Application to Graduate, or Dissertation/Thesis submission.
5. Degree programs are not obligated to exercise this option solely because a student requests it.

## Degree-Specific Requirements

### Master of Arts and Master of Science

In addition to completing the general requirements for advanced degrees and the specified program requirements, candidates for the degree of Master of Arts (M.A.) or Master of Science (M.S.) must outline an acceptable program of study on the Master's Degree Program Proposal and complete their degrees within the time limit for completion of the master's degree.

### Master's Program Proposal

Students pursuing an M.A., M.F.A., M.S., or M.P.P. degree are required to submit an acceptable program proposal to their department during the first quarter of enrollment. Coterminal students must submit the proposal during the first quarter after admission to the coterminal program. The program proposal establishes a student's individual program of study to meet University and department degree requirements. Students must amend the proposal formally if their plans for meeting degree requirements change.

In reviewing the program proposal or any subsequent amendment to it, the department confirms that the course of study proposed by the student fulfills all department course requirements (for example, requirements specifying total number of units, course levels, particular courses, sequences, or substitutes). The department confirms that all other department requirements (for example, required projects, foreign language proficiency, or qualifying exams) are listed on the form and that all general University requirements (minimum units, residency, and so on) for the master's degree will be met through the proposed program of study. Students who fail to submit an acceptable proposal may be dismissed.

### Time Limit for Completion of the Master's Degree

All requirements for a master's degree must be completed within three years after the student's first term of enrollment in the master's program (five years for Honors Cooperative students). Students pursuing a coterminal master's degree must complete their requirements within three years of their first quarter of graduate standing.

The time limit is not automatically extended by a student's leave of absence. All requests for extension, whether prompted by a leave or some other circumstance, must be filed by the student before the conclusion of the program's time limit. Departments are not obliged to grant an extension. The maximum extension is one additional year. Extensions require review of academic progress and any other factors regarded as relevant by the department, and approval by the department; such approval is at the department's discretion.

### Master of Public Policy

The degree of Master of Public Policy (M.P.P.) is a two-year program leading to a professional degree. Enrollment in the M.P.P. program is limited to candidates who have earlier been accepted to another Stanford graduate degree program and to recent (within three years) Stanford graduates. In addition to completing the general requirements for advanced degrees and the program requirements specified in the "Public Policy (<http://stanford.edu/dept/registrar/bulletin/6616.htm>)" section of this bulletin, candidates for the degree of Master of Public Policy (M.P.P.) must outline an acceptable program of study on the Master's Degree Program Proposal and complete their degrees within the time limit for completion of the master's degree.



## Master of Business Administration

The degree of Master of Business Administration (M.B.A.) is conferred on candidates who have satisfied the requirements established by the faculty of the Graduate School of Business and the general requirements for advanced degrees. Full particulars concerning the school requirements are found on the M.B.A. program web site of the Graduate School of Business (<http://www.gsb.stanford.edu/mba/academics>). The M.B.A. must be completed within the time limit for completion of the master's degree.

## Master of Fine Arts

In addition to completing the general requirements for advanced degrees and the program requirements specified in the "Art and Art History (<http://stanford.edu/dept/registrar/bulletin/7148.htm>)" section of this bulletin, candidates for the degree of Master of Fine Arts (M.F.A.) must outline an acceptable program of study on the Master's Degree Program Proposal and complete their degrees within the time limit for completion of the master's degree.

## Master of Liberal Arts

The Master of Liberal Arts (M.L.A.) program is a part-time interdisciplinary master's program in the liberal arts for returning adult students. In addition to completing the general requirements for advanced degrees, candidates for the degree of Master of Liberal Arts (M.L.A.) must complete their degrees within five years, an exception to the rule specified above.

## Engineer

In addition to completing the general requirements for advanced degrees and the requirements specified by their department, candidates for the degree of Engineer must be admitted to candidacy and must complete a thesis per the specifications below.

## Candidacy

The Application for Candidacy for Degree of Engineer is an agreement between the student and the department on a specific program of study to fulfill degree requirements. Students must apply for candidacy by the end of the second quarter of the program. Honors Cooperative students must apply by the end of the fourth quarter of the program. Candidacy is valid for five calendar years.

## Thesis

A University thesis is required for the Engineer degree. Students have the option of submitting the thesis electronically or via the paper process. Standards for professional presentation of the thesis have been established by the Committee on Graduate Studies. Directions for preparation of the thesis for electronic or paper submission are available at the Office of the University Registrar [dissertation/thesis](http://studentaffairs.stanford.edu/registrar/students/dissertation-thesis) (<http://studentaffairs.stanford.edu/registrar/students/dissertation-thesis>) web site.

The deadline for submission of theses for degree conferral in each term is specified by the University academic calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>). If submitting via the paper process, three copies of the thesis, bearing the approval of the adviser under whose supervision it was prepared, must be submitted to the Office of the University Registrar before the quarterly deadline listed on the University academic calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>). A fee is charged for binding copies of the paper thesis. If submitting via the electronic process the signed thesis signature page and title page must be submitted to the Student Services Center (<http://www.stanford.edu/group/student-services-center>) and one final copy of the thesis must be uploaded, and approved by the Final Reader, on or before the quarterly deadline indicated in the University's academic calendar ([\[studentaffairs.stanford.edu/registrar/academic-calendar\]\(http://studentaffairs.stanford.edu/registrar/academic-calendar\)\). There is no fee charged for the electronic submission process.](http://</a></p></div><div data-bbox=)

Students must be registered or on graduation quarter in the term in which they submit the thesis; see "Graduation Quarter (<http://stanford.edu/dept/registrar/bulletin/4941.htm>)" section of this bulletin for additional information. At the time the thesis is submitted, an Application to Graduate must be on file, all department requirements must be complete, and candidacy must be valid through the term of degree conferral.

## Master of Legal Studies

The Master of Legal Studies degree (M.L.S.), a nonprofessional degree, is conferred upon candidates who satisfactorily complete courses in law totaling the number of units required under the current Faculty Regulations of the Stanford Law School over not less than one academic year and who otherwise have satisfied the requirements of the University and the Stanford Law School. The Stanford Law School Student Handbook (pdf) provides detailed information on degree requirements.

## Master of Laws

The degree of Master of Laws (L.L.M.) is conferred upon candidates who satisfactorily complete courses in law totaling the number of units required under the current Faculty Regulations of the Stanford Law School over not less than one academic year and who otherwise have satisfied the requirements of the University and the Stanford Law School.

The degree is designed for foreign graduate students trained in law and is available only to students with a primary law degree earned outside the United States. The L.L.M. program offers students a choice of three areas of specialization: Corporate Governance and Practice; Law, Science, and Technology; or International Economic Law, Business; and Policy. The Stanford Law School Student Handbook ([http://www.law.stanford.edu/experience/studentlife/SLS\\_Student\\_Handbook2011.pdf](http://www.law.stanford.edu/experience/studentlife/SLS_Student_Handbook2011.pdf)) (pdf) provides detailed information on degree requirements.

## Master of the Science of Law

The degree of Master of the Science of Law (J.S.M.) is conferred upon candidates who satisfactorily complete courses in law totaling the number of units required under the current Faculty Regulations of the Stanford Law School over not less than one academic year and who otherwise have satisfied the requirements of the University and the Stanford Law School.

The degree is primarily designed for those qualified students who hold a J.D. or its equivalent and who are at the Stanford Law School for independent reasons (for example, as teaching fellows) and who wish to combine work toward the degree with their primary academic activities. Specially qualified lawyers, public officials, academics, and other professionals who have worked outside the United States may apply for the degree through the Stanford Program in International Legal Studies (SPILS). The Stanford Law School Student Handbook ([http://www.law.stanford.edu/experience/studentlife/SLS\\_Student\\_Handbook2011.pdf](http://www.law.stanford.edu/experience/studentlife/SLS_Student_Handbook2011.pdf)) (pdf) provides detailed information on degree requirements.

## Degree-Specific Requirements

### Doctor of Jurisprudence

The degree of Doctor of Jurisprudence (J.D.) is conferred on candidates who satisfactorily complete courses in law totaling the number of units required under the current Faculty Regulations of the Stanford Law School over not less than three academic years and who otherwise have satisfied the requirements of the University and the Stanford Law School. The

Stanford Law School web site (<http://www.law.stanford.edu/degrees>) provides detailed information on degree requirements.

## Doctor of the Science of Law

The degree of the Doctor of the Science of Law (J.S.D.) is conferred upon candidates who hold a J.D. or its equivalent, who complete one academic year in residence, and who, as a result of independent legal research, present a dissertation that is, in the opinion of the faculty of the Stanford Law School a contribution to knowledge. Such work and dissertation must conform to the rules of the Stanford Law School and the University for the dissertation and the University Oral Examination, as described in the "Doctor of Philosophy" section of this bulletin.

Candidacy is limited to students of exceptional distinction and promise. The Stanford Law School web site (<http://www.law.stanford.edu/degrees/jd>) provides detailed information on degree requirements.

## Doctor of Musical Arts

The degree of Doctor of Musical Arts (D.M.A.) is conferred on candidates who have satisfied the general requirements for advanced degrees, the program requirements specified in the "Music (<http://stanford.edu/dept/registrar/bulletin/7094.htm>)" section of this bulletin, and the candidacy requirement as described in the "Doctor of Philosophy" section.

## Doctor of Medicine

Candidates for the degree of Doctor of Medicine (M.D.) must satisfactorily complete the required curriculum in medicine. The requirements for the M.D. degree are detailed online at <http://med.stanford.edu/md>.

## Doctor of Philosophy

The degree of Doctor of Philosophy (Ph.D.) is conferred on candidates who have demonstrated to the satisfaction of their department or school substantial scholarship, high attainment in a particular field of knowledge, and the ability to do independent investigation and present the results of such research. They must satisfy the general requirements for advanced degrees, the program requirements specified by their departments, and the doctoral requirements described below. The option for a Ph.D. minor is also described below, though it is not a Ph.D. requirement.

## Candidacy

Admission to a doctoral degree program is preliminary to, and distinct from, admission to candidacy. Admission to candidacy for the doctoral degree is a judgment by the faculty in the department or school of the student's potential to successfully complete the requirements of the degree program. Students are expected to complete department qualifying procedures and apply for candidacy by the end of their second year in the Ph.D. program. Honors Cooperative students must apply by the end of their fourth year.

Admission to candidacy for the doctoral degree is granted by the major department following a student's successful completion of qualifying procedures as determined by the department. Departmental policy determines procedures for subsequent attempts to become advanced to candidacy in the event that the student does not successfully complete the procedures. Failure to advance to candidacy results in the dismissal of the student from the program (see "Guidelines for Dismissal of Graduate Students for Academic Reasons (p. 43)").

The Application for Candidacy specifies a departmentally approved program of study to fulfill degree requirements, including required course work, language requirements, teaching requirements, dissertation (final project and public lecture-demonstration for D.M.A.), and University oral examination (for Ph.D.). Prior to candidacy, at least 3 units of work must be taken with each of four Stanford faculty members. To reiterate, however, a student will only be admitted to candidacy if, in addition to the student's fulfilling departmental prerequisites, the faculty makes the judgment that

the student has the potential to successfully complete the requirements of the degree program.

If the Ph.D. student is pursuing a minor, approval by the department awarding the minor is also required on the Application for Candidacy.

All requirements for the degree must be completed before candidacy expires. Candidacy is valid for five years unless terminated by the department (for example, for unsatisfactory progress). The time limit is not automatically extended by a student's leave of absence.

## Time Limit for Completion of a Degree with Candidacy

All requirements for the degree must be completed before candidacy expires. Candidacy is valid for five years unless terminated by the department (for example, for unsatisfactory progress). The time limit is not automatically extended by a student's leave of absence.

Failure to make minimum progress or complete university, department, and program requirements in a timely or satisfactory manner may lead to dismissal (see Guidelines for Dismissal of Graduate Students for Academic Reasons) (p. ).

All requests for extension, whether prompted by a leave or some other circumstance, must be filed by the student before the conclusion of the program's time limit. Departments are not obligated to grant an extension. Students may receive a maximum of one additional year of candidacy per extension. Extensions require review by the department of a dissertation progress report, a timetable for completion of the dissertation, any other factors regarded as relevant by the department, and approval by the department; such approval is at the department's discretion.

## Teaching and Research Requirements

A number of departments require their students to teach (serving as a teaching assistant) or assist a faculty member in research (serving as a research assistant) for one or more quarters as part of their doctoral programs. Detailed information is included in the department sections of this bulletin.

## Foreign Language Requirement

Some departments require a reading knowledge of one or more foreign languages as indicated in department sections of this bulletin. Fulfillment of language requirements must be endorsed by the chair of the major department.

## University Oral Examination

Passing a University oral examination is a requirement of the Ph.D. and J.S.D. degrees. The purpose of the examination is to test the candidate's command of the field of study and to confirm fitness for scholarly pursuits. Departments determine when, after admission to candidacy, the oral examination is taken and whether the exam will be a test of knowledge of the field, a review of a dissertation proposal, or a defense of the dissertation. The chairperson of a Stanford oral examination is appointed for this examination only, to represent the interests of the University for a fair and rigorous process.

Students must be registered in the term in which the University oral examination is taken. The period between the last day of final exams of one

term and the day prior to the first day of the following term is considered an extension of the earlier term. Candidacy must also be valid.

The University Oral Examination Committee consists of at least five Stanford faculty members: four examiners; and the committee chair from another department. All committee members are normally members of the Stanford University Academic Council, and the chair must be a member of the Stanford University Academic Council. Emeritus faculty are also eligible to serve as examiners or chair of the committee.

A petition for appointment of an examining committee member who is neither a current or emeritus member of the Academic Council may be approved by the chair of the department if that person contributes an area of expertise that is not readily available from the faculty and holds a Ph.D. or equivalent foreign degree. Exceptions for individuals whose terminal degree is not the Ph.D. or equivalent foreign degree may be granted by the Vice Provost for Graduate Education, upon the request of the student's department chair. The majority of the examiners must be current or emeritus Academic Council members; more specifically, one of four or five examiners or two of six or seven examiners may be appointed to the Oral Examination Committee by means of this petition.

The chair of the examining committee may not have a full or joint appointment in the adviser's or student's department, but may have a courtesy appointment in the department. The chair can be from the same department as any other member(s) of the examination committee and can be from the student's minor department provided that the student's adviser does not have a full or joint appointment in the minor department.

For Interdisciplinary Degree Programs (IDPs), the chair of the examining committee may not have a full or joint appointment in the primary adviser's major department and must have independence from the student and adviser.

The University Oral Examination form must be submitted to the department graduate studies administrator at least two weeks prior to the proposed examination date. The examination is conducted according to the major department's adopted practice, but it should not exceed three hours in length, and it must include a period of private questioning by the examining committee.

Responsibility for monitoring appointment of the oral examination chair rests with the candidate's major department. Although the department cannot require the candidate to approach faculty members to serve as chair, many departments invite students and their advisers to participate in the process of selecting and contacting potential chairs.

The candidate passes the examination if the examining committee casts four favorable votes out of five or six, five favorable votes out of seven, or six favorable votes out of eight. Five members present and voting constitute a quorum. If the committee votes to fail a student, the committee chair sends within five days a written evaluation of the candidate's performance to the major department and the student. Within 30 days and after review of the examining committee's evaluation and recommendation, the chair of the student's major department must send the student a written statement indicating the final action of the department.

## Dissertation

An approved doctoral dissertation is required for the Ph.D. and J.S.D. degrees. The doctoral dissertation must be an original contribution to scholarship or scientific knowledge and must exemplify the highest standards of the discipline. If it is judged to meet this standard, the dissertation is approved for the school or department by the doctoral dissertation reading committee. Each member of the reading committee signs the signature page of the dissertation to certify that the work is of acceptable scope and quality. These signatures must be in ink; proxy or electronic signatures are not permitted. One reading committee member reads the dissertation in its final form and certifies on the Certificate of Final Reading that department and University specifications have been met.

Dissertations must be in English. Approval for writing the dissertation in another language is normally granted only in cases where the other language or literature in that language is also the subject of the discipline. Such approval is routinely granted for dissertations in the Division of Literatures, Cultures, and Languages, in accordance with the policy of the individual department. Approval is granted by the school dean upon a written request from the chair of the student's major department. Dissertations written in another language must include an extended summary in English.

Students have the option of submitting the dissertation electronically or via the paper process. Directions for preparation of the dissertation for electronic or paper submission are available at the Office of the University Registrar dissertation (<http://studentaffairs.stanford.edu/registrar/students/dissertation-thesis>) web site. If submitting via the paper process, the signed dissertation copies and accompanying documents must be submitted to the Office of the University Registrar on or before the quarterly deadline indicated in the University's academic calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>). A fee is charged for the microfilming and binding of the paper dissertation copies. If submitting via the electronic process the signed dissertation signature page and title page must be submitted to the Student Services Center (<http://www.stanford.edu/group/studentservicescenter>) and one final copy of the dissertation must be uploaded, and approved by the Final Reader, on or before the quarterly deadline indicated in the University's academic calendar (<http://www.stanford.edu/group/studentservicescenter>). There is no fee charged for the electronic submission process.

Students must either be registered or on graduation quarter in the term they submit the dissertation; see "Graduation Quarter" in the "Graduate Degrees (<http://stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this Bulletin for additional information. At the time the dissertation is submitted, an Application to Graduate must be on file, all department requirements must be complete, and candidacy must be valid through the term of degree conferral.

## Doctoral Dissertation Reading Committee

The doctoral dissertation reading committee consists of the principal dissertation adviser and, typically, two other readers. The doctoral dissertation reading committee must have three members and may not have more than five members. All members of the reading committee approve the dissertation. At least one member must be from the student's major department. Normally, all committee members are members of the Stanford University Academic Council or are emeritus Academic Council members. The student's department chair may, in some cases, approve the appointment of a reader who is not a current or emeritus member of the Academic Council, if that person is particularly well qualified to consult on the dissertation topic and holds a Ph.D. or equivalent foreign degree. Exceptions for individuals whose terminal degree is not the PhD or equivalent foreign degree may be granted by the Vice Provost for Graduate Education, upon the request of the student's department chair. Former Stanford Academic Council members and non-Academic Council members may thus on occasion serve on a reading committee. A non-Academic Council member (including former Academic Council members) may replace only one of three required members of dissertation reading committees. If the reading committee has four or five members, at least three members (comprising the majority) must be current or emeritus members of the Academic Council.

Any member of the Academic Council may serve as the principal dissertation adviser. If former Academic Council members, emeritus Academic Council members, or non-Academic Council members are to serve as the principal dissertation adviser, the appointment of a co-advisor who is currently on the Academic Council is required. This is to ensure representation for the student in the department by someone playing a major adviser role in completion of the dissertation. However, a co-advisor is

not required during the first two years following retirement for emeritus Academic Council members who are recalled to active service.

The reading committee, as proposed by the student and agreed to by the prospective members, is endorsed by the chair of the major department on the Doctoral Dissertation Reading Committee form. This form must be submitted before approval of Terminal Graduate Registration (TGR) status or before scheduling a University oral examination that is a defense of the dissertation. The reading committee may be appointed earlier, according to the department timetable for doctoral programs. All subsequent changes to the reading committee must be approved by the chair of the major department. The reading committee must conform to University regulations at the time of degree conferral.

## Ph.D. Minor

Students pursuing a Ph.D. may pursue a minor in another department or program to complement their Ph.D. program. This option is not available to students pursuing other graduate degrees. Ph.D. candidates cannot pursue a minor in their own major department or program. In rare cases, a Ph.D. student may complete the requirements for more than one minor. In that case, 20 unduplicated units must be completed for each minor.

Only departments that offer a Ph.D. may offer a minor, and those departments are not required to do so. Interdisciplinary Ph.D. minors, administered by a designated academic department, may be approved by the Faculty Senate. The minor should represent a program of graduate quality and depth, including core requirements and electives or examinations. The department offering the minor establishes the core and examination requirements. Elective courses are planned by the students in conjunction with their minor and Ph.D. departments.

The minimum University requirement for a Ph.D. minor is 20 units of course work at the graduate level (typically courses numbered 200 and above). If a minor department chooses to require those pursuing the minor to pass the Ph.D. qualifying or field examinations, the 20-unit minimum can be reduced. All of the course work for a minor must be done at Stanford.

Units taken for the minor can be counted as part of the overall requirement for the Ph.D. of 135 units of graduate course work done at Stanford. Courses used for a minor may not be used also to meet the requirements for a master's degree.

A Ph.D. minor form outlining a program of study must be approved by the major and minor departments. This form is submitted at the time of admission to candidacy and specifies whether representation from the minor department on the University oral examination committee is required.

## Joint Degree Programs

A Joint Degree Program (JDP) is a specified combination of degree programs or degree types in which a student is enrolled in two graduate degree programs concurrently. JDPs are developed and proposed by the relevant academic units with agreement of the deans of the schools affected.

An approved JDP includes a set of agreements between the participating programs and schools about matters such as admissions, advising, curricula, and tuition. In a JDP, a specified number of units may be double-counted toward the minimum University residency requirements for both degrees, reducing the total number of residency units required to complete both degrees. Application deadlines for each program or degree apply. Students must be admitted to the JDP no later than the study list deadline of the term prior to the term of expected degree conferral. In a JDP, both degrees are conferred concurrently since the units required for each degree are linked to the completion of both degrees. The sole exception is the J.D. degree which may be awarded prior to the second degree.

The following Joint Degree Programs, permitting students to complete requirements for two degrees with a reduced number of total residency units, are offered:

- Juris Doctor with a Master of Arts in Economics, Education, History, Public Policy, or the Division of International Comparative and Area Studies: African Studies, East Asian Studies, International Policy Studies, Latin American Studies, and Russian, East European and Eurasian Studies (J.D./M.A.)
- Juris Doctor with a Master of Science in Bioengineering, Computer Science, Electrical Engineering, Environment and Resources, Health Research and Policy, or Management Science and Engineering (J.D./M.S.)
- Juris Doctor with a Master of Public Policy (J.D./M.P.P.)
- Juris Doctor with a Doctor of Philosophy in Bioengineering, Economics, Environment and Resources, History, Management Science and Engineering, Philosophy, Political Science, Psychology, or Sociology (J.D./Ph.D.)
- Juris Doctor with a Master of Business Administration (J.D./M.B.A.)
- Master of Business Administration with a Master of Arts in Education (M.B.A./M.A.)
- Master of Business Administration with a Master of Science in Environment and Resources (M.B.A./M.S.)
- Master of Business Administration with a Master of Public Policy (M.B.A./M.P.P.)
- Master of Arts in International Policy Studies with a Master of Public Policy (M.A./M.P.P.)
- Master of Science in Management Science and Engineering with a Master of Public Policy (M.S./M.P.P.)
- Doctor of Philosophy in Economics, Education, Psychology, or Sociology with a Master of Public Policy (Ph.D./M.P.P.)
- Juris Doctor with a Doctor of Medicine (J.D./M.D.)
- Master of Public Policy with a Doctor of Medicine (M.P.P./M.D.)

Specific requirements for the joint degree programs are available from the participating departments and schools and at Registrar's (<http://registrar.stanford.edu/students/academics/jdp.htm>) web site.

Creation of additional Joint Degree Programs that are combinations of J.D./M.A., J.D./M.S., and Ph.D./M.P.P. degrees have been authorized by the Faculty Senate. New JDPs from among these combinations may double-count up to 45 units towards residency requirements. JDPs from these combinations are proposed by the coordinating programs and schools. Once approvals from the chairs of the programs and deans of the relevant schools are obtained, approval on behalf of the Committee on Graduate Studies is granted by the Office of the Vice Provost for Graduate Education, and final approval is granted by the Office of the University Registrar. JDPs combining other degree types or programs may be proposed, but require review by the Faculty Senate Committee on Graduate Studies and must be approved by the Faculty Senate.

## Minimum Progress Requirements for Graduate Students

The academic requirements for graduate students include completion of University, department, and program requirements, such as admission to candidacy, successful completion of qualifying exams, and so on in a timely and satisfactory manner. Graduate students must also meet the following standards of minimum progress as indicated by units and grades. (These standards apply to all advanced degree programs except the School of Business Ph.D., and the M.B.A., J.D., L.L.M., J.S.M., J.S.D., M.D., and M.L.A., which follow guidelines issued by the respective schools and are described in their respective school bulletins.)

Graduate students enrolled for 11 or more units must pass at least 8 units per term by the end of each term. Those registered for fewer than 11 units must pass at least 6 units per term by the end of each term, unless other requirements are specified in a particular case or for a particular program.

In addition, graduate students must maintain a 3.0 (B) grade point average overall in courses applicable to the degree.

Department requirements for minimum progress that set a higher standard for units to be completed, or a higher or lower standard for grade point average to be maintained, take precedence over the University policy; any such different standards must be published in the Stanford Bulletin.

Students identified as not meeting the requirements for minimum progress and timely and satisfactory completion of requirements are reviewed by their departments to determine whether the problem lies with administrative matters such as reporting of grades or with academic performance. Students have the opportunity to explain any special circumstances. Approval for continuation in the degree program is contingent on agreement by the student and department to a suitable plan to maintain appropriate progress in subsequent quarters. Dismissal of graduate students is addressed in separate guidelines.

Graduate students who have been granted Terminal Graduate Registration (TGR) status must enroll each term in the TGR course (801 for master's and Engineer programs or 802 for doctoral programs) in their department in the section appropriate for the adviser. An 'N' grade signifying satisfactory progress must be received each quarter to maintain registration privileges. An 'N#' grade indicates unsatisfactory progress. The first 'N#' grade constitutes a warning. A second consecutive 'N#' grade normally causes the department to deny the student further registration until a written plan for completion of degree requirements has been approved by the department. Subsequent 'N#' grades are grounds for dismissal from the program.

Students receiving federal student aid funds, including student loans, must maintain satisfactory academic progress standards that may be stricter than departmental standards. See the Financial Aid Office (<http://exploreddegrees.stanford.edu/graduatedegrees/http://financialaid.stanford.edu>) web site for details.

## Graduate Units Requirements

The University's expectation is that the units counted towards all graduate degrees are primarily in graduate courses. The University has set specific requirements for units applied to the minimum requirement for the M.A., M.S., and M.F.A. degrees: All units must be in courses at or above the 100 level and at least 50 percent of those must be courses designated primarily for graduate students (typically at least the 200 level). Units earned in courses below the 100 level may not be counted towards the minimum unit requirement for the master's degree. Department specifications for the level of course work accepted for a particular master's degree program may be higher than the University's specifications.

## Changes of Degree Programs

Graduate students are admitted to Stanford for a specific degree program. Students who have attended Stanford for at least one term and who are currently enrolled may submit a Graduate Program Authorization Petition to make one of the following changes:

1. change to a new degree program in the same department;
2. change to a new degree program in a different department;
3. add a new degree program in the same or a different department to be pursued with the existing program. Coterminal students must have the bachelor's degree conferred before adding a second advanced degree

program. Summer term enrollment is optional for students beginning a new degree program in the Autumn term provided that they have been enrolled the prior Spring term.

It is important that the attempt to add or change degree programs be made while enrolled. Otherwise, a new Application for Graduate Admission must be submitted and an application fee paid. The Graduate Program Authorization Petition is submitted electronically through Axess to the department in which admission is requested. If applying for a higher degree program, students may also be required to submit other application materials such as GRE Subject Test scores, a statement of purpose, or new letters of recommendation. Decisions on the petitions are made by the programs or departments to which they are directed, and are at the discretion of those programs or departments.

International students changing departments or degree programs must also obtain the approval of the Foreign Student Adviser at the Bechtel International Center. If the requested change lengthens their stay, they also are required to submit verification of sufficient funding to complete the new degree program.

Students who wish to terminate study in a graduate program should submit a properly endorsed Request to Permanently Withdraw from Degree Program form (<http://studentaffairs.stanford.edu/registrar/forms>) to the Student Services Center (<http://www.stanford.edu/group/student-services-center>). To return to graduate study thereafter, the student is required to apply for reinstatement (if returning to the same degree program) or admission (if applying to a different program). Both applications require payment of a fee.

## Guidelines for Dismissal of Graduate Students for Academic Reasons

Admission to graduate programs at Stanford is highly selective. It is anticipated that every admitted student will be able to fulfill the requirements for the advanced degree. This document provides guidelines to be used in the unusual circumstance that a department must consider dismissal of a graduate student for academic reasons. These guidelines apply to all advanced degree programs except those in the schools of Law and Business, the STEP program in the School of Education, and the M.D. program in the School of Medicine, which follow guidelines issued by the respective schools.

The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the University, department, and program requirements for the degree, and fulfillment of minimum progress requirements. The guidelines that follow specify procedures for dismissal of graduate students who are not meeting these conditions. In such cases, a departmental committee (hereafter "the committee"), whether the department's committee of the faculty or other committee authorized to act on the department's behalf such as the departmental graduate studies committee, will:

1. Where possible and as early as possible, warn the student, in writing, of the situation and deficiency. A detailed explanation of the reason for the warning should be provided.
2. Consider extenuating circumstances communicated by the student.
3. Decide the question of dismissal by majority vote of the committee (with at least three faculty members participating in the committee's deliberation), and communicate the decision to the student in writing.
4. Place a summary of department discussions, votes, and decisions in the student's file.
5. Provide students the opportunity to examine their department files, if requested.

6. Provide students with information on their rights to appeal under the Student Academic Grievance Procedure. See the "Student Academic Grievance Procedure (<http://stanford.edu/dept/registrat/bulletin/4988.htm>)" section of this bulletin.

Careful records of department decisions safeguard the rights of both students and faculty.

## Additional Specifics for Degrees with Candidacy

### Before Candidacy

The committee may vote to dismiss a student who is not making minimum progress or completing requirements in a timely and satisfactory way before review for admission to candidacy. Before considering dismissal, the committee should communicate with the student (which may include a meeting with the student) concerning his or her academic performance and how to correct deficiencies, where such deficiencies are deemed correctable.

### At the Review for Candidacy

In a review for admission to candidacy, if the committee votes not to recommend the student for admission to candidacy, the vote results in the dismissal of the student from the program. The department chair, or Director of Graduate Studies, or the student's adviser shall communicate the department's decision to the student in writing and orally. The student may submit a written request for reconsideration. The committee shall respond in writing to the request for reconsideration; it may decline to reconsider its decision.

### During Candidacy

When a student admitted to candidacy is not making minimum progress or not completing University, department, or program requirements in a timely and satisfactory manner, the student's adviser, the Director of Graduate Studies, or department chair, and other relevant faculty should meet with the student. A written summary of these discussions shall be sent to the student and the adviser and added to the student's department file. The summary should specify the student's academic deficiencies, the steps necessary to correct them (if deemed correctable), and the period of time that is allowed for their correction (normally one academic quarter). At the end of the warning period, the committee should review the student's progress and notify the student of its proposed actions. If the student has corrected the deficiencies, he or she should be notified in writing that the warning has been lifted.

If the deficiencies are not deemed correctable by the committee (for example, the failure of a required course or examination, or a pattern of unsatisfactory performance) or if, at the end of the warning period, the student has not in the view of the committee corrected the deficiencies, the committee may initiate proceedings for dismissal. The student shall be notified, in writing, that the case of dismissal will be considered at an impending committee meeting. The student has the right to be invited to attend a portion of the scheduled meeting to present his or her own case; a student may also make this case to the committee in writing.

After full discussion at the committee meeting, the committee, without the student present, shall review the case and vote on the issue of dismissal. The student shall be sent a written summary of the discussion, including the committee's decision and the reasons for it. The student may submit a written request for reconsideration. The committee's response to the request for reconsideration shall be made in writing; it may decline to reconsider its decision.

## Childbirth Accommodation Policy

Women graduate students, including students in professional schools, anticipating or experiencing a birth are eligible for an academic accommodation period of up to two consecutive academic quarters (in total) before and after the birth, during which the student may postpone course assignments, examinations, and other academic requirements. During this period, they are eligible for full-time enrollment and retain access to Stanford facilities, Cardinal Care, and Stanford housing. Such students are granted an automatic one quarter extension of University and departmental requirements and academic milestones, with the possibility of up to three quarters by petition under unusual circumstances. Women graduate students supported by fellowships, teaching assistantships, and/or research assistantships are excused from regular TA or RA duties for a period of six weeks during which they continue to receive support. Students do not receive a stipend or salary if none was received previously, but are eligible for the academic accommodation period and the one quarter extension of academic milestones. For more information and a complete statement of the policy, see the Childbirth Accommodation (<http://stanford.edu/group/gap/5-9>) web site.

## Residency Policy for Graduate Students

Each type of graduate degree offered at Stanford (for example, Master of Science, Doctor of Philosophy) has a residency requirement based on the number of academic units required for the degree. These residency requirements and the maximum allowable transfer units for each degree type are listed below. Unless permission is granted by the department (for example, for field work) enrolled graduate students must maintain a significant physical presence on campus throughout each quarter a student is enrolled.

The unit requirements for degrees can represent solely course work required for the degree or a combination of course work, research, and a thesis or dissertation. Academic departments and schools offering degrees may establish unit requirements that are higher than the minimum University residency requirement, but they may not have a residency requirement that is lower than the University standard. In addition to the University's residency requirement based on a minimum number of units for each degree, the School of Medicine and the Graduate School of Business may establish residency requirements based on the number of quarters of full-time registration in which students are enrolled to earn a degree. However, in no case may a student earn fewer units than the University minimum for each degree. All residency requirements are published in the Stanford Bulletin. Students should consult the Stanford Bulletin or their academic department to determine if their degree program has residency requirements that exceed the minimum.

Students eligible for Veterans Affairs educational benefits should refer to the "Veterans' Educational Benefits (p. 50)" section of this bulletin.

It is Stanford University's general policy that units are applicable toward only one degree. Units may not normally be duplicated or double-counted toward the residency requirement for more than one degree. Exceptions to this general policy for specified combinations of degree types, known as Joint Degree Programs, may be approved by agreement of the Faculty Senate and the deans of the schools affected, with review by the Committee on Graduate Studies. See the "Joint Degree Programs (p. 43)" section of this bulletin for additional information.

Only completed course units are counted toward the residency requirement. Courses with missing, incomplete, in progress, or failing grades do not

count toward the residency requirement. Courses from which a student has formally withdrawn do not count toward the residency requirement.

Terminal Graduate Registration (TGR) is available to graduate students who have met all of the conditions listed in the "TGR (p. )" section of this bulletin.

## University Minimum Residency Requirements for Graduate Degrees <sup>1</sup>

Degree Type	Minimum # of Units	Maximum Allowable External Transfer Units
M.A., M.S., M.F.A., M.L.A.	45	0 (see note 4)
Engineer (see note 2)	90	45
M.B.A., M.P.P. (see note 3)	90	0 (see note 4)
Ph.D., D.M.A. (see note 5)	135	45
M.D.	235	90
J.D. (see notes 6,7)	109	45
M.L.S., L.L.M., J.S.M. (see note 6)	35	0 (see note 4)
J.S.D. (see note 6)	44	0 (see note 4)

- <sup>1</sup> The University has authorized the granting of the M.A.T., Ed.S. and Ed.D degrees, but they are not being offered.
- <sup>2</sup> Up to 45 units completed at Stanford toward a M.A. or M.S. degree or accepted as transfer credit in an Engineering discipline may be used toward the 90 unit residency requirement for the Engineer degree. At least 45 units of work at Stanford are necessary to complete the 90 residency units for the Engineer degree.
- <sup>3</sup> Enrollment in the M.P.P. degree program is limited to candidates who have earlier been accepted to another Stanford graduate degree program and to recent (within three years) Stanford graduates.
- <sup>4</sup> Students eligible for Veterans Affairs educational benefits should refer to the Veterans Benefits section of "Admissions and Financial Aid (<http://stanford.edu/dept/registrar/bulletin/4815.htm>)" in this bulletin.
- <sup>5</sup> Up to 45 units completed at Stanford toward a M.A. or M.S. degree or accepted as transfer credit may be used toward the 135 unit residency requirement for the Ph.D. or D.M.A. degree. At least 90 units of work at Stanford are necessary to complete the 135 residency units for the Ph.D. or D.M.A. degree.
- <sup>6</sup> The Academic Senate approved these residency requirements on February 4, 2010, effective for the 2009-10 academic year.
- <sup>7</sup> J.D. students entering prior to the Autumn Quarter 2009-10 must take the equivalent of 86 semester units.

## Coterminal Programs Residency Requirement

For information on the minimum requirements for the coterminal bachelor's/master's program, see the "Coterminal Degrees (p. 36)" section of this bulletin.

## Graduate Residency Transfer Credit

After at least one quarter of enrollment, students pursuing an Engineer, D.M.A., or Ph.D. may apply for transfer credit for graduate work done at another institution. Doctoral and Engineer candidates who also earned their

master's at Stanford are not eligible for transfer residency credit, nor are any master's degree students.

Students enrolled at Stanford who are going to study elsewhere during their degree program should obtain prior approval of any transfer credit sought before their departure.

The following criteria are used by the department in determining whether, in its discretion, it awards transfer credit for graduate-level work done at another institution:

1. Courses should have comparable Stanford counterparts that are approved by the student's department. A maximum of 12 units of courses with no Stanford counterparts and/or research units may be granted transfer credit.
2. The student must have been enrolled at the other institution in a student category which yields graduate credit. The maximum amount of credit given for extension and nonmatriculated (non-degree) courses is 12 units. No transfer credit is given for online or correspondence work.
3. Courses must have been taken after the conferral of the bachelor's degree. The only exception is for work taken through programs structured like the Stanford coterminal bachelor's/master's program.
4. Courses must have been completed with a grade point average (GPA) of 3.0 (B) or better. Pass grades are accepted only for courses for which letter grades were not an option and for which the standard of passing is 'B' quality work.
5. Courses must have been taken at a regionally accredited institution in the U.S. or at an officially recognized institution in a foreign country. Courses taken at foreign universities must be at the level of study comparable to a U.S. graduate program.

The Application for Graduate Residency Credit is reviewed by the department and the Office of the University Registrar. For transfer credit done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence. One semester unit or hour usually equals 1.5 quarter units.

## Leaves of Absence (Graduate)

Students on leave of absence are not registered at Stanford and, therefore, do not have the rights and privileges of registered students. They cannot fulfill any official department or University requirements during the leave period.

Leaves do not delay candidacy or master's program expiration dates.

Students on leave may complete course work for which an 'Incomplete' grade was awarded in a prior term and are expected to comply with the maximum one-year time limit for resolving incompletes; a leave of absence does not stop the clock on the time limit for resolving incompletes.

When a student is granted (or placed on) a leave of absence after the beginning of the term, courses in which the student was enrolled after the drop deadline appear on the student's transcript and show the symbol 'W' (Withdraw).

## Voluntary Leaves of Absence

Graduate students who do not meet the requirement for continuous registration during the academic year must obtain an approved leave of absence, in advance, for the term(s) they will not be registered. The leave of absence must be reviewed for approval by the chair or director of graduate studies of the student's major department and, if the student is in the United States on a foreign student visa, by the Bechtel International Center (<http://icenter.stanford.edu>). The granting of a leave of absence is at the discretion of the department and subject to review by the Office of the University Registrar. The University may condition its approval of a

petition for leave of absence on the student's meeting such requirements as the University deems appropriate in the individual case for the student to be eligible to return (such as, in the case of a leave for medical reasons, proof of treatment and/or an interview with a health care professional at Vaden Health Center (<http://vaden.stanford.edu>) or Counseling and Psychological Services (<http://vaden.stanford.edu/caps>) or its designee).

New graduate students and approved coterminal students may not take a leave of absence during their first quarter. Coterminal students are required to register their first graduate quarter. However, new Stanford students may request a deferment from the department.

Leaves of absence are granted for a maximum of one calendar year, or four quarters. Leaves requested for a longer period are approved only in exceptional circumstances (for example, mandatory military service). An extension of leave, for a maximum of one year or four quarters, is approved only in unusual circumstances. Extension requests must be made before the expiration of the original leave of absence. Leaves of absence for graduate students may not exceed a cumulative total of two years (eight quarters including summer quarters).

## Involuntary Leaves of Absence

An involuntary leave of absence can be imposed in circumstances in which a student:

- presents a substantial risk of harm to self or others or is failing to carry out substantial self-care obligations; or
- significantly disrupts the educational or other activities of the University community; or
- is unable to participate meaningfully in educational activities; or
- requires a level of care from the University community that exceeds the resources and staffing that the University can reasonably be expected to provide for the student's well-being.

Students whose circumstances warrant a review under the Involuntary Leave of Absence Policy will be apprised, in writing, of University concerns and will be provided an opportunity to respond to concerns in writing or in person or via telephone before a review committee convened by the Dean of Student Life. Students placed on involuntary leave of absence can appeal an unfavorable decision to the Vice Provost for Student Affairs. The University can condition a student's return to registered student status on such requirements as the University deems appropriate in the individual case (such as, in the case of a leave for medical reasons, proof of treatment and/or an interview with a health care professional at Vaden Health Center (<http://vaden.stanford.edu>) or Counseling and Psychological Services (<http://vaden.stanford.edu/caps>) or its designee). The Dean of Student Life publishes the full Involuntary Leave of Absence Policy (<http://vaden.stanford.edu/caps>) on its web site. Information on tuition refunds is available in the "Refunds (<https://exploreddegrees-nextyear.stanford.edu/tuitionfeesandhousing/#refundstext>)" section of this bulletin.

## Discontinuation and Reinstatement

A student's academic degree program may be discontinued if the student:

- fails to be enrolled by the study list deadline; or
- fails to be approved for a leave of absence by the start of the term; or
- voluntarily terminates graduate studies; or
- is dismissed from graduate studies for academic reasons; or
- is expelled from the University.

Students who fail to be either enrolled by the final study list deadline or approved for a leave of absence by the start of a term or after a voluntary withdrawal are required to apply for reinstatement through the Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>) office before they can return to the same degree program. Students whose master's program or doctoral candidacy has expired must petition to have extensions

of their programs or candidacy approved by their departments before reinstatement may be approved.

The decision to approve or deny reinstatement is made by the student's department or program. Departments are not obliged to approve reinstatements of students. Reinstatement decisions are made at the discretion of the department or the program and may be based on the applicant's academic status when last enrolled, activities while away from campus, the length of the absence, the perceived potential for successful completion of the program, and the ability of the department to support the student both academically and financially, as well as any other factors or considerations regarded as relevant by the department or program.

Reinstatement information is available from the Graduate Admissions office. A fee is required. Reinstatement applications must be submitted prior to the first day of the term for which re-enrollment is requested if the student is registering for courses.

In the rare circumstance where a student who had been dismissed for academic reasons wishes to return to the same degree program, and where reinstatement was not precluded at the time of the dismissal, the student should request reinstatement as described above. In this circumstance, the degree program may review such relevant information as course work completed elsewhere or any other factors deemed to be appropriate for consideration.

Conditions for reinstatement may be established at the discretion of the program. The decision to approve or deny reinstatement is made by the department or program to which the student is seeking reinstatement, and is in its discretion. In addition, the department or program retains the right to condition reinstatement on such academic or other conditions as it deems appropriate.

Students who have been expelled from Stanford University are not permitted to apply for reinstatement.

## Terminal Graduate Registration (TGR)

Doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the University oral exam and dissertation, completed 135 units or 10.5 quarters of residency (if under the old residency policy), and submitted a Doctoral Dissertation Reading Committee form, may request Terminal Graduate Registration status to complete their dissertations. Students pursuing Engineer degrees may apply for TGR status after admission to candidacy, completion of all required courses, and completion of 90 units or six quarters of residency (if under the old residency policy). Students enrolled in master's programs with a required project or thesis may apply for TGR status upon completion of all required courses and completion of 45 units. Students with more than one active graduate degree program must be TGR-eligible in all programs in order to apply for TGR status.

The TGR Final Registration status may also be granted for one quarter only to a graduate student who is returning after reinstatement, working on incompletes in his or her final quarter, or registering for one final term after all requirements are completed when Graduation Quarter is not applicable. TGR requirements above apply. Doctoral students under the term-based residency policy need nine quarters of residency to qualify for TGR Final Registration Status.

Each quarter, TGR students must enroll in the 801 (for master's and Engineer students) or 802 (for doctoral students) course in their department for zero units, in the appropriate section for their adviser. TGR students register at a special tuition rate. TGR students may enroll in up to 3 units of course work per quarter at this tuition rate. Within certain restrictions, TGR students may enroll in additional courses at the applicable unit rate. The additional courses cannot be applied toward degree requirements since all degree requirements must be complete in order to earn TGR status. See the "Minimum Progress Requirements for Graduate Students



(<http://stanford.edu/dept/registrar/bulletin/4910.htm>)" of this bulletin for information about satisfactory progress requirements for TGR students.

## Graduate Tuition Adjustment

Graduate students who need fewer than 8 remaining units to complete degree requirements or to qualify for TGR status, may register for one quarter on a unit basis (3 to 7 units) to cover the deficiency. This status may be used only once during a degree program. Students with disabilities covered under the Americans with Disabilities Act that have an approved reduced course load (RCL) recommended by the Office of Accessible Education (OAE) (<http://studentaffairs.stanford.edu/oea>) may also request a tuition adjustment for each quarter in which they take a RCL. The Graduate Tuition Adjustment may also be requested by students who have an approved Childbirth Accommodation.

## Graduation Quarter Status

Registration is required for the term in which a student submits a dissertation or has a degree conferred. Students who meet all the following conditions are eligible to be assessed a special tuition rate for the quarter in which they are receiving a degree:

1. All course work, degree requirements, oral exams, and residency requirements for all graduate degree programs, including joint degree programs, have been completed prior to the start of the requested Graduation Quarter. .
2. A graduate or professional student must have been enrolled or have been on an approved leave of absence in the term immediately preceding the term chosen as the graduation quarter. Summer term enrollment is optional for students on graduation quarter in the Autumn term provided that they have been enrolled the prior Spring term.
3. The student has formally applied to graduate in Axess.
4. The student has only to submit the dissertation, project, or master's thesis by the deadline for submission in the term designated as the graduation quarter.
5. The student has filed all necessary forms regarding graduation quarter before the first day of the term chosen as graduation quarter.

Students on graduation quarter are registered at Stanford and, therefore, have the rights and privileges of registered students. Graduation Quarter status may be used only once during a degree program. There is a tuition rate of \$100 for the graduation quarter.

## Conferral of Degrees

Upon recommendation to the Senate of the Academic Council by the faculty of the relevant departments or schools and the Committee on Graduate Studies, degrees are awarded four times each year, at the conclusion of Autumn, Winter, Spring, and Summer terms. All diplomas, however, are prepared and distributed after degree conferral in accordance to the distribution dates listed on the Registrar's Office (<http://studentaffairs.stanford.edu/registrar/students/diplomas>) web site.

Students must apply for conferral of a graduate degree by filing an Application to Graduate in Axess by the deadline for each term. The deadlines are available in the Academic Calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>). A separate application must be filed for each degree program and for each conferral term.

Requests for conferral are reviewed by the Office of the University Registrar and the student's department to verify completion of degree

requirements. Students must be registered in the term of degree conferral. Students with unmet financial obligations resulting in the placement of a hold on their registration cannot receive a transcript, statement of completion, degree certificate, or diploma until the hold is released by the Office of Student Financial Services. An academic record where no other degree objective is being pursued is permanently frozen after the final degree conferral, and all subsequent grade and enrollment change requests will be denied.

Students are typically expected to apply to graduate during the term in which they expect to be awarded a degree. The University, however, reserves the right to confer a degree on a student who has completed all of the requirements for a degree even though the student has not applied to graduate; such an individual would then be subject to the University's usual rules and restrictions regarding future enrollment or registration.

Students who wish to withdraw a request for conferral or make changes to the Application to Graduate should submit the Withdrawal of Application to Graduate form (<http://studentaffairs.stanford.edu/registrar/forms>) to the Student Services Center (<http://www.stanford.edu/group/student-services-center>) by the late application to graduate deadline.

Students who withdraw their graduation applications or fail to meet degree requirements must reapply to graduate in a subsequent term.

Stanford University awards no honorary degrees.

## Advising and Credentials

### Advising

By the start of their first term, students should be paired by the department with faculty advisers who assist them in planning a program of study to meet degree requirements. The department should also inform doctoral students in a timely fashion about procedures for selecting a dissertation adviser, reading committee members, and orals committee members. Departments should make every effort to assist doctoral students who are not yet admitted to candidacy in finding an appropriate adviser.

Students are obliged to follow department procedures for identifying advisers and committee members for their dissertation reading and university oral examinations.

Occasionally, a student's research may diverge from the area of competence of the adviser, or irreconcilable differences may occur between the student and the faculty adviser. In such cases, the student or the faculty adviser may request a change in assignment. If the department decides to grant the request, every reasonable effort must be made to pair the student with another suitable adviser. This may entail some modification of the student's research project.

In the rare case where a student's dissertation research on an approved project is in an advanced stage and the dissertation adviser is no longer available, every reasonable effort must be made to appoint a new adviser, usually from the student's reading committee. This may also require that a new member be added to the reading committee before the draft dissertation is evaluated, to keep the reconstituted committee in compliance with the University requirements for its composition.

### Teaching Credentials

Stanford University is accredited by the California Commission on Teacher Credentialing and the National Council for Accreditation of Teacher Education and is authorized to recommend candidates for credentials. The University offers a complete training program for both Single (Secondary) and Multiple Subject (Elementary) teaching credentials. Upon completion of a Stanford approved program, the credentials allow teachers to serve in California public schools.

Current Stanford undergraduates wishing to complete the requirements for a teaching credential should apply to the coterminous program at the School of Education (<http://stanford.edu/dept/registrar/bulletin/5124.htm>). All other

applicants should apply directly to the Stanford Teacher Education Program (STEP) at the School of Education.

# Transfer Work

Stanford accepts a small number of undergraduate transfer students each year. Requirements for admission (<http://www.stanford.edu/dept/uga/application/transfer>) are described as part of the undergraduate application process and are listed on the Undergraduate Admission website. Stanford University has a designated adviser who coordinates support for transfer students.

The Office of the University Registrar evaluates and records the amount of transfer credit and advanced placement test credit an undergraduate can apply toward graduation requirements. Stanford awards credit based on course work completed at U.S. colleges or universities accredited by a regional accrediting association; or course work completed at international colleges or universities of recognized standing. Credit may also be awarded for certain Advanced Placement programs, International Baccalaureate Program, GCE, French Baccalaureate, and the German Abitur examinations.

See the "Advanced Placement (<http://www.stanford.edu/dept/registrar/bulletin/4883.htm>)" section of this Bulletin for information concerning Stanford's policy on credit for Advanced Placement work. Details on how to request credit for advanced placement examinations are available at the Registrar's Advanced Placement site (<http://studentaffairs.stanford.edu/registrar/students/ap>).

## Undergraduate Transfer Work

Academic credit for work done elsewhere may be allowed toward a Stanford bachelor's degree under the following rules and conditions:

1. Credit may be granted for work completed at institutions in the U.S. only if the institutions are accredited.
2. Study in institutions outside the U.S., when validated by examination results, tutorial reports, or other official evidence of satisfactory work, may be credited toward a Stanford bachelor's degree, subject to the approval of the credit evaluator and the appropriate departments.
3. Credit is officially allowed only after the student has been unconditionally admitted to Stanford.
4. Credit is allowed for work completed at institutions in the U.S. only on the basis of an official transcript received by the Registrar at Stanford directly from the institution where the credit was earned.
5. Credit from another institution may be transferred for courses which are substantially equivalent to those offered at Stanford University on the undergraduate level, subject to the approval of the credit evaluator. A maximum of 20 quarter units may represent courses which do not parallel specific undergraduate courses at Stanford, again, subject to the approval of the credit evaluator as to quality and suitability.
6. Course work cannot duplicate, overlap, or regress previous work.
7. Transfer course work cannot count towards secondary school diploma and/or graduation requirements.
8. To fulfill GER requirements through transfer work, the course must match a specific Stanford course that fulfills the same GER requirement, be a minimum of three quarter units, and be taken for a letter grade.

9. Transfer work can be used to satisfy a department major or minor requirement. The transfer work must first be officially accepted into the University through the Office of the University Registrar. Departments determine if approved transfer work can be used to satisfy a department major or minor requirement.
10. The credit allowed at Stanford for one quarter's work may not exceed the number of units that would have been permissible for one quarter if the work had been done at Stanford; for work done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence.
11. Credit is allowed at Stanford for work graded 'A,' 'B,' 'C,' or 'Pass' (where 'Pass' is equivalent to a letter grade of 'C' or above), but not for work graded 'D' or below.
12. No more than 45 (90 for transfer students) quarter units of credit for work done elsewhere may be counted toward a bachelor's degree at Stanford (including advance placement test credit).
13. Credit earned in extension, correspondence, and online courses is transferable only if the university offering the courses allows that credit toward its own bachelor's degree. Such credit is limited to a maximum of 45 quarter units for extension courses, a maximum of 15 quarter units for correspondence and online study, and a maximum of 45 quarter units for the combination of extension, correspondence, and online courses.
14. Credit earned in military training and service is not transferable to Stanford, unless offered by an accredited college or university in the U.S. and evaluated as above by the credit evaluator.

## Graduate Residency Transfer Credit

After at least one quarter of enrollment, students pursuing an Engineer, D.M.A., or Ph.D. may apply for transfer credit for graduate work done at another institution. Doctoral and Engineer candidates who also earned their master's at Stanford are not eligible for transfer residency credit, nor are any master's degree students.

Students enrolled at Stanford who are going to study elsewhere during their degree program should obtain prior approval of any transfer credit sought before their departure.

The following criteria are used by the department in determining whether, in its discretion, it awards transfer credit for graduate-level work done at another institution:

1. Courses should have comparable Stanford counterparts that are approved by the student's department. A maximum of 12 units of courses with no Stanford counterparts and/or research units may be granted transfer credit.
2. The student must have been enrolled at the other institution in a student category which yields graduate credit. The maximum amount of credit given for extension and nonmatriculated (non-degree) courses is 12 units. No transfer credit is given for online or correspondence work.
3. Courses must have been taken after the conferral of the bachelor's degree. The only exception is for work taken through programs structured like the Stanford coterminal bachelor's/master's program.
4. Courses must have been completed with a grade point average (GPA) of 3.0 (B) or better. Pass grades are accepted only for courses for which letter grades were not an option and for which the standard of passing is 'B' quality work.
5. Courses must have been taken at a regionally accredited institution in the U.S. or at an officially recognized institution in a foreign country. Courses taken at foreign universities must be at the level of study comparable to a U.S. graduate program.

The Application for Graduate Residency Credit is reviewed by the department and the Office of the University Registrar. For transfer credit done under a system other than the quarter system, the permissible maximum units are calculated at an appropriate ratio of equivalence. One semester unit or hour usually equals 1.5 quarter units.

## Veterans Affairs

The Office of the University Registrar serves as the liaison between the University, its students, and the various federal, state, and local agencies concerned with veterans' benefits. Stanford certifies enrollment for students in degree seeking programs and students in one of 23 VA approved certificate programs offered through the Stanford Center for Professional Development. Other non-matriculated and certificate programs are not eligible. All students eligible to receive veterans' benefits while attending the University are urged to complete arrangements with the appropriate agency in advance of enrollment.

Stanford University is required to certify only those courses that meet minimum graduation requirements. Courses not directly related to a student's degree program or courses beyond those required for a specific degree program are not certified. Undergraduates should meet with an adviser to develop a course enrollment plan. Graduate students should have their departments approve their study lists as meeting graduation requirements on a quarterly basis.

To comply with federal regulations concerning credit for previous training (38 CFR 21.4253), Stanford University is required to evaluate all previous education and training completed elsewhere to determine what credit, if any, should be granted to students eligible to receive Veterans Affairs (VA) educational benefits. Stanford is required to complete an evaluation; credit is granted when appropriate. Credit is evaluated toward the degree program registered with Veterans Affairs as determined by the Office of the University Registrar in conjunction with the relevant academic department(s) or program(s). All relevant policies regarding transfer credit apply. In addition, this evaluation occurs each time a student's degree program is changed. Stanford University intends to make a good faith effort to comply with the Principles of Excellence established by Executive Order 13607 by the 2013-2014 academic year.

Subject to current federal and University guidelines, students eligible for receipt of VA educational benefits have their prior education and training evaluated up to the credit limits outlined in the "Residency Policy for Graduate Students" and "Undergraduate Degrees and Programs" sections of this bulletin. As an exception to that policy, students in master's programs in the schools of Earth Sciences, Education, Engineering, Humanities and Sciences, Law, Medicine, and Graduate Business are allowed a maximum of 6 transfer (quarter) units.

## VA Status

In order to activate students' VA educational benefits at Stanford the Office of the University Registrar requires that students submit the following forms:

- A copy of the Certificate of Eligibility distributed by the VA
- Veterans' Benefits - Statement of Rights and Responsibilities (online form)
- DD-214 (if applicable)
- Any official transcripts from other institutions

It is the students' responsibility to ensure that all forms are submitted to the Office of University Registrar in order to activate the student as VA benefits receiving student.

In order to comply with VA regulations, students are responsible for the following:

- Obtain official transcripts from all postsecondary institutions attended, whether VA benefits were received or not.
- Report any changes in enrollment status to the Office of the University Registrar.
- Report any changes that are made to a degree plan. Undergraduates declaring or making changes to their major(s), minor(s), honor(s), or degree program(s) in Axxess and Graduates adding or removing degree programs through the Graduate Program Authorization Petition in Axxess should submit a Student Services Center Help ticket (attention VA Certifying Official) to report degree plan change.
- General overpayments of VA benefits are the responsibility of the student, even if the payment was submitted directly to the school on the student's behalf.
- Stanford University is required to certify only those courses that meet minimum graduation requirements. Courses not directly related to a student's degree program or courses beyond those required for a specific degree program are not certified. Undergraduates should meet with their adviser to develop a course enrollment plan. Graduate students should have their departments approve their study lists as meeting graduation requirements on a quarterly basis.
- If concurrently enrolled with another college/university, notify both Stanford and the host institution.
- *Undergraduates only:* VA regulations require undergraduates to declare their major by the end of their sophomore year. Stanford cannot certify enrollment to the VA beyond sophomore year unless a major has been declared. Note that a student can change their major at any time.

## Certification

The Office of the University Registrar certifies enrollment to the VA Office quarterly, approximately one week after the Preliminary Study List Deadline. See the Stanford Academic Calendar for exact dates in each quarter.

After the Final Study List deadline, the Office of the University Registrar confirms that your enrollment has not changed in Axxess. If enrollment has increased or decreased your enrollment certification is adjusted.

The Office of the University continues to certify the student to the VA until the student leaves the program or unless notified by the student and/or the VA to stop the process of certification.

General overpayments of VA benefits are the responsibility of the student. If the enrollment change has resulted in tuition overpayment, the student is responsible for paying the tuition and fees back to the VA. If the student is a Ch. 33 recipient and the enrollment change has resulted in tuition overpayment, a refund check will be issued by Stanford to the student. It remains the student's responsibility to provide tuition and fees back to the VA. If the enrollment change has resulted in underpayment, the VA sends the difference in tuition fees to the student, excluding Ch. 33 recipients. If you are a Ch. 33 recipient, fees will be paid directly to the institution in a separate payment.

## Programs Subject to Restriction

Note that the following programs cannot be certified due to VA and federal regulations:

- *Certificate programs for non-matriculated students:* The VA defines "matriculated" as having been formally admitted to a college or university. Per the VA, educational benefits cannot be paid to "non-matriculated" college or university students. Hence, any certificate program that does not officially admit its students into Stanford University cannot be certified.
- *Visiting Students Programs:* Stanford cannot certify visiting students unless they meet one of the following conditions:

1. The student has an approved parent letter from the home institution which guarantees that the courses can be transferred back to original program.
  2. The student is pending admission to a Stanford degree program and is required to take a prerequisite course(s). In that case the student can be certified for two terms.
- *Medical Residencies/Fellowship programs that are not certified by the ACGME:* these residencies are not allowed to be certified as on the job training. This is according to VA guidelines and the Federal Code of Regulations. See the School of Medicine for a full list of the fellowship/residency programs.

All students eligible to receive veterans' benefits while attending the University are urged to complete arrangements with the appropriate agency in advance of enrollment.

## Financial Aid

The Post-9/11 GI Bill, also known as Chapter 33, is the most commonly used VA educational benefits program at Stanford. This program provides funding for tuition, required fees, books and housing. The level of an individual student's Chapter 33 benefits is determined by the qualifying veteran's length of military service since 9/11/2001. For the 2012-13 academic year, the base benefit for tuition and fees is capped at \$17,500. Eligible students may also receive funds through the Yellow Ribbon Provision.

Most of the VA educational benefit programs pay benefits directly to students on a monthly basis. However, under the Post-9/11 GI Bill (Chapter 33), the VA sends tuition and fees benefits to Stanford, where the Financial Aid Office is responsible for applying the funds to the student account (university bill). Chapter 33 books and housing benefits are sent directly to students monthly. Students may need to apply the housing benefits to the university bill to pay for on-campus room and board.

## Yellow Ribbon Provision

Stanford elects on a yearly basis to participate in the Yellow Ribbon Program. Under this provision Stanford provides an annual contribution to supplement the Chapter 33 base tuition benefit. The VA matches Stanford's Yellow Ribbon contribution. For the 2012-13 academic year, Stanford's annual Yellow Ribbon contribution for undergraduate students is \$3,000, with the VA providing a matching amount of \$3,000. For graduate and professional students, the amount of Stanford's Yellow Ribbon contribution varies by school and program; see the Yellow Ribbon chart on the University Registrar's web site.

## Undergraduates

Undergraduates may apply for need-based financial aid from Stanford to supplement VA educational benefits. If the financial aid application demonstrates financial need beyond the amount of expected VA benefits, the student will be awarded institutional aid to meet the additional need.

If the student will be receiving VA educational benefits transferred from a parent, the student will be treated as a dependent student for financial aid purposes. The student's parents' income and asset information will be considered in determining eligibility for need-based aid from Stanford. If the student is a veteran, the student will most likely be treated as an independent student and will not need to provide parent information. Receipt of VA educational benefits does not impact your eligibility for federal student loan programs.

VA educational benefits are treated like other outside awards in that they can reduce or replace the Student Responsibility portion of the aid package. VA benefits do not reduce or replace the Parent Contribution in the determination of eligibility for need-based Stanford aid.

## Graduate Students

Schools and departments are responsible for providing the Yellow Ribbon contribution for eligible graduate students. The Financial Aid Office will coordinate receipt of funds with responsible individuals in each school. Receipt of VA educational benefits does not impact your eligibility for federal student loan programs.

# Academic Policies and Statements

## Compliance with University Policies/Registration Holds

Registration as a student constitutes a commitment by the student to abide by and accept University policies, rules, requirements, and regulations, including (but not limited to) those concerning registration, academic performance, student conduct, health and safety, housing, use of the libraries and computing resources, operation of vehicles on campus, University facilities, and the payment of fees and assessments. Some of these are set forth in this bulletin while others are available in relevant University offices.

Students should take responsibility for informing themselves of applicable University policies, rules, requirements, and regulations. A collection is available on the Stanford University policy (<http://www.stanford.edu/about/administration/policy>) web site. Many are also set forth in the Research Policy Handbook (<http://rph.stanford.edu>) and the Graduate Academic Policies and Procedures Handbook (the GAP handbook) (<http://gap.stanford.edu>).

The University reserves the right to withhold registration privileges or to cancel the registration of any student: who is not in compliance with its policies, rules, requirements, or regulations; or for reasons pertaining to academic performance, health and wellness, qualification to be a student, behavioral conduct, or the safety of the University community.

## Notification/Obligation to Read Email

For many University communications, email to a student's Stanford email account is the official form of notification to the student, and emails sent by University officials to such email addresses will be presumed to have been received and read by the student. Emails and forms delivered through a SUNet account by a student to the University may likewise constitute a formal communication, with the use of this password-protected account constituting the student's electronic signature.

## Registration and Study Lists

The preliminary study list deadline is the first day of classes of each quarter during the academic year. As early as possible, but no later than this deadline, students (including those with TGR status) must submit to the Office of the University Registrar via Axess, a study list to enroll officially in classes for the quarter. Students are expected to be enrolled "at status" by the preliminary study list deadline; meaning that students must be enrolled in sufficient units to meet requirements for their status, whether full-time, or on approved special registration status. Students who enroll in more units than their anticipated tuition charge covers will be charged the additional tuition. They may not enroll in courses for zero units unless those courses, like TGR, are defined as zero-unit courses. Undergraduates are subject

to academic load limits described in the "Amount of Work (p. 51)" section of this bulletin. Students will be charged a \$200 late study list fee for submitting their study lists after the quarterly deadline.

The University reserves the right to withhold registration from, and to cancel the advance registration or registration of, any student having unmet obligations to the University.

## Study List Changes

Students may add courses or units to their study lists through the end of the third week of classes. (Individual faculty may choose to close their classes to new enrollments at an earlier date.) Courses or units may be added only if the revised program remains within the normal load limits.

Courses or units may be dropped by students through the end of the third week of classes, without any record of the course remaining on the student's transcript. No drops are permitted after this point. The Final Study List deadline is the last day for tuition reassessment for dropped courses or units.

A student may withdraw from a course after the final study list deadline through the end of the eighth week of each quarter. In this case, a grade notation of 'W' (withdraw) is automatically recorded on the student's transcript for that course. There are no tuition reassessments for withdrawing from individual courses. Students who do not officially withdraw from a class by the end of the eighth week are assigned the appropriate grade or notation by the instructor to reflect the work completed.

Through the end of the eighth week of classes, students may choose the grading option of their choice in courses where an option is offered.

If the instructor allows a student to take an 'I' (incomplete) in the course, the student must make the appropriate arrangements for that with the instructor by the last day of classes.

The deadlines described above follow the same pattern each quarter but, due to the varying lengths of Stanford's quarters, they may not always fall in exactly the week specified. Students should consult the University's academic calendar (<http://studentaffairs.stanford.edu/registrar/academic-calendar>) for the deadline dates each term. Other deadlines may apply in Law, Graduate School of Business, Medicine, and Summer Session.

## Repeated Courses

Students may not enroll in courses for credit for which they received either Advanced Placement or transfer credit.

Some Stanford courses may be repeated for credit; they are specially noted in this bulletin. Most courses may not be repeated for credit. Under the general University grading system, when a course which may not be repeated for credit is retaken by a student, the following special rules apply:

1. A student may retake any course on his or her transcript, regardless of grade earned, and have the original grade, for completed courses only, replaced by the notation 'RP' (repeated course). When retaking a course, the student must enroll in it for the same number of units originally taken. When the grade for the second enrollment in the course has been reported, the units and grade points for the second course count in the cumulative grade point average in place of the grade and units for the first enrollment in the course. Because the notation 'RP' can only replace grades for completed courses, the notation 'W' cannot be replaced by the notation 'RP' in any case.
2. A student may not retake the same course for a third time unless he or she received a 'NC' (no credit) or 'NP' (not passed) when it was taken and completed the second time. Undergraduate students must file a petition for approval to take the course for a third time with the office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall. When a student completes a course for the third time, grades and units for both the second and third completions count in the cumulative grade point average. The notation 'W' is not counted toward the three-retain maximum.

## Amount of Work

The usual amount of work for undergraduate students is 15 units per quarter; 180 units (225 for dual degree students) are required for graduation. Registration for fewer than 12 units is rarely permitted and may cause the undergraduate to be ineligible for certification as a full-time student. The maximum is 20 units (21 if the program includes a 1-unit activity course). Requests for exception to the maximum may be considered for compelling reasons, the approval of which may include conditions or restrictions.

A past superior academic performance is not considered to be sufficient justification for exceeding the maximum. Petitions for programs of fewer than 12 or more than 20 units must be submitted to the office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research, Sweet Hall, first floor. For additional information regarding satisfactory academic progress, refer to the "Academic Standing (p. 58)" section of this bulletin.

Matriculated graduate students are expected to enroll for at least eight units during the academic year; schools and departments may set a higher minimum. Petitions for programs of fewer than 8 must be signed by the student's department and submitted for consideration to the Office of the University Registrar. Graduate students are normally expected to enroll in no more than 24 units; registration for more than 24 units must be approved by the department. Under certain circumstances, graduate students may register on a part-time basis. See the "Tuition, Fees, and Housing (p. 17)" section of this bulletin.

## Unit of Credit

*Guidance for faculty and instructors on how to comply with this policy is available on the Registrar's web site.*

Every unit for which credit is given is understood to represent approximately three hours of actual work per week for the average student. Thus, in lecture or discussion work, for 1 unit of credit, one hour per week may be allotted to the lecture or discussion and two hours for preparation or subsequent reading and study. Where the time is wholly occupied with studio, field, or laboratory work, or in the classroom work of conversation classes, three full hours per week through one quarter are expected of the student for each unit of credit; but, where such work is supplemented by systematic outside reading or experiment under the direction of the instructor, a reduction may be made in the actual studio, field, laboratory, or classroom time as seems just to the department.

## Religious Holidays

Students planning not to attend class or take an exam because of a religious observance are expected to convey this information to instructors in advance. The Office for Religious Life makes available to faculty, staff, and students a list of significant religious observances at the beginning of each academic year. For further information, contact the Deans for Religious Life at (650) 723-1762 or see the Religious Life (<http://exploreddegrees.stanford.edu/academicpoliciesandstatements/http://religiouslife.stanford.edu>) web site.

## Privacy of Students Records

### Notification of Rights Under FERPA

The Family Educational Rights and Privacy Act of 1974 (FERPA) affords students certain rights with respect to their education records. They are:

1. The right to inspect and review the student's education records within 45 days of the date the University receives a request for access.

The student should submit to the Registrar, Dean, chair of the department, or other appropriate University official, a written request that identifies the record(s) the student wishes to inspect. The

University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

2. The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise in violation of the student's privacy rights under FERPA.
  - A. A student may ask the University to amend the record that he or she believes is inaccurate or misleading. The student should write the University official responsible for the record (with a copy to the University Registrar), clearly identify the part of the records he or she wants changed, and specify why it should be changed.
  - B. If the University decides not to amend the record as requested by the student, the University will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment.
  - C. Additional information regarding the hearing procedures is provided to the student when notified of the right to a hearing.
3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.

FERPA contains various exceptions to the general rule that the University should not disclose education records without seeking the prior written consent of the student. The following circumstances are representative of those in which education records (and information drawn from education records) may be disclosed without the student's prior written consent:

- A. Upon request, the University may release Directory Information (see the "Directory Information (<http://www.stanford.edu/dept/registrar/bulletin/4962.htm>)" section of this bulletin).
- B. School officials who have a legitimate educational interest in a student's education record may be permitted to review it. A school official is: a person employed by the University in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the University has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student or volunteer serving on an official committee (or representing a recognized student group), such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks. A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her responsibility to Stanford or to the student.
- C. The University discloses education records without consent to officials of another school, in which a student seeks or intends to enroll, upon request of officials at that other school.
- D. The University may choose to disclose education records (and information drawn from education records) to either supporting parent(s) or guardian(s) where the student is claimed as a dependent under the Internal Revenue Code.
- E. The University may inform persons including either parent(s) or guardian(s) when disclosure of the information is necessary to protect the health or safety of the student or other persons.
- F. For students under the age of 21, the University may notify either parent(s) or guardian(s) of a violation of any law or policy relating to the use of alcohol or controlled substances.

G. The University must provide records in response to lawfully issued subpoenas, or as otherwise compelled by legal process.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA.

The name and address of the office that administers FERPA is:  
Family Policy Compliance Office, U.S. Department of Education,  
400 Maryland Avenue, SW, Washington, DC 20202-4605.

## Sharing Information with Parents

Students are encouraged to maintain an ongoing, open dialogue with parents throughout their careers at Stanford about academic progress and personal development. Most student difficulties are resolved at Stanford without involving parents. The University does recognize, however, that there are some exceptional situations where parental involvement may be appropriate to assist a student through a difficult circumstance. Under those circumstances, Stanford may (but is not required to) choose to disclose information to parents if permitted by law.

Under the Family Educational Rights and Privacy Act (FERPA), Stanford is permitted to disclose information drawn from education records to parents if one or more parent claims the student as a dependent for federal tax purposes. Some laws, especially those relating to medical and mental health care, prohibit the disclosure of information without the student's consent, even where the student is a tax dependent.

## Directory Information

The University regards the following items of information as "directory information," that is, information that the University may make available to any person upon specific request (and without student consent):

- Name\*
- Date of birth
- Place of birth
- Directory addresses and telephone numbers
- Email addresses
- SUNet ID (as opposed to Stanford Student ID Number)\*
- Mailing addresses
- Campus office address (for graduate students)
- Secondary or permanent mailing addresses
- Residence assignment and room or apartment number
- Specific quarters or semesters of registration at Stanford
- Stanford degree(s) awarded and date(s)
- Major(s), minor(s), and field(s)
- University degree honors
- Student theses and dissertations\*
- Participation in officially recognized sports or activities\*
- Weight and height of members of athletic teams\*
- Institution attended immediately prior to Stanford
- ID card photographs

For more information, see Stanford's FERPA (<http://studentaffairs.stanford.edu/registrar/students/ferpa>) web page.

Students may prohibit the release of any of the items listed above (except those with an '\*') by designating which items should not be released on the Privacy function of Axess. Students may prohibit the release of all directory information listed above after an appointment with the Office of the University Registrar to discuss the ramifications of this action. Student theses and dissertations can be restricted through the publishing options and embargo settings students select during submission.

Students, faculty, and others with questions regarding student records should contact the Office of the University Registrar.

## Consent to Use of Photographic Images

Registration as a student and attendance at or participation in classes and other campus and University activities constitutes an agreement by the student to the University's use and distribution (both now and in the future) of the student's image or voice in photographs, video or audio capture, or electronic reproductions of such classes and other campus and University activities.

If any student in a class where such photographing or recording is to take place does not wish to have his or her image or voice so used, the student should raise the matter in advance with the instructor.

## Examinations

### Midterms

Classes that give midterm examinations outside of regular class hours must:

1. announce the date and time during the first week of the academic quarter, and
2. provide reasonable alternative times to those students for whom these announced times are not convenient.

According to Honor Code interpretations and applications, different examinations may be given at these alternative times.

## End-Quarter Policy Statement

The End-Quarter Period is a time of reduced social and extracurricular activity preceding final examinations. Its purpose is to permit students to concentrate on academic work and to prepare for final examinations.

In Autumn, Winter, and Spring quarters, End-Quarter starts seven full days (to begin at 12:01 a.m.) prior to the first day of final exams. In Spring Quarter, final examinations begin on Friday; no classes are held on Thursday, the day before. In Summer Quarter, this consists of the weekend and the four class days preceding the final examinations, which take place on Friday and Saturday of the eighth week. (See the Time Schedule for dates.)

During the End-Quarter Period, classes are regularly scheduled and assignments made; this regular class time is used by instructors in whatever way seems best suited to the completion and summation of course material. Instructors should neither make extraordinary assignments nor announce additional course meetings in order to "catch up" in course presentations that have fallen behind. They are free, however, and even encouraged to conduct optional review sessions and to suggest other activities that might seem appropriate for students preparing for final examinations.

No graded homework assignments, mandatory quizzes, or examinations should be given during the End-Quarter Period except:

1. In classes where graded homework assignments or quizzes are routine parts of the instruction process.
2. In classes with laboratories where the final examination will not test the laboratory component. In such a case, the laboratory session(s) during the End-Quarter Period may be used to examine students on that aspect of the course.

Major papers or projects about which the student has had reasonable notice may be called due in the End-Quarter Period.

Take-home final examinations, given in place of the officially scheduled in-class examination, may be distributed in the End-Quarter Period. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course. Such a policy respects the principle that students' final examinations are to be scheduled over a period of several days.

End-quarter examinations may not be held during this period. This policy preserves the instruction time for courses and protects the students' opportunities for extensive review and synthesis of their courses.

During the End-Quarter Period, no musical, dramatic, or athletic events involving student participation may be scheduled, unless approved as exceptions by the Committee on Undergraduate Standards and Policy (C-USP), nor may routine committee meetings be scheduled (such as those of the ASSU, the Senate of the Academic Council, or the committees of the President of the University) when such meetings normally would involve student participation.

Note—Students who believe that there are faculty who are violating End-Quarter policy should contact the Office of the University Registrar (<https://remedyweb.stanford.edu/helpsu/2.0/helpsu-form?pcat=Registrar>).

## End-Quarter Examinations

Examinations are part of the process of education at the same time that they are a means to measure the student's performance in course work. Their structure, content, frequency, and length are to be determined in accordance with the nature of the course and the material presented in it, subject only to the limitations contained herein.

Great flexibility is available regarding the types of examinations that an instructor may choose to employ. Examinations, including final examinations, may be, for example, in-class essay examinations, take-home essay examinations, objective examinations, oral examinations, or appropriate substitutes such as papers or projects. Instructors may use any type of examination, paper, or project, or any combination thereof, guided only by the appropriateness of the types of examinations, papers, or projects for the material upon which the student is being examined.

When the final examination is an in-class examination, the following regulations apply:

1. A three-hour period is reserved during examination week for the final examination in each course of more than 2 units. This examination period must be available for students, but not necessarily in its entirety, if an in-class examination is given. In courses with extraordinary meeting times, such that ambiguity might exist as regards the period reserved for the final examination, the schedule should be clarified and students informed no later than the end of the second week of the quarter.
2. Examinations in 1- or 2-unit courses must be completed by the end of the last class meeting before the End-Quarter Period, except in Summer Quarter when examinations must be completed during the last regularly scheduled class session.

When the final examination or its appropriate substitute is not an in-class examination (for example, when an instructor chooses to employ a take-home examination, paper, or project in lieu of an in-class examination), the following regulations apply:

1. The schedule and format of the final examination or its appropriate substitute are made known not later than the end of the second week of the quarter and, if changed subsequently, may be only an option of the plan originally announced by the instructor.
2. Although the instructor may ask students to return take-home examinations early in the final examination period, the instructor may not call them due until the end of the regularly scheduled examination time for that course.

In submitting official Study Lists, students commit to all course requirements, including the examination procedures chosen and announced by the course instructor. In choosing courses, students should take cognizance of the official schedule of final examinations announced on the Registrar's (<http://studentaffairs.stanford.edu/registrar/final-exams>) web site. Students anticipating conflicts in final examination schedules should seek to resolve these with the instructors involved before the Preliminary Study List deadline at the beginning of the quarter. If accommodation cannot be made at that time, the student should revise his or her Study List before the Final Study List deadline at the end of the third week of the quarter in order to be able to meet the required final examination.

If unforeseen circumstances prevent the student from sitting for the regularly scheduled examination, instructors should make alternative arrangements on an individual basis. Such unforeseen circumstances include illness, personal emergency, or the student's required participation in special events (for example, athletic championships) approved as exceptions by the Committee on Undergraduate Standards and Policy (C-USP). Inquiries regarding these circumstances may be directed to the office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual)).

## Statement Concerning Early Examinations

Students are reminded that taking final examinations earlier than the scheduled time is a privilege, not a right. They should request this privilege only in the event of extraordinary circumstances.

Since the final examination schedule for each quarter (<http://studentaffairs.stanford.edu/registrar/final-exams>) is published annually on the Registrar's web site at the time of course selection and enrollment, students are expected to make their academic plans in light of known personal circumstances that may make certain examination times difficult for them.

In general, faculty members are discouraged from giving final examinations earlier than the published and announced times. If faculty nevertheless decide to administer early examinations, either the questions should be completely different from those on the regularly scheduled examination or the early examination should be administered in a highly controlled setting. An example of such a setting would be a campus seminar room where the examination questions would be collected along with students' work and students would be reminded of their Honor Code (<http://www.stanford.edu/dept/registrar/bulletin/79155.htm>) obligations not to share information about the examination contents. Giving students easy opportunities to abuse the integrity of an examination is unfair to honest students and inconsistent with the spirit of the Honor Code (<http://www.stanford.edu/dept/registrar/bulletin/79155.htm>).

Academic fields differ in the degree to which early examination requests present dilemmas for faculty. If, for example, an examination format consists of a small number of essay questions, where students would be greatly advantaged by knowing the question topics, faculty should be especially reluctant to allow early examinations unless they are willing to offer totally different examinations or a different kind of academic task, for example, a final paper in lieu of an examination.

## Grading Systems

### General University Grading Systems

The general University grading system is applicable to all of Stanford University except the Graduate School of Business, the School of Law, and M.D. students in the School of Medicine. Note that the GPA (grade point average) and rank in class are not computed under the general University

grading system. Stanford does use an internal-only GPA which is based on units completed up to the time of conferral of the first bachelor's degree. This information is used for internal purposes only (including academic standing) and is not displayed on the official transcript which is sent outside the University. Most courses are graded according to the general University grading system. However, courses offered through Law, Business, and Medicine are graded according to those schools' grading systems, even in cases where students in other programs are enrolled in their classes. Note also that, as to graduate students, there may be departmental requirements as to grades that must be maintained for purposes of minimum academic progress.

## Definition and Explanation of Grading Systems

All grades/notations for courses taken in 1995-96 or later are to be visible on student transcripts. Effective Summer Quarter 2008-09, the notation \* was changed to GNR (Grade Not Reported).

Grade	Description
A (+,-)	Excellent
B (+,-)	Good
C (+,-)	Satisfactory
D (+,-)	Minimal pass
NP	Not Passed
NC	No Credit (unsatisfactory performance, 'D+' or below equivalent, in a class taken on a satisfactory/no credit basis)
CR	Credit (student-elected satisfactory; A, B, or C equivalent)
S	No-option Satisfactory; A, B, or C equivalent
L	Pass, letter grade to be reported
W	Withdraw
N	Continuing course
I	Incomplete
RP	Repeated Course
*	No grade reported (effective through Spring 2008-09).
GNR	Grade not reported (effective beginning Autumn Quarter 2009-10).

## Explanation

Grade	Description
NC	The notation 'NC' represents unsatisfactory performance in courses taken on a satisfactory/no credit basis. Performance is equivalent to letter grade 'D+' or below.
NP	The notation 'NP' is used by instructors in courses taken for a letter grade that are not passed.
CR	In a course for which some students receive letter grades, the 'CR' represents performance that is satisfactory or better when the student has elected the 'CR' grading option.



S	For an activity course or a course in which the instructor elects to grade students only on a satisfactory/no credit basis, the 'S' represents performance that is satisfactory or better. For such a course, no letter grades may be assigned for satisfactorily completed work. It should be noted that the Registrar is unable to record course grades submitted when the instructor has not observed the required distinction between 'S' and 'CR.' The 'satisfactory' options are intended to relieve the pressure on students for achievement in grades. The 'satisfactory' options in no way imply fewer or different course work requirements than those required of students who elect evaluation with a letter grade. A department may limit the number of 'satisfactory' courses to count for a major program. No more than 36 units of Stanford course work (including activity courses) in which a 'CR' or 'S' was awarded can be applied toward the 180 (225 if dual degrees are being pursued) units required for a bachelor's degree. Transfer students are limited to 27 'CR' or 'S' units applied to the 180/225 minimum.
L	The 'L' is a temporary notation that represents creditable completion of a course for which the student will receive a permanent letter grade before the start of the next quarter. The 'L' is given when the instructor needs additional time to determine the specific grade to be recorded, but it is not appropriate if additional work is expected to be submitted by the student. A student receives unit credit for work graded 'L.'
N	The 'N' indicates satisfactory progress in a course that has not yet reached completion. Continuation courses need not continue at the same number of units, but the grade for all quarters of such a course must be the same.
N-	The 'N-' grade indicates unsatisfactory progress in a continuing course. The first 'N-' grade constitutes a warning. The adviser, department chair, and student should discuss the deficiencies and agree on the steps necessary to correct them. A second consecutive 'N-' will normally cause the department to deny the student further registration until a written plan for the completion of the degree requirements has been submitted by the student and accepted by the department. Subsequent 'N-' grades are grounds for dismissal from the program.
I	The 'I' is restricted to cases in which the student has satisfactorily completed a substantial part of the course work. No credit will be given until the course is completed and a passing grade received. When a final grade is received, all reference to the initial 'I' is removed. 'I' grades must be changed to a permanent notation or grade within a maximum of one year. If an incomplete grade is not cleared at the end of one year, it is changed automatically by the Office of the University Registrar to an 'NP' (not passed) or 'NC' (no credit) as appropriate for the grading method of the course. Students must request an incomplete grade by the last class meeting. Faculty may determine whether to grant the request or not. Faculty are free to determine the conditions under which the incomplete is made up, including setting a deadline of less than one year.
RP	The notation 'RP' (meaning Repeated Course) replaces the original grade recorded for a course when a student retakes a course. (See the "Repeated Courses" section of this bulletin.)
W	The notation 'W' (meaning Withdraw) is recorded when a student withdraws from a course.
*	The '**' symbol appears when no grade has been reported to the Registrar for courses taken prior to 2001-02. The

\*\* symbol remains on the transcript until a grade has been reported (effective through Spring 2008-09).

**GNR** The notation 'GNR' appears when no grade has been reported to the Registrar. The 'GNR' notation remains on the transcript until a grade has been reported. (Effective beginning Autumn Quarter 2009-10.)

## Reporting of Grades

All grades should be reported within 96 hours after the time and day reserved for the final examination, and in no case later than noon of the fourth day (including weekends) after the last day of the final examination period.

In the case of degree candidates in Spring Quarter, final grades should be reported by noon of the day following the end of the final examination period.

## Revision of End-Quarter Grades

When duly filed with the Office of the University Registrar, end-quarter grades are final and not subject to change by reason of a revision of judgment on the instructor's part; nor are grades to be revised on the basis of a second trial (for example, a new examination or additional work undertaken or completed after the end of the quarter). Changes may be made at any time to correct an actual error in computation or transcription, or where some part of the student's work has been unintentionally overlooked; that is, if the new grade is the one that would have been entered on the original report had there been no mistake in computing and had all the pertinent data been before the instructor, the change is a proper one.

If a student questions an end-quarter grade based on the grading of part of a specific piece of work (for example, part of a test) on the basis of one of the allowable factors mentioned in the preceding paragraph (for example, an error in computation or transcription, or work unintentionally overlooked, but not matters of judgment as mentioned below), the instructor may review the entire piece of work in question (for example, the entire test) for the purpose of determining whether the end-quarter grade was a proper one. In general, changing an end-quarter grade is permitted on the basis of the allowable factors already mentioned whether an error is discovered by the student or the instructor; however, changing a grade is not permitted by reason of revision of judgment on the part of the instructor.

In the event that a student disputes an end-quarter grade, the established grievance procedure should be followed (see the "Student Academic Grievance Procedure (<http://www.stanford.edu/dept/registrar/bulletin/4988.htm>)" section of this bulletin).

## Graduate School of Business Grades

All courses offered by the Graduate School of Business are graded according to the following five-level scheme:

Grade	Description
H	Honors. Work that is of truly superior quality.
HP	High Pass. A passing performance, and one that falls approximately in the upper quarter of passing grades.
P	Pass. A passing performance that falls in the center of the distribution of all passing grades.
LP	Low Pass. A passing performance that falls approximately in the lower quarter of passing grades.
U	Unsatisfactory. A failing performance. Work that does not satisfy the basic requirements of the course and is deficient in significant ways.
GNR	The notation 'GNR' appears when no grade has been reported to the Registrar. The 'GNR' notation remains on the transcript until a grade has been reported (effective Autumn Quarter 2009-10).

GSB courses may receive grades of "+" (Pass) for courses taken on a Pass-Fail basis, with "U" denoting a failing grade, "I" for Incomplete, and "N" for a continuing grade. The grade of N is recorded in a course that spans more than a single quarter, where the grade in an earlier quarter will be determined only later, after the entire course sequence is complete..

Prior to 2009-10, an asterisk (\*) notation was placed when no grade was reported.

## Stanford Law School Grades

Effective Autumn Quarter 2009-10, units earned in the Stanford Law School are quarter units. Units earned in the Stanford Law School prior to 2009-10 were semester units. The following grading system became effective in Autumn Semester 2008-09. J.D. students who graduated in 2009 remained on the prior grading system but all other students shifted to the new grading system. For more information, see the Stanford Law School Handbook ([http://www.law.stanford.edu/experience/studentlife/SLS\\_Student\\_Handbook.pdf](http://www.law.stanford.edu/experience/studentlife/SLS_Student_Handbook.pdf)).

Grade	Description
H	Honors (exceptional work, significantly superior to the average performance at the school)
P	Pass (representing successful mastery of the course material)
R	Restricted credit (representing work that is unsatisfactory)
F	Fail (representing work that does not show minimally adequate mastery of the material)
MP	Mandatory pass (representing P or better work)
N	Continuing course
I	Incomplete
*	No grade reported
GNR	Grade not reported (effective Autumn Quarter 2009-10).

The grading systems employed at the Stanford Law School September 2001 through Spring 2009 were as follows. Under the numerical system (with letter equivalents), the range of satisfactory grades ran from 4.3 to 2.5 as outlined in the following distribution. Below the grade of 2.5 was one level of restricted credit (2.2) and one level of failure (2.1). The number grades with letter equivalents were as follows:

Numbering	Grade
4.3-4.2	A+
4.1-3.9	A
3.8-3.5	A-
3.4-3.2	B+
3.1-2.9	B
2.8-2.5	B-
2.2	Restricted Credit
2.1	Failure

On this old system, students could elect to take a limited number of courses on a credit/restricted credit/no credit system (K/RK/NK). 'K' was awarded for work that was comparable to numerical grades 4.3 to 2.5, 'RK' for Restricted Credit-level work (2.2), and 'NK' for Failure-level work (2.1). A limited number of courses were offered on a mandatory credit (KM)/no credit (NK) basis.

'N' is a temporary notation used in a continuing course; it is replaced with a final grade upon completion of the course series.

## School of Medicine Grades

In general, the following grades are used in reporting on the performance of students in the M.D. program:

Grade	Description
Pass (+)	Indicates that the student has demonstrated to the satisfaction of the department or teaching group responsible for the course that the student has mastered the material taught in the course.
Fail (-)	Indicates that the student has not demonstrated to the satisfaction of the department or teaching group responsible for the course that the student has mastered the material taught in the course.
Incomplete (I)	Indicates that extenuating medical or personal circumstances have prevented the student from completing the course requirements. This grade is given when requested by the student with the prior approval of an Advising Dean in the School of Medicine.
Continuing (N)	Indicates that the course has not concluded and the student is continuing the course.
Exempt (Ex)	Indicates a course that is exempted by examination. No units are awarded.
GNR	The notation 'GNR' appears when no grade has been reported to the Registrar. The 'GNR' notation remains on the transcript until a grade has been reported (effective Autumn Quarter 2009-10).

In general, a 'Fail' grade can be cleared by repeating and passing the particular course or by other arrangement prescribed by the department or teaching group. An 'Incomplete' grade can be made up in a manner specified by the department or teaching group within a reasonable time; if the deficiency is not made up within the specified time, the 'Incomplete' grade becomes a 'Fail' grade. The opportunity to clear a 'Fail' grade or an 'Incomplete' grade cannot be extended to individuals who are not registered or eligible to register as students in the M.D. program. For more specific information, see the Assessment of Student Academic Performance (<http://med.stanford.edu/md/curriculum/assessment-grading.html>) web site.

## Records

### Transcripts

Transcripts of Stanford records are issued by the Office of the University Registrar upon the student's request when submitted in writing or via the online Axxess system. There is no charge for official transcripts. The courses taken in one quarter do not appear on any student's transcript until after the final study list deadline. The University reserves the right to withhold transcripts or records of students with unmet obligations to the University.

### Certification of Enrollment or Degrees

The Office of the University Registrar can provide written confirmation of registration, enrollment, or degree status upon request by the student. The printed certification can be used whenever enrollment or degree verification is required for car insurance, loan deferments, medical coverage, scholarship purposes, and so on. Using Axxess, students are able to print an official certification at no charge. Certification of full- or part-time enrollment cannot be provided until after the study list is filed for the quarter in question.

Degrees are conferred quarterly, but diplomas are issued in accordance to the distribution dates listed on the Registrar's Office (<http://studentaffairs.stanford.edu/registrar/students/diplomas>) web site. After conferral, the degree awarded to a student can be verified by contacting the Office of the University Registrar for an official transcript, or official degree certification form. Requests for transcripts or degree certifications must be made by the student in writing or through Axxess.

Stanford University has authorized the National Student Clearinghouse (NSC) to act as its agent for purposes of third party enrollment and degree verification. The NSC will be able to verify degrees and enrollment for only those students who have not placed a privacy block on their academic record. The student's name when enrolled, Social Security Number or Student ID, and date of birth will be required for identification purposes and enrollment or degree verification. All third parties should contact the National Student Clearinghouse by phone or visit their web site for current enrollment and degree verification information, instructions, and fees.

Full-time enrollment for undergraduates is considered to be enrollment in a minimum of 12 units of course work per quarter at Stanford. Work necessary to complete units from previous quarters does not count toward the 12 units necessary for full-time status in the current quarter. Enrollment in 8 to 11 units is considered half-time enrollment. Enrollment in 1 to 7 units is considered less-than-half-time, or part-time enrollment. During Summer Quarter, all graduate students who hold appointments as research or teaching assistants are considered to be enrolled on at least a half-time basis.

All undergraduates validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification.

Stanford uses the following definitions (in units) to certify the enrollment status of graduate and professional students each quarter:

Status	Graduate	Business (M.B.A./Sloan)	Law	Medicine (M.D.)
Full time:	8 or more	11 or more	9 or more	9 or more
Half time:	6 or 7	6-10	6-8	6-8
Part time:	5 or fewer	5 or fewer	5 or fewer	5 or fewer

TGR students enrolled in a course numbered 801 or 802 are certified as full time. Graduate students on an approved Graduation Quarter status are certified as full time.

As a general proposition, only information classified by the University as directory information (see the "Directory Information (<http://www.stanford.edu/dept/registrar/bulletin/4962.htm>)" section of this bulletin) can be confirmed to inquirers other than the student.

## Academic Standing

Undergraduates must maintain a minimum 2.0 cumulative GPA and a quantitative unit requirement for good academic standing. In addition, a minimum 2.0 cumulative GPA is required for conferral of a baccalaureate degree.

Undergraduates normally are expected to plan their academic programs so that they can complete 180 units in four years (twelve quarters), including the requirements for a major and the General Education (p. 26), Writing and Rhetoric (p. ), and Language (p. ) Requirements. Satisfactory academic progress is, on average, 45 units per academic year for four years leading to at least 180 units, a cumulative grade point average of at least 2.0, and a baccalaureate degree.

While undergraduates are expected to register for a minimum of 12 units, they are required to earn at least 9 units each quarter (by the end of the final exam period) and at least 36 units in their most recent three quarters of Stanford enrollment (by the end of the third final exam period). In addition, students are expected to maintain a cumulative grade point average of at least 2.0. Transfer work completed at other institutions is not considered in this calculation.

A student earning fewer than 9 units per quarter or fewer than 36 units in three quarters, or earning less than a 2.0 cumulative grade point average, is placed on probation. Additionally, a student may be placed directly on provisional registration or suspension (further defined in this section) without first being placed on probation if the student had a prior probation status. Students on probation (p. ) or provisional registration (p.

) status are required to earn a minimum of 12 units of new course work per quarter (by the end of the final quarter examination period for each quarter) in each quarter for three consecutive quarters, and achieve and maintain a cumulative grade point average of at least 2.0 to attain good academic standing. (A Stanford Summer Session quarter counts toward the three consecutive quarter requirement if 11 or more units are earned). The C-USP Subcommittee on Academic Standing may stipulate otherwise by acting upon a petition for fewer units.

Full-time enrollment is considered to be enrollment in a minimum of 12 units of course work per quarter at Stanford. Under extenuating circumstances, students may petition to the C-USP Subcommittee on Academic Standing to take fewer units. Work necessary to complete units from previous quarters does not count toward the 12 units necessary for full-time enrollment in the current quarter. All students registering for fewer than 12 units should consider the effects of that registration on their degree progress, visas, deferment of student loans, residency requirements, varsity athlete status, and their eligibility for financial aid and awards.

All undergraduates validly registered at Stanford are considered to be in good standing for the purposes of enrollment certification and athletic participation.

Units are granted for courses completed with grades 'A,' 'B,' 'C,' 'D,' 'Satisfactory' ('CR' or 'S'), and 'L.' Courses graded 'N' are counted provisionally as units completed, provided the student enrolls in the continuing segment of that course the following quarter. When the course is completed, the student receives the units for which he or she enrolled. No units are granted for a course in which the student receives an 'I' or a 'GNR' ('GNR' replaced the '\*' effective Autumn Quarter 2009-10) until the course is completed satisfactorily and the final grade reported. No units are granted for a course in which the student receives a 'W'. (See the "Grading Systems (p. 55)" section of this bulletin).

Students who receive all 'W's as the result of a Leave of Absence (either voluntary or involuntary) are subject to Academic Standing policies.

The C-USP Subcommittee on Academic Standing in its discretion is empowered to place conditions on students on probation or provisional registration in regard to enrollment and participation in programs and activities. In addition, students on probation require approval in advance from Undergraduate Advising and Research ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP/advising/MakeAdvisingAppointment.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP/advising/MakeAdvisingAppointment.html)), Residential Education (<http://studentaffairs.stanford.edu/resed>), and the Overseas Studies Program (<http://bossp.stanford.edu>) office or Stanford in Washington Program (<http://siw.stanford.edu>) office in order to participate in Stanford's Overseas Studies Program or Stanford in Washington Program; while students on provisional registration are ineligible to participate in these programs.

Academic performance of a student participating in a coterminal program, and whose undergraduate degree or degrees have not yet been conferred, is reviewed on a case-by-case basis in conjunction with the graduate department or program in which the student is enrolled.

Students receiving federal student aid funds must maintain satisfactory academic progress standards that may be stricter than those outlined here. See the Financial Aid Office web site at <http://financialaid.stanford.edu> for details.

## Probation

A student who fails to earn at least 36 units of work in his or her most recent three quarters of enrollment at the University (by the end of the third final exam period), or who fails to earn by the end of the final examination period at least 9 quarter units of work in his or her most recent quarter of enrollment at the University, or who has a cumulative grade point average of less than 2.0, may be placed on probation (warning status).

A student shall be removed from probation after three consecutive subsequent quarters of enrollment at the University if, in each quarter, he or she earns a minimum of 12 units of new course work by the end of the final examination period and achieves and maintains a cumulative grade

point average of at least 2.0. A student may also be removed from probation at the discretion of the C-USP Subcommittee on Academic Standing or its designees as a result of a review of individual records.

## Provisional Registration

A student who, while on probation, fails in any quarter of registration to earn a minimum of 12 units of new course work by the end of the final examination period or fails to achieve and maintain a cumulative grade point average of at least 2.0, may be placed on provisional registration status. In addition, and on occasion, a student may also be placed directly on provisional registration without first being placed on probation if the student has had a prior probation status.

Provisional registration status requires that the student earn a minimum of 12 units of new course work per quarter (by the end of the final quarter examination period for each quarter) in each quarter for three consecutive quarters, and achieve and maintain a cumulative grade point average of at least 2.0 to attain good academic standing.

A student shall be removed from provisional registration after three consecutive subsequent quarters of enrollment at the University if, in each quarter, he or she earns a minimum of 12 units of new course work by the end of the final examination period and achieves and maintains a cumulative grade point average of at least 2.0. A student may also be removed from provisional registration at the discretion of the C-USP Subcommittee on Academic Standing or its designees as a result of a review of individual records.

## Suspension

A student who, while on provisional registration, fails to earn a minimum of 12 units of new course work by the end of the final examination period, or who fails to achieve and maintain a cumulative grade point average of at least 2.0, may be suspended. In addition, and on occasion, a student may also be suspended directly from probation; or may be suspended without first being placed on probation or provisional registration if the student has had a prior probation status.

While students suspended for the first time are suspended for one year, students suspended a subsequent time may be suspended for up to three years.

Students suspended for one year are not eligible to enroll for four quarters (including Summer Quarter) following the quarter in which the suspension was issued. Students suspended for up to three years are not eligible to enroll for up to twelve quarters (including Summer Quarter) following the quarter in which the suspension was issued.

As well, until re-enrollment, students who are suspended are ineligible for the privileges associated with registration—privileges that include living in University housing, participating in voluntary student organizations, and involvement in any activity for which enrollment is a requirement.

C-USP, in its discretion, may impose conditions on the suspension and in regard to return from a suspension.

## Appeal of Suspension

Students who have been suspended, and who believe they have a compelling reason to appeal their suspension, without a break in enrollment, are required to submit a Petition to Appeal Academic Suspension. Otherwise, students are expected to complete their academic suspension in full.

## Returning from Suspension

Students are required to submit a properly endorsed application for reinstatement to request reenrollment after the suspension period has been completed. Instructions including deadlines for requesting to return should be obtained from the Office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall. The C-USP Subcommittee on Academic Standing, or

those designated by the subcommittee, acts upon all requests concerning academic standing, including requests to return after academic suspension. The subcommittee or its designees may determine whether the application for reinstatement to return will be approved or not, and/or the conditions a student must meet in order to return. Request to return decisions may be based on activities while away from campus, the perceived potential for successful completion of the program, as well as any other factors or considerations regarded as relevant to the Vice Provost for Undergraduate Education or the subcommittee or its designees.

Questions concerning academic standing or requests to return should be directed to the Office of the Vice Provost for Undergraduate Education, via the office of Undergraduate Advising and Research (UAR), Sweet Hall.

Students returning from suspension should also contact appropriate campus offices, such as Housing and Financial Aid, regarding those deadlines and procedures.

## Notification (Academic Standing)

Written notification that a student is on probation, provisional registration, or suspension is sent to the student, to the student's academic adviser, and to other relevant university offices and individuals as soon as possible after the close of the quarter. Students also receive written notification of the outcome of their Petition to Appeal Academic Suspension or request to return after suspension. Current student status, such as whether a student is enrolled or not, is considered Directory Information for FERPA purposes at Stanford, and Stanford may provide either parent(s) or guardian(s) written notification of a change in student status. Provided that a student consents, or the student is a dependent for income tax purposes, Stanford may also provide either parent(s) or guardian(s) written notification that the student is on probation, provisional registration, suspension, or leave of absence (either voluntary or involuntary). Other FERPA exceptions may also apply.

## Student Academic Grievance Procedure

The following policy is subject to periodic review and modification.

1. Coverage
  - A. Any Stanford undergraduate or graduate student who believes that he or she has been subjected to an improper decision on an academic matter is entitled to file a grievance to obtain an independent review of the allegedly improper decision, followed by corrective action if appropriate. A grievance is a complaint in writing made to an administrative officer of the University concerning an academic decision, made by a person or group of persons acting in an official University capacity, that directly and adversely affects the student as an individual in his or her academic capacity.
  - B. This grievance procedure applies only in those cases involving a perceived academic impropriety arising from a decision taken by: (1) an individual instructor or researcher; (2) a school, department, or program; (3) a committee charged to administer academic policies of a particular school, department, or program; or (4) the University Registrar, the Vice Provost for Undergraduate Education, the C-USP Subcommittee on Academic Standing, or a Senate committee or subcommittee charged to administer academic policies of the Senate of the Academic Council. This procedure does not apply to: (1) complaints expressing dissatisfaction with a University policy of general application challenged on the grounds that the policy is unfair or inadvisable; (2) individual school, department, or program academic policies, as long as those policies are not inconsistent with general University policy; (3) matters proceeding through the Office of Judicial Affairs; or (4) involuntary leave decisions.

- C. Individuals should be aware that the University Ombuds Office is available to all Stanford students, faculty, and staff to discuss and advise on any matter of University concern and frequently helps expedite resolution of such matters. Although it has no decision-making authority, the University Ombuds Office has wide powers of inquiry, including into student complaints against instructors.

## 2. Grievance and Appeal Procedures

- A. **Informal Attempts at Resolution:** the student first should discuss the matter, orally or in writing, with the individual(s) most directly responsible. If no resolution results, the student should then consult with the individual at the next administrative level, for example, the chair or director of the relevant department or program, or, for those cases in which there is none, with the school dean. At this stage, the department chair or program director, if any, may inform the dean that the consultation is taking place and may solicit his or her advice on how to ensure that adequate steps are taken to achieve a fair result. Efforts should be made to resolve the issues at an informal level without the complaint escalating to the status of a formal grievance.

### B. The Filing of the Grievance:

- i If informal means of resolution prove unsatisfactory, the student should set forth in writing a statement of the decision that constitutes the subject matter of the dispute, the grounds on which it is being challenged, and the reasons why the grievant believes that the decision was improperly taken. The statement should also include a description of the remedy sought and the informal efforts taken to date to resolve the matter. It is at this point that the complaint becomes a formal grievance. The written grievance should specifically address the matters set forth in the Standards for Review, as stated in Section 4 below. The grievance should include an allegation of any adverse effects on the grievant, known to the grievant at the time of filing.
- ii The grievance document should be submitted to the dean of the school in which the grievance arose; for a grievance concerning a decision of the University Registrar, the Vice Provost for Undergraduate Education, or of a Senate committee or subcommittee, the procedures set forth herein for grievances and appeals shall be modified as stated in Section 3 below. A grievance must be filed in a timely fashion, that is, normally within 30 days of the end of the academic quarter in which the adverse decision occurred or should reasonably have been discovered. Except in extraordinary circumstances, delay in filing a grievance may constitute grounds for rejection of the grievance.

### C. The Response to the Grievance:

- i The relevant dean will consider the grievance. The dean may attempt to resolve the matter informally or make whatever disposition of the grievance that he or she deems appropriate. The dean may, in appropriate cases, remand the grievance to a lower administrative level (including to the level at which the grievance arose) for further consideration.
- ii The dean may also refer the grievance, or any issue therein, to any person (the "grievance officer") who will consider the matter and report to the dean as the latter directs. The dean will inform the grievant (and the party against whose decision the grievance has been filed) in writing of any referral of the matter and will specify the

matters referred, the directions to the person or persons to whom the referral is made (including the time frame within which the person is to report back to the dean), and the name of that person.

- iii In undertaking the review, the dean or the grievance officer may request a response to the issues raised in the grievance from any individuals believed to have information considered relevant, including faculty, staff, and students.
- iv Should attempts to resolve the matter informally not be successful, the dean will decide the grievance, and will notify the grievant (and the party against whose decision the grievance has been filed) in writing of the disposition made of the grievance and the grounds for the disposition at the earliest practicable date after his or her receipt of the grievance.
- v Normally, no more than 60 days should elapse between the filing of a grievance and the disposition by the dean. If, because of absence of key persons from the campus or other circumstances or exigencies (including those due to breaks in the academic calendar), the dean decides that disposition on that schedule is not possible, he or she shall inform the grievant (and the party against whose decision the grievance has been filed) of that in writing, giving the grounds therefore and an estimate of when a disposition can be expected. During summers and the winter closure, this time frame will nearly always be extended.

### D. The Filing of an Appeal:

- i If the grievant is dissatisfied with the disposition of the grievance at the dean level, either on substantive or on procedural grounds, he or she may appeal in writing to the Provost.
- ii The appeal must specify the particular substantive or procedural bases of the appeal (that is, the appeal must be made on grounds other than general dissatisfaction with the disposition) and must be directed only to issues raised in the grievance as filed or to procedural errors in the grievance process itself, and not to new issues. The appeal must contain the following:
  - a. A copy of the original grievance and any other documents submitted by the grievant in connection therewith.
  - b. A copy of the determination made by the dean on that grievance.
  - c. A statement of why the reasons for the determination of the dean are not satisfactory to the grievant. This statement should specifically address the matters set forth in the Standards for Review in Section 4 below.
- iii The grievant will file his or her appeal at the earliest practicable date after the grievant's receipt of the determination by the dean. Normally, no more than 30 days should elapse between the transmittal of the dean's decision on the grievance and the filing of the appeal. Except in extraordinary circumstances, delay in filing an appeal will constitute grounds for rejection of the appeal.

### E. The Response to the Appeal:

- i The Provost may attempt to resolve the matter informally, or refer the appeal, or any issue thereof, to any person (the "grievance appeal officer") who shall consider the matter and report to the Provost as

the latter directs. The Provost may also, in appropriate cases, remand the matter to a lower administrative level (including to the level at which the grievance arose) for further consideration.

- ii The Provost will inform the grievant (and the party against whose decision the grievance has been filed) in writing of any referral of the matter and will specify the matters referred, the directions to the person to whom the referral is made (including the time frame within which the person is to report back to the Provost), and the name of that person.
- iii Should attempts be made to resolve the matter informally not be successful, the Provost will decide the appeal, and will notify the grievant (and the party against whose decision the grievance has been filed) in writing of the disposition made of the grievance and the grounds for the disposition at the earliest practicable date after his or her receipt of the appeal. The decision of the Provost shall be final, unless the grievant requests a further appeal to the President pursuant to subsection 2f below, and the President agrees to entertain this further appeal.
- iv Normally no more than 45 days should elapse between the filing of the appeal and the disposition by the Provost. If, because of absence of key persons from the campus or other circumstances or exigencies (including those due to breaks in the academic calendar), the Provost judges that disposition on that schedule is not possible, he or she will inform the grievant (and the party against whose decision the grievance has been filed) of the fact in writing, giving the grounds therefore and an estimate of when a disposition can be expected. During summers and the winter closure, this time frame will nearly always be extended.

- F. The Request to the President: if the student is dissatisfied with the disposition of the appeal by the Provost, he or she may write to the President of the University giving reasons why he or she believes the grievance result to be wrong (following the general format set forth in subsection 2d.2 above). No more than 30 days should elapse between the transmittal of the Provost's disposition and the written statement to the President urging further appeal. In any case, the President may agree or decline to entertain this further appeal. If the President declines to entertain the further appeal, the decision of the Provost is final. If the President decides to entertain the further appeal, he or she will follow the general procedures set forth in Section 2e above, and the decision of the President will be final.

### 3. Grievances Concerning Decisions of the University Registrar, the Vice Provost for Undergraduate Education, or of a Senate Committee or Subcommittee

- A. For a grievance concerning a decision of the University Registrar, the Vice Provost for Undergraduate Education, the C-USP Subcommittee on Academic Standing, or of a Senate committee or subcommittee, the grievant will file his or her grievance with the Provost, rather than with the dean, and the Provost will handle that grievance in accordance with the procedures set forth in Section 2c above.
- B. There is no appeal of the Provost's disposition of that grievance, except as may be available under Section 2f above.

### 4. Standards for Review and Procedural Matters

- A. The review of grievances or appeals will usually be limited to the following considerations:

- i Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
- ii Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
- iii Given the proper facts, criteria, and procedures, was the decision one which a person in the position of the decision maker might reasonably have made?

B. The time frames set forth herein are guidelines. They may be extended by the relevant administrative officer in his or her discretion for good cause.

C. Questions concerning the filing and appeal of grievances should be directed to the Office of the Provost.

## Stanford University ID Number

The Stanford University ID Number is assigned to each student's academic record for unique identification. It is printed on the Stanford University ID card and on documents distributed by the Office of the University Registrar and other administrative offices. It is a violation of University policy to use another's Stanford University ID Number to misrepresent yourself in any way; such use can result in loss of student privileges or other disciplinary action.

## SUNet ID

The SUNet ID provides access to the Stanford University Network (SUNet) and its services, and identifies authorized users of these services. Each member of the Stanford electronic community creates a unique SUNet ID and SUNet ID password for him/herself. SUNet IDs provide:

- Access services
- Email service
- Storage space within Stanford's distributed file system
- Usenet newsgroups
- World wide web services, including serving of personal web pages on the Leland system and access to Stanford Web Resources

The SUNet ID together with SUNet ID password may serve in place of a signature on electronic forms. The SUNet ID password must remain confidential; it is a violation of University policy to permit another person to use your SUNet ID or password. It is a violation of University policy to use another's SUNet ID or SUNet ID password to misrepresent yourself in any way; such use can result in loss of student privileges or other disciplinary action.

## Identification Cards

The ID card serves as an identification card, an electronic key, and a debit card, allowing cardholders to use services for which they have privileges, to enter certain facilities, and to make purchases.

ID cards are available to registered students, faculty, academic staff, and regular staff. Students obtain their ID cards at the Student Services Center, Tresidder Union, 459 Lagunita Drive, 2nd Floor (650) 498-CARD). Faculty and staff obtain ID cards at George Forsythe Hall, 275 Panama Street, Room 190 (650-498-CARD).

Courtesy ID cards are available for spouses and domestic partners of the Stanford professoriate, academic staff, regular staff, and students. These cards may be obtained from the Stanford Card ID Office at Forsythe Hall.

The spouse/partner courtesy ID card enables use of some campus services during terms for which the student is registered.

Visiting Scholars who are on campus for a minimum of one quarter and contribute to Stanford's mission by teaching or collaborating on Stanford research also receive ID cards and campus privileges during their stay on campus. These cards may be obtained from the Stanford Card ID Office at Forsythe Hall.

Library access and borrowing privileges are reserved for the Stanford professoriate, academic staff, regular staff, students, and others associated with the University with a need for such access.

ID cards bear a photograph of the cardholder. This photograph is maintained in an online database and, as stated in the "Directory Information (<http://www.stanford.edu/dept/registrar/bulletin/4962.htm>)" section of this bulletin, is available for classroom, student residence, and other use upon specific request and without student consent unless the student has designated that the photograph not be released. Photographs can be designated as private using the Privacy function of Axess.

Misuse of the ID card may result in discipline or administrative action.

For more information, see the Campus Card Service (<http://exploreddegrees.stanford.edu/academicpoliciesandstatements/http://campuscard.stanford.edu>) web site. For the complete policy on Stanford Identification Cards, see the Administrative Guide, 28-4 ([http://adminguide.stanford.edu/28\\_4.pdf](http://adminguide.stanford.edu/28_4.pdf)) (pdf).

## Auditing

No person shall attend any class unless he or she is a fully registered student enrolled in the course or meets the criteria for auditors. Auditors are not permitted in courses that involve direct participation such as language or laboratory science courses, field work, art courses with studio work, or other types of individualized instruction. Auditors are expected to be observers rather than active participants in the courses they attend, unless the instructors request attendance on a different basis. Stanford does not confer credit for auditing, nor is a permanent record kept of courses audited. Students who have been suspended are not permitted to audit.

Auditors may not join classes for the first time after the University's final study list deadline. Auditors are not eligible for other University services or privileges including housing, health insurance (Cardinal Care), Vaden clinical services, and the University health plan. The University Registrar reviews for approval any other services or privileges that may be sought.

In all cases of auditing, the instructor's prior written consent and the Office of the University Registrar's prior approval are required. Further information is available from the Office of the University Registrar.

# Nonacademic Regulations

## Nondiscrimination Policy

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities; Stanford also prohibits unlawful harassment including sexual harassment and sexual violence. The following person has been designated

to handle inquiries regarding this nondiscrimination policy including under Title IX: Rosa Gonzalez, Director of the Diversity and Access Office and Title IX Coordinator, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu) (email).

## ADA (Americans with Disabilities Act)/Section 504 Grievance Procedure (Student)

For information more generally concerning policies and procedures for students with disabilities, see the Diversity & Access Office (<http://www.stanford.edu/dept/diversityaccess>) web site, or the ADA/Section 504 Compliance Officer, Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford CA, 94305-8230, (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu) (email); see also the Office for Accessible Education (OAE) (<http://studentaffairs.stanford.edu/oae>) web site.

### Policy

The following is the policy:

#### I. Policy

Stanford University, in compliance with state and federal laws and regulations, including the Americans with Disabilities Act of 1990 (ADA; as amended 2008) and Section 504 of the Rehabilitation Act of 1973 (Section 504), does not discriminate on the basis of disability in administration of its education-related programs and activities, and has an institutional commitment to provide equal educational opportunities for disabled students who are otherwise qualified.

Students who believe they have been subjected to unlawful discrimination on the basis of disability, or have been denied access to services or accommodations required by law, have the right to use this grievance procedure.

#### II. Applicability

As a general proposition, the grievance procedure set forth below is applicable to undergraduate and graduate students of the University. In general, it is designed to address disputes concerning the following:

1. Disagreements regarding a requested service, accommodation, or modification of a University practice or requirement;
2. Inaccessibility of a program or activity;
3. Harassment or discrimination on the basis of disability;
4. Violation of privacy in the context of disability.

As a general proposition, this grievance procedure supplants the Student Academic Grievance Procedure (p. 59) and the Student Non-Academic Grievance Procedure (p. ) (both of which are set forth in this bulletin) for disability-related grievances. Questions of applicability will be decided by the Director of the Diversity and Access Office.

#### III. Compliance Officers

Stanford University's Compliance Officers are responsible for administering this grievance procedure as well as ensuring compliance with applicable laws. The Director of the Diversity and Access Office is the designated ADA / Section 504 Compliance Officer. That office is located in the Mariposa House, 585 Capistrano Way, Stanford, CA 94305-8230,

650-725-0326 (Voice), 650-723-1216 (TTY), 650-723-1791 (Fax), email: [disability.access@stanford.edu](mailto:disability.access@stanford.edu).

Additional Compliance Officers may be designated from time to time by the Provost from those faculty and staff members knowledgeable concerning disability issues and the legal mandates of state and federal disability statutes.

## IV. Informal Resolution

Prior to initiating the formal complaint procedure set forth below, the student should, in general, first discuss the matter orally or in writing with the individual(s) most directly responsible. If no resolution results, or if direct contact is inappropriate under the circumstances, the student should then consult with the Compliance Officer at the Diversity and Access Office who will attempt to facilitate a resolution. (The informal resolution process may involve consultation with the Dean of Educational Resources.)

If the Compliance Officer is not successful in quickly achieving a satisfactory resolution (that is, generally within seven calendar days), the Compliance Officer will inform the student of his or her efforts and the student's right to file a formal complaint.

## V. Formal Complaint

If the procedure set forth above for informal resolution does not yield a successful resolution, then the student may file a formal complaint in the following manner:

1. **When to File Complaint:** Complaints must be filed as soon as possible, but in no event later than 10 days after the end of the quarter in which the concern arose.
2. **What to File:** a complaint must be in writing and include the following:
  - A. The grievant's name, address, email address and phone number;
  - B. A full description of the problem;
  - C. A description of what efforts have been made to resolve the issue informally;
  - D. A statement of the remedy requested.
3. **Where to File Complaint:** the complaint is to be filed with the Compliance Officer at the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford CA 94305-8230, 650-725-0326 (Voice), 650-723-1216 (TTY), 650-723-1791 (Fax), email: [disability.access@stanford.edu](mailto:disability.access@stanford.edu).
4. **Notice of Receipt:** upon receipt of the complaint, the Compliance Officer reviews the complaint for timeliness and appropriateness for this grievance procedure, and provides the grievant with written notice acknowledging its receipt.
5. **Investigation:** the Compliance Officer will promptly initiate an investigation and may refer the matter (or any part of it) to a grievance officer or other designee, who will look into and/or address the matter as the Compliance Officer directs. In undertaking the investigation, the Compliance Officer or grievance officer may interview, consult with, and/or request a written response to the issues raised in the grievance from any individual the grievance officer believes to have relevant information, including faculty, staff, and students.
6. **Representation:** the grievant and the party against whom the grievance is directed each have the right to have a representative. The party shall indicate whether he or she is to be assisted by a representative and, if so, the name of that representative. For purposes of this procedure, an attorney is not an appropriate representative.
7. **Findings and Notification:** upon completion of the investigation, the grievance officer will prepare and transmit to the student, and to the party against whom the grievance is directed, a final report containing a summary of the investigation, written findings, and a

proposed disposition. This transmission will be expected within 45 calendar days of the filing of the formal complaint. The deadline may be extended by the Compliance Officer for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure. The final report may also be provided, where appropriate, to any University officer whose authority will be needed to carry out the proposed disposition or to determine whether any personnel action is appropriate.

8. **Final Disposition:** the disposition proposed by the Compliance Officer will be put into effect promptly. The grievant or any party against whom the grievance or the proposed disposition is directed may appeal. The appeal to the Provost (as set forth below) will not suspend the implementation of the disposition proposed by the grievance officer, except in those circumstances where the Provost decides that good cause exists making the suspension of implementation appropriate.

## VI. Urgent Matters

Whenever the application of any of the time deadlines or procedures set forth in this grievance procedure creates a problem due to the nature of the complaint, the urgency of the matter, or the proximity of the upcoming event, the Compliance Officer will, at the request of the grievant, determine whether an appropriate expedited procedure can be fashioned.

## VII. Remedies

Possible remedies under this grievance procedure include corrective steps, actions to reverse the effects of discrimination or to end harassment, and measures to provide a reasonable accommodation or proper ongoing treatment. As stated above, a copy of the Compliance Officer's report may, where appropriate, be sent to University officer(s) to determine whether any personnel action should be pursued.

## VIII. Appeal

Within ten calendar days of the issuance of the final report, the grievant or the party against whom the grievance is directed may appeal to the Provost the grievance officer's determination.

An appeal is taken by filing a written request for review with the Compliance Officer at the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford CA 94305-8230; (650) 723-0755 (Voice), (650) 723-1216 (TTY), (650) 723-1791 (Fax), email: [disability.access@stanford.edu](mailto:disability.access@stanford.edu).

The written request for review must specify the particular substantive and/or procedural basis for the appeal, and must be made on grounds other than general dissatisfaction with the proposed disposition. Furthermore, the appeal must be directed only to issues raised in the formal complaint as filed or to procedural errors in the conduct of the grievance procedure itself, and not to new issues.

The Compliance Officer will forward the appeal to the Provost, and also provide copies to the other party or parties. If the grievance involves a decision that is being challenged, the review by the Provost or his or her designee usually will be limited to the following considerations:

1. Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
2. Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
3. Given the proper facts, criteria, and procedures, was the decision a reasonable one?

A copy of the Provost's written decision will be expected within 30 calendar days of the filing of the appeal and will be sent to the parties, the Compliance Officer and, if appropriate, to the University officer whose authority will be needed to carry out the disposition. The deadline may be



extended by the Provost for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure. The decision of the Provost on the appeal is final.

## Title IX of the Education Amendments of 1972

It is the policy of Stanford University to comply with Title IX of the Education Amendment of 1972 and its regulations, which prohibit unlawful discrimination on the basis of sex. The Title IX Compliance Officer is Rosa Gonzalez, the Director of the Diversity and Access Office, who has been appointed to coordinate the University's efforts to comply with the law. Anyone who believes that Stanford is not in compliance with Title IX and its regulations should contact the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford, CA 94305-8230, (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email). The Compliance Officer serves as a resource to provide accommodations and services to address the effects of sexual harassment and sexual violence. Grievance procedures to address complaints of discrimination on the basis of sex are set forth in the "Student Non-Academic Grievance Procedure (p. )". See also Administrative Guide Memo 23.2 and 23.3 (<http://adminguide.stanford.edu/23.pdf>).

## Title VI of the Civil Rights Act of 1964

It is the policy of Stanford University to comply with Title VI of the Civil Rights Act of 1964 and its regulations, which prohibit unlawful discrimination on the basis of race, color, and national origin. The Title VI Compliance Officer is the Director of the Diversity and Access Office, who has been appointed to coordinate the University's efforts to comply with the law. Anyone who believes that Stanford is not in compliance with Title VI and its regulations should contact the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email). Grievance procedures to address complaints of discrimination on the basis of race, color, and national origin are set forth in the "Student Non-Academic Grievance Procedure (p. )." See also Administrative Guide Memo 23 (<http://adminguide.stanford.edu/23.pdf>) web site.

## Grievances

A Stanford undergraduate or graduate student who believes that he or she has been subject to an improper decision on an academic matter may file a grievance pursuant to the Student Academic Grievance Procedure (p. 59). For other types of grievances, students should review the section that follows on the Student Non-Academic Grievance Procedure (p. ), and consult concerning applicable procedures with the Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), equal.opportunity@stanford.edu (email).

## Student Non-Academic Grievance Procedure

### Policy

The following is the policy:

1. Applicability

A. It is perhaps inevitable in any university that some students may at times feel improperly treated, and that concerns about unfairness (including potential discrimination and harassment) may also at times arise.

In this regard (and although this grievance procedure is not limited to concerns of discrimination), Stanford University's Nondiscrimination Policy provides in part: "Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities; Stanford also prohibits unlawful harassment including sexual harassment and sexual violence."

B. At Stanford, there are a number of grievance procedures through which students can raise and seek redress for what they believe to be unfair, improper or discriminatory decisions, actions, or treatment. For example:

- i If the matter involves an academic decision, the Student Academic Grievance Procedure may be the applicable procedure.
- ii If the matter involves a disability-related concern, the Student ADA/Section 504 Grievance Procedure may be applicable.
- iii If the matter involves a student-athlete and his or her sport, the Student-Athlete Grievance Procedure may be applicable.

C. The purpose of the Student Non-Academic Grievance Procedure is to provide a process for students to seek resolution of disputes and grievances that may not fall within the scope of one of the other grievance processes, including those which may arise in a student's capacity as a student-employee.

D. As a general proposition, this procedure is available to undergraduates and graduate students at Stanford University. It is designed to address individual decisions or individual actions that affect the grievant personally in his or her capacity as a student, but it does not apply to matters proceeding through the Office of Judicial Affairs or through the Dean's leave policy. This is likewise not a grievance procedure to address the concerns of student groups. Similarly and as a general proposition, dissatisfaction with a departmental, school, or University policy or practice of broad or general application is not grounds for a grievance under this procedure; the Director of the Diversity and Access Office (hereafter "the Director") may, in his or her discretion, entertain such a grievance in exceptional circumstances, such as where (for example) the policy or practice is alleged to be contrary to law. In the same way, the Director may entertain a grievance under this procedure brought by an individual who is not an undergraduate or graduate student, in an appropriate case or as required by law.

E. The Director is responsible for administering this Student Non-Academic Grievance Procedure.

- i The Director may be contacted at: Director of the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice),

(650) 723-1216 (TTY), (650) 723-1791 (fax),  
equal.opportunity@stanford.edu (email), <http://www.stanford.edu/dept/ocr>.

- ii The Director in his or her sole discretion can decide whether to refer a grievance brought under this procedure to another grievance process. In cases involving allegations of sexual harassment in particular, the Director may wish to consult with the Director of the Sexual Harassment Policy Office as to the most appropriate way to proceed; see Section 5.d below. In cases involving student employment, the Director may wish to consult with the University's Department of Human Resources.

## 2. Informal Resolution

- A. As a general proposition (and although particular circumstances may warrant an exception), the student should first discuss the problem and seek a solution with the individual(s) most directly involved.
- B. If no resolution results (or if circumstances make discussion inappropriate with the person most directly involved), the student should then consult with the individual at the next (higher) administrative level in the department, school, residence or University administrative unit. Serious efforts should be made to resolve the issue locally at an informal level without resort to a formal grievance; such efforts may continue even after the formal process is underway.

## 3. Formal Grievance

- A. If informal means of resolution prove inadequate, the student should set forth in writing the substance of the complaint, the grounds for it and the evidence on which it is based, and the efforts taken to date to resolve the matter. It is at this stage that the complaint becomes a formal grievance.
- B. The grievance document should be submitted to the Director. A grievance should be filed in a timely fashion, i.e., normally within thirty days of the end of the academic quarter in which the action that is the subject of the grievance occurred. Except in extraordinary circumstances, delay in filing a grievance will be grounds for rejection of that grievance.
- C. The Director will promptly initiate a review, which should normally be completed within sixty days. The Director may attempt to resolve the matter informally, and may refer the matter (or any part of it) to a grievance officer or other designee, who will look into and/or address the matter as the Director directs. The Director may also, in appropriate cases, remand the matter to the appropriate administrator (including to the administrative level at which the grievance arose) for further consideration.
- D. In undertaking this review, either the Director, his or her designee, or the grievance officer may request a response to the issues raised in the grievance from any individuals believed to have information the reviewer considers relevant, including faculty, staff and students.
- E. The Director (or his or her designee) will issue his or her decision in writing, and take steps to initiate such corrective action as is called for (if any). Conduct meriting discipline will be brought to the attention of the appropriate disciplinary process.

## 4. Appeal

- A. If the student is dissatisfied with the disposition by the Director (or his or her designee), he or she may appeal to the Provost (Office of the President and Provost, Building 10, Stanford, CA 94305-2061; phone 650-725-4075; fax 650-725-1347). The

appeal should be filed in writing with the Provost within ten days of the issuance of the decision by the Director (or his or her designee); a delay in filing the appeal may be grounds for rejection of that appeal.

- B. The Provost may attempt to resolve the matter informally, and may refer the matter (or any part of it) to a grievance appeal officer, who will review the matter at the Provost's direction. The Provost may also, in appropriate cases, remand the matter to the appropriate administrator (including to the administrative level at which the grievance arose) for further consideration.
- C. The Provost should normally complete his or her review of the appeal and issue his or her decision in writing within forty-five days. That decision is final.

## 5. General Provisions

- A. Time Guidelines—The time frames set forth herein are guidelines. They may be extended by the Director or Provost, as applicable, in his or her discretion for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure.
- B. Advisers—A student initiating or participating in a grievance under this procedure may be accompanied by an adviser in any discussion with the Director, the Provost or their designees, or a grievance or grievance appeal officer under this procedure; any adviser must be a current Stanford faculty, staff member or student.
- C. Ombuds—Students should be aware that the University Ombuds (<http://www.stanford.edu/dept/ocr/ombuds>) is available to discuss and advise on any matters of University concern and frequently help expedite resolution of such matters. Although it has no decision making authority, the Ombuds' Office has wide powers of inquiry.
- D. Sexual Harassment and Sexual Misconduct and Sexual Assault—For information and resources concerning sexual harassment, students should refer to the web page of the Sexual Harassment Policy Office at <http://harass.stanford.edu>. For information and resources concerning sexual assault and relationship abuse, students should refer to the web page of the Sexual Violence Advisory Board at <http://www.stanford.edu/group/svab/help.shtml>.
- E. No retaliation—Stanford University prohibits retaliation or reprisals against individuals based on their pursuit in good faith of a grievance under this procedure, or their participation in good faith in the grievance process.
- F. Standards for Review—If the grievance involves a decision that is being challenged, the review by the Director, as well as the review by the Provost on appeal, usually will be limited to the following considerations:
  - i Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
  - ii Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
  - iii Given the proper facts, criteria, and procedures, was the decision one which a person in the position of the decision maker might reasonably have made?

# Age Discrimination Act of 1975

The following is the policy:

## 1. Policy

It is the policy of Stanford University to comply with the Age Discrimination Act of 1975 and its regulations, which prohibit unlawful discrimination on the basis of age. The Age Discrimination Act Compliance Officer is the Director of the Diversity and Access Office ("the Director"), who has been appointed to coordinate the University's efforts to comply with the law. Anyone who believes that Stanford is not in compliance with the Age Discrimination Act and its regulations ("the Act") should contact the Director at the Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford, CA 94305-8230; (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu) (email).

## 2. Grievance Procedure

- A. An individual who believes that Stanford is not acting in compliance with the Act and who wishes to file a grievance should set forth in writing the substance of his or her complaint, the grounds for it and the evidence on which it is based, and the efforts (if any) taken to date to resolve the matter. It is at this stage that the complaint becomes a formal grievance.
- B. The grievance document should be submitted to the Director. A grievance should be filed in a timely fashion, i.e., normally within thirty days of the end of the academic quarter in which the action that is the subject of the grievance occurred. Except in extraordinary circumstances, delay in filing a grievance will be grounds for rejection of that grievance.
- C. The Director will promptly initiate a review, which should normally be completed within sixty days. The Director may attempt to resolve the matter informally, and may refer the matter (or any part of it) to a grievance officer or other designee, who will look into and/or address the matter as the Director directs. The Director may also, in appropriate cases, remand the matter to the appropriate administrator (including to the administrative level at which the grievance arose) for further consideration.
- D. In undertaking this review, either the Director, his or her designee, or the grievance officer may request a response to the issues raised in the grievance from any individuals believed to have information the reviewer considers relevant, including faculty, staff and students.
- E. The Director (or his or her designee) will issue his or her decision in writing, and take steps to initiate such corrective action as is called for (if any).

## 3. Appeal

- A. If the grievant is dissatisfied with the disposition by the Director (or his or her designee), he or she may appeal to the Provost (Office of the President and Provost, Building 10, Stanford, CA 94305-2061; phone 650-725-4075; fax 650-725-1347). The appeal should be filed in writing with the Provost within ten days of the issuance of the decision by the Director (or his or her designee); a delay in filing the appeal may be grounds for rejection of that appeal.

- B. The Provost may attempt to resolve the matter informally, and may refer the matter (or any part of it) to a grievance appeal officer, who will review the matter at the Provost's direction. The Provost may also, in appropriate cases, remand the matter to the appropriate administrator (including to the administrative level at which the grievance arose) for further consideration.
- C. The Provost should normally complete his or her review of the appeal and issue his or her decision in writing within forty-five days. That decision is final.

## 4. General Provisions

- A. Time Guidelines—The time frames set forth herein are guidelines. They may be extended by the Director or Provost, as applicable, in his or her discretion for good cause (including for reasons relating to breaks in the academic calendar), and will nearly always be extended during summers and the winter closure.
- B. No Retaliation—Stanford University prohibits retaliation or reprisals against individuals based on their pursuit in good faith of a grievance under this procedure, or their participation in good faith in the grievance process.
- C. Standards for Review—If the grievance involves a decision that is being challenged, the review by the Director, as well as the review by the Provost on appeal, usually will be limited to the following considerations:
  - i Were the proper facts and criteria brought to bear on the decision? Were improper or extraneous facts or criteria brought to bear that substantially affected the decision to the detriment of the grievant?
  - ii Were there any procedural irregularities that substantially affected the outcome of the matter to the detriment of the grievant?
  - iii Given the proper facts, criteria, and procedures, was the decision one which a person in the position of the decision maker might reasonably have made?

## Ownership and Use of Stanford Name and Trademarks

Stanford registered marks, as well as other names, seals, logos, and other symbols and marks that are representative of Stanford, may be used solely with permission of Stanford. Merchandise bearing Stanford's names and marks, such as t-shirts, glassware, and notebooks, must be licensed. For complete text of the currently applicable policy, including the University officers authorized to grant permission to use the Stanford name and marks, see Administrative Guide Memo 15.5, Ownership and Use of Stanford Name and Trademarks ([http://adminguide.stanford.edu/15\\_5.pdf](http://adminguide.stanford.edu/15_5.pdf)) web site.

## Copyright

Copyright laws protect original works of authorship and give the owners of copyrights the exclusive right to do and to authorize others to do certain things in regard to a copyrighted work, including: make copies, distribute the work, display or perform the work publicly, and create derivative works. Copyright laws apply to nearly all forms of captured content, including traditional works like books, photographs, music, drama and sculpture. The laws also adapt to changes in technologies, and include in their scope modern forms of works like motion pictures, web sites, electronic media, software, multimedia works and some databases. Registration is not required to obtain a copyright, so if in doubt, assume a copyright applies.

Unless an exception to the copyright owner's exclusive rights applies, you must obtain permission from the copyright owner to copy, distribute, display or perform a copyrighted work in any medium for any purpose. Be especially mindful of copyright principles when using the Internet. Just because a work is posted on the Internet does not mean that the owner of the copyright has given you permission to use it. In general, do not post material onto the Internet without copyright clearance.

Stanford University Libraries have licenses with many publishers, which permit copying of materials in accordance with the educational, research or administrative functions of the University. In addition, there are four major exceptions to the copyright owner's exclusive rights, which (if applicable) permit limited use without permission. These are: the fair use exception, the library exception, the face-to-face teaching exception, and the distance-learning exception. For a more detailed explanation of these exceptions, the copyright laws and Stanford's copyright policies, please review the University's Copyright Reminder ([http://www-sul.stanford.edu/libraries\\_collections/copyright\\_reminders](http://www-sul.stanford.edu/libraries_collections/copyright_reminders)) web site. It is each person's responsibility to be aware of and abide by copyright law; violation may result in civil or criminal liability, and constitutes grounds for University discipline, up to and including discharge, dismissal and expulsion.

## Peer-to-Peer File Sharing

The use of file-sharing networks and software to download and share copyrighted works like software, music, movies, television programs, and books can violate copyright laws. Both the person who makes an illegal copy of a copyrighted work available and the person who receives or downloads an illegal copy have violated the law and Stanford policies. Many file-sharing programs have default settings that share copyrighted files, such as music and movies, through the Internet. Before enabling any of these programs students, faculty, or staff must read the fine print, make sure to understand the program itself, and only use such programs lawfully. Under the Digital Millennium Copyright Act (DMCA), copyright owners are entitled to notify Internet service providers, such as Stanford, that IP addresses linked to the Stanford network are sharing copies of music, movies, or other content without authorization. The law requires the University to respond to such complaints by eliminating access to the infringing materials. Stanford will disconnect students who fail to respond to a DMCA complaint promptly. Furthermore, the University also will suspend or terminate computer access to the Stanford network, including termination of the SUNet ID, to members of the community who continue to violate copyright laws. Finally, the University will take action through the student, employee, or faculty disciplinary processes if necessary. Beyond University consequences, copyright holders may file civil lawsuits against copyright infringers seeking extensive monetary damages. If compelled by a lawful subpoena, Stanford may be required to identify students, faculty, staff, or others who have violated copyright law. For more information about file-sharing, refer to Residential Computing's online resource, File-Sharing and Copyright Law (<http://rescomp.stanford.edu/info/dmca>) web site.

## Recording Lectures

Except with permission from the Office of Accessible Education (<http://studentaffairs.stanford.edu/oe>) or the instructor in question, students may not audio- or video-record lectures. Even with permission, students may only use such recordings for personal use; no posting or further distribution or use is permitted.

## Domestic Partners

In October 1990, Stanford University adopted a domestic partners policy. This policy, which implements the University's nondiscrimination policy, makes services that have historically been available to married students available on an equal basis to students with same-sex or opposite-sex domestic partners. These services include access to student housing, a

courtesy card that provides access to University facilities, and the ability to purchase medical care at Vaden Health Service. A domestic partnership is defined as an established long-term partnership with an exclusive mutual commitment in which the partners share the necessities of life and ongoing responsibility for their common welfare.

## Sexual Harassment and Consensual Sexual or Romantic Relationships

For the complete text of the currently applicable version of this policy, see Administrative Guide Memo 23.2, Sexual Harassment, [http://adminguide.stanford.edu/23\\_2.pdf](http://adminguide.stanford.edu/23_2.pdf). It is also available from the Sexual Harassment Policy Office (<http://exploreddegrees.stanford.edu/nonacademicregulations/http://harass.stanford.edu>) homepage.

### Summary

Stanford University strives to provide a place of work and study free of sexual harassment, intimidation or exploitation. Where sexual harassment is found to have occurred, the University will act to stop the harassment, prevent its recurrence, and discipline and/or take other appropriate action against those responsible.

### Policy

The following is quoted from the policy:

1. In General
  - A. Applicability and Sanctions for Policy Violations—This policy applies to all students, faculty and staff of Stanford University, as well as to others who participate in Stanford programs and activities. Its application includes Stanford programs and activities both on and off-campus, including overseas programs. Individuals who violate this policy are subject to discipline up to and including discharge, expulsion, and/or other appropriate sanction or action.
  - B. Respect for Each Other—Stanford University strives to provide a place of work and study free of sexual harassment, intimidation or exploitation. It is expected that students, faculty, staff and other individuals covered by this policy will treat one another with respect.
  - C. Prompt Attention—Reports of sexual harassment are taken seriously and will be dealt with promptly. The specific action taken in any particular case depends on the nature and gravity of the conduct reported, and may include intervention, mediation, investigation and the initiation of grievance and disciplinary processes as discussed more fully below. Where sexual harassment is found to have occurred, the University will act to stop the harassment, prevent its recurrence, and discipline and/or take other appropriate action against those responsible.
  - D. Confidentiality—The University recognizes that confidentiality is important. Sexual harassment advisers and others responsible to implement this policy will respect the confidentiality and privacy of individuals reporting or accused of sexual harassment to the extent reasonably possible. Examples of situations where confidentiality cannot be maintained include circumstances when the University is required by law to disclose information (such as in response to legal process) and when disclosure is required by the University's outweighing interest in protecting the rights of others.
  - E. Protection Against Retaliation—Retaliation and/or reprisals against an individual who in good faith reports or provides information in an investigation about behavior that may

violate this policy are against the law and will not be tolerated. Intentionally making a false report or providing false information, however, is grounds for discipline.

- F. Relationship to Freedom of Expression—Stanford is committed to the principles of free inquiry and free expression. Vigorous discussion and debate are fundamental to the University, and this policy is not intended to stifle teaching methods or freedom of expression generally, nor will it be permitted to do so. Sexual harassment, however, is neither legally protected expression nor the proper exercise of academic freedom; it compromises the integrity of the University, its tradition of intellectual freedom and the trust placed in its members.

## 2. What Is Sexual Harassment?

Unwelcome sexual advances, requests for sexual favors, and other visual, verbal or physical conduct of a sexual nature constitute sexual harassment when:

- A. It is implicitly or explicitly suggested that submission to or rejection of the conduct will be a factor in academic or employment decisions or evaluations, or permission to participate in a University activity; or
- B. The conduct has the purpose or effect of unreasonably interfering with an individual's academic or work performance or creating an intimidating or hostile academic, work or student living environment.

Determining what constitutes sexual harassment depends upon the specific facts and the context in which the conduct occurs. Sexual harassment may take many forms—subtle and indirect, or blatant and overt. For example,

- i It may be conduct toward an individual of the opposite sex or the same sex.
- ii It may occur between peers or between individuals in a hierarchical relationship.
- iii It may be aimed at coercing an individual to participate in an unwanted sexual relationship or it may have the effect of causing an individual to change behavior or work performance.
- iv It may consist of repeated actions or may even arise from a single incident if sufficiently egregious.

- C. The University's Policy on Sexual Assault (see Guide Memo 23.3, Sexual Assault ([http://adminguide.stanford.edu/23\\_3.pdf](http://adminguide.stanford.edu/23_3.pdf))) may also apply when sexual harassment involves physical contact.

## 3. What To Do About Sexual Harassment

Individuals seeking further information are directed to the following resources:

- The Sexual Harassment Policy Office (Mariposa House, 585 Capistrano Way, Room 208-209, Stanford University, Stanford, CA, 94305-8230; (650) 723-1583; email: [harass@stanford.edu](mailto:harass@stanford.edu) for information, consultation, advice, or to lodge a complaint. Note that anonymous inquiries can be made to the SHPO by phone during business hours.
- The Sexual Harassment Policy Office web page at <http://harass.stanford.edu>.
- Any designated Sexual Harassment Adviser or resource person listed in 3.a or 5.a.

The following are the primary methods for dealing with sexual harassment at Stanford. They are not required to be followed in any specific order. However, early informal methods are often effective in correcting questionable behavior.

- A. Consultation—Consultation about sexual harassment is available from the Sexual Harassment Policy Office, Sexual Harassment Advisers (including residence deans), human resources officers, employee relations specialists, counselors at Counseling and Psychological Services (CAPS) or the Help Center, chaplains at Memorial Church, ombudspersons and others. A current list of Sexual Harassment Advisers is available from the Sexual Harassment Policy Office and at <http://harass.stanford.edu/SHadvisers.html>. Consultation is available for anyone who wants to discuss issues related to sexual harassment, whether or not "harassment" actually has occurred, and whether the person seeking information is a complainant, a person who believes his or her own actions may be the subject of criticism (even if unwarranted), or a third party.

Often there is a desire that a consultation be confidential or "off the record." This can usually be achieved when individuals discuss concerns about sexual harassment without identifying the other persons involved, and sometimes even without identifying themselves. Confidential consultations about sexual harassment also may be available from persons who, by law, have special professional status, such as:

- i Counselors at Counseling and Psychological Services (CAPS), <http://caps.stanford.edu>
- ii Counselors at the Help Center, <http://www.stanford.edu/dept/helpcenter>
- iii Chaplains at Memorial Church
- iv The University Ombudsperson, <http://www.stanford.edu/dept/ombuds>

In these latter cases, the level of confidentiality depends on what legal protections are held by the specific persons receiving the information and should be addressed with them before specific facts are disclosed. For more information see <http://harass.stanford.edu/confidential.html>.

For further information on confidentiality, see Section 1(d) above.

- B. Direct Communication—An individual may act on concerns about sexual harassment directly, by addressing the other party in person or writing a letter describing the unwelcome behavior and its effect and stating that the behavior must stop. A Sexual Harassment Adviser can help the individual plan what to say or write, and likewise can counsel persons who receive such communications. Reprisals against an individual who in good faith initiates such a communication violate this policy.

- C. Third Party Intervention—Depending on the circumstances, third party intervention in the workplace, student residence or academic setting may be attempted. Third party intervenors may be the Sexual Harassment Advisers, human resources professionals, the ombudspersons, other faculty or staff, or sometimes mediators unrelated to the University.

When third party intervention is used, typically the third party (or third parties) will meet privately with each of the persons involved, try to clarify their perceptions and attempt to develop a mutually acceptable understanding that can insure that the parties are comfortable with their future interactions. Other processes, such as a mediated discussion among the parties or with a supervisor, may also be explored in appropriate cases.

Possible outcomes of third party intervention include explicit agreements about future conduct, changes in workplace assignments, substitution of one class for another, or other relief, where appropriate.

D. Formal Grievance, Appeal, and Disciplinary Processes—Grievance, appeal, or disciplinary processes may be pursued as applicable.

- i Grievances and Appeals—The applicable procedure depends on the circumstances and the status of the person bringing the charge and the person against whom the charge is brought. Generally, the process consists of the individual's submission of a written statement, a process of fact-finding or investigation by a University representative, followed by a decision and, in some cases, the possibility of one or more appeals, usually to Stanford administrative officers at higher levels. The relevant procedure (see below) should be read carefully, since the procedures vary considerably.

If the identified University fact-finder or grievance officer has a conflict of interest, an alternate will be arranged, and the Director of the Sexual Harassment Policy Office or the Director of Employee and Labor Relations can help assure that this occurs.

In most cases, grievances and appeals must be brought within a specified time after the action complained of. While informal resolution efforts will not automatically extend the time limits for filing a grievance or appeal, in appropriate circumstances the complainant and the other relevant parties may mutually agree in writing to extend the time for filing a grievance or appeal.

A list of the established grievance and appeal procedures is located at [http://hrweb.stanford.edu/elr/policies/list\\_grievance\\_procedures.html](http://hrweb.stanford.edu/elr/policies/list_grievance_procedures.html). Copies may also be obtained from the Sexual Harassment Policy Office, <http://www.stanford.edu/group/SexHarass>.

Copies of the following may be obtained from Employee and Labor Relations, 651 Serra Street:

- a. "Solving Workplace Problems at Stanford: Understanding the Staff Dispute Resolution Policy" (also at <http://hrweb.stanford.edu/forms/staffresolution.pdf>.)
- b. "Solving Workplace Problems at Stanford: Information for Academic Staff – Librarians and Academic Staff – Research Associates"
- c. "The Dispute Resolution Process (A User's Guide)"

- ii Disciplinary Procedures—In appropriate cases, disciplinary procedures may be initiated. The applicable disciplinary procedure depends on the status of the individual whose conduct is in question. For example, faculty are subject to the Statement on Faculty Discipline <http://www.stanford.edu/dept/provost/faculty/policies/handbook/ch4.html#statementonfacultydiscipline>, and students to the Fundamental Standard. For additional information related to student judicial affairs, see <http://www.stanford.edu/dept/vpsa/judicialaffairs>.

The individuals referenced in this section are available to discuss these options and differing methods for dealing with sexual harassment.

- A. Investigations—If significant facts are contested, an investigation may be undertaken. The investigation will be conducted in a way that respects, to the extent possible, the privacy of all of the persons involved. In appropriate cases, professional investigators may be asked to assist in the investigation. The results of the investigation may be used in the third party intervention process or in a grievance or disciplinary action.

- B. Recordkeeping—The Sexual Harassment Policy Office will track reports of sexual harassment for statistical purposes and report at least annually to the University President concerning their number, nature and disposition. The Sexual Harassment Policy Office may keep confidential records of reports of sexual harassment and the actions taken in response to those reports, and use them for purposes such as to identify individuals or departments likely to benefit from training so that training priorities can be established. No identifying information will be retained in cases where the individual accused was not informed that there was a complaint.

- C. Indemnification and Costs—The question sometimes arises as to whether the University will defend and indemnify a Stanford employee accused of sexual harassment. California law provides, in part, "An employer shall indemnify [its] employee for all that the employee necessarily expends or loses in direct consequence of the discharge of his [or her] duties as such." The issue of indemnification depends on the facts and circumstances of each situation. Individuals who violate this policy, however, should be aware that they and/or their schools, institutes, or other units may be required to pay or contribute to any judgments, costs and expenses incurred as a result of behavior that is wrongful and/or contrary to the discharge of the employee's duties. In general, see Administrative Guide Memo 15.7 ([http://adminguide.stanford.edu/15\\_7.pdf](http://adminguide.stanford.edu/15_7.pdf)).

5. Resources for Dealing with Sexual Harassment

- A. Advice—Persons who have concerns about sexual harassment should contact the Sexual Harassment Policy Office, any Sexual Harassment Adviser at <http://harass.stanford.edu/SHadvisers.html> or one of the other individuals listed below. Reports should be made as soon as possible: the earlier the report, the easier it is to investigate and take appropriate remedial action. When reports are long delayed, the University will try to act to the extent it is reasonable to do so, but it may be impossible to achieve a satisfactory result after much time has passed.

Likewise, anyone who receives a report or a grievance involving sexual harassment should promptly consult with the Sexual Harassment Policy Office or with a Sexual Harassment Adviser.

There are a number of individuals specially trained and charged with specific responsibilities in the area of sexual harassment. In brief, they are:

- i Sexual Harassment Advisers (<http://harass.stanford.edu/SHadvisers.html>) serve as resources to individuals who wish to discuss issues of sexual harassment, either because they have been harassed or because they want information about the University's policy and procedures. There is usually at least one Adviser assigned to each of the schools at the University and to each large work unit; most of the residence deans also have been appointed as Sexual Harassment Advisers. Advisers are also authorized to receive complaints.

4. Procedural Matters

ii The Director of the Sexual Harassment Policy Office is responsible for the implementation of this policy. The Director's Office also provides advice and consultation to individuals when requested; receives complaints and coordinates their handling; supervises the other Advisers; encourages and assists prevention education for students, faculty and staff; keeps records showing the disposition of complaints; and generally coordinates matters arising under this policy. Because education and awareness are the best ways to prevent sexual harassment; developing awareness, education and training programs and publishing informational material are among the most important functions of the Sexual Harassment Policy Office (<http://harass.stanford.edu>).

iii As stated above, individuals with concerns about sexual harassment may also discuss their concerns informally with psychological counselors (for example through CAPS or the HELP Center), chaplains (through the Memorial Chapel), or the University ombudsperson. For more information, see <http://harass.stanford.edu/resources.html>.

B. External Reporting—Sexual harassment is prohibited by state and federal law. In addition to the internal resources described above, individuals may pursue complaints directly with the government agencies that deal with unlawful harassment and discrimination claims, e.g., the U.S. Equal Employment Opportunity Commission (EEOC), the Office for Civil Rights (OCR) of the U.S. Department of Education, and the State of California Department of Fair Employment and Housing (DFEH). These agencies are listed in the Government section of the telephone book. A violation of this policy may exist even where the conduct in question does not violate the law.

#### 6. Consensual Sexual or Romantic Relationships

A. In General—There are special risks in any sexual or romantic relationship between individuals in inherently unequal positions, and parties in such a relationship assume those risks. In the University context, such positions include (but are not limited to) teacher and student, supervisor and employee, senior faculty and junior faculty, mentor and trainee, adviser and advisee, teaching assistant and student, coach and athlete, and the individuals who supervise the day-to-day student living environment and student residents. Because of the potential for conflict of interest, exploitation, favoritism, and bias, such relationships may undermine the real or perceived integrity of the supervision and evaluation provided, and the trust inherent particularly in the teacher-student context. They may, moreover, be less consensual than the individual whose position confers power or authority believes. The relationship is likely to be perceived in different ways by each of the parties to it, especially in retrospect.

Moreover, such relationships may harm or injure others in the academic or work environment. Relationships in which one party is in a position to review the work or influence the career of the other may provide grounds for complaint by third parties when that relationship gives undue access or advantage, restricts opportunities, or creates a perception of these problems. Furthermore, circumstances may change, and conduct that was previously welcome may become unwelcome. Even when both parties have consented at the outset to a romantic involvement, this past consent does not remove grounds for a charge based upon subsequent unwelcome conduct.

Where such a relationship exists, the person in the position of greater authority or power will bear the primary burden of accountability, and must ensure that he or she—and this is particularly important for teachers—does not exercise any supervisory or evaluative function over the other person in the relationship. Where such recusal is required, the recusing party must also notify his or her supervisor, department chair or dean, so that such chair, dean or supervisor can exercise his or her responsibility to evaluate the adequacy of the alternative supervisory or evaluative arrangements to be put in place. Staff members may notify their local human resources officers. To reiterate, the responsibility for recusal and notification rests with the person in the position of greater authority or power. Failure to comply with these recusal and notification requirements is a violation of this policy, and therefore grounds for discipline. The University has the option to take any action necessary to insure compliance with the spirit of this recusal policy, including transferring either or both employees in order to minimize disruption of the work group. In those extraordinarily rare situations where it is programmatically infeasible to provide alternative supervision or evaluation, the cognizant Dean or Director must approve all evaluative and compensation actions.

B. With Students—At a university, the role of the teacher is multifaceted, including serving as intellectual guide, counselor, mentor and advisor; the teacher's influence and authority extend far beyond the classroom. Consequently and as a general proposition, the University believes that a sexual or romantic relationship between a teacher and a student, even where consensual and whether or not the student would otherwise be subject to supervision or evaluation by the teacher, is inconsistent with the proper role of the teacher, and should be avoided. The University therefore very strongly discourages such relationships.

7. Policy Review and Evaluation—This policy went into effect on October 6, 1993, and was amended on November 30, 1995, and on May 30, 2002. It is subject to periodic review, and any comments or suggestions should be forwarded to the Director of the Sexual Harassment Policy Office.

## Resources

The following is a summary of resources concerning sexual harassment available to members of the Stanford Community:

A brochure containing the policy, a list of current sexual harassment advisers, confidential resources, and other helpful information is available online at the Sexual Harassment Policy Office (<http://exploreddegrees.stanford.edu/nonacademicregulations/http://harass.stanford.edu>) web site, and in printed form from the Sexual Harassment Policy Office at Mariposa House, 585 Capistrano Way, Room 208-209, Stanford University, Stanford, CA, 94305-8230; (650) 723-1583; email: [harass@stanford.edu](mailto:harass@stanford.edu). Copies of the University policy on sexual assault, which complements this sexual harassment policy, as well as all other documents mentioned in this section, are also available at the Sexual Harassment Policy Office.

All faculty, staff, and students who have questions regarding this policy and its enforcement can consult with a Sexual Harassment Adviser or can be directed to the local Personnel Officer or Regional Human Resources Manager. Faculty members should contact their dean or department chair, and students should contact the Director of the Sexual Harassment Policy Office or the Dean of Student Affairs.

Sexual Harassment Policy Office—telephone: (650) 723-1583; email: [harass@stanford.edu](mailto:harass@stanford.edu).

*Director:* Laraine Zappert (Clinical Professor, Psychiatry and Behavioral Sciences)

*Assistant Director:* Nanette Andrews

# Sexual Misconduct and Sexual Assault

The University's Policy on Sexual Misconduct and Sexual Assault is published in complete form in the Administrative Guide Memo 23.3 ([http://adminguide.stanford.edu/23\\_3.pdf](http://adminguide.stanford.edu/23_3.pdf)), available at, and on the Judicial Affairs Office (<http://studentaffairs.stanford.edu/judicialaffairs/policy/other>) web site.

## Summary

The following summarizes the policy on Sexual Assault and provides information on resources available to members of the Stanford community.

## Policy

Under Title IX, sexual violence (sexual misconduct and sexual assault) is a severe form of sexual harassment. Sexual misconduct and sexual assault are unacceptable and will not be tolerated at Stanford University. All University employees (including student residence staff employees) have a duty to report claims of sexual misconduct or sexual assault to Rosa Gonzalez, Title IX Coordinator at (650) 723-0755, [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu), <http://www.stanford.edu/dept/diversityaccess/>. For students, report claims to the Title IX Coordinator or the Office of Sexual Assault and Relationship Abuse (SARA) at (650) 725-1056 or [saraoffice@stanford.edu](mailto:saraoffice@stanford.edu).

The University urges an individual who has been subjected to sexual misconduct or sexual assault to make an official report. A report of the matter will be dealt with promptly. Confidentiality will be maintained to the extent possible.

The University is committed to providing information regarding on- and off-campus services and resources to all parties involved.

Students, faculty and staff found to be in violation of this policy will be subject to discipline up to and including termination, expulsion or other appropriate institutional sanctions; affiliates and program participants may be removed from University programs and/or prevented from returning to campus.

A comprehensive website dedicated to sexual violence awareness, prevention and support can be found at Office of Sexual Assault & Relationship Abuse Education & Response (SARA) (<http://studentaffairs.stanford.edu/sara>). The site contains a list of resources, describes reporting options and has an anonymous notification form.

## Definitions

*What is Sexual Misconduct?*

Sexual misconduct is the commission of an unwanted sexual act, whether by an acquaintance or by a stranger, that occurs without indication of consent.

*What is Sexual Assault?*

Sexual assault is the actual, attempted or threatened unwanted sexual act, whether by an acquaintance or by a stranger, accomplished (1) against a person's will by means of force (express or implied), violence, duress, menace, fear or fraud, or (2) when a person is incapacitated or unaware of the nature of the act, due to unconsciousness, sleep and/or intoxicating substances.

*What is Consent?*

Consent is informed, freely given, and mutually understood. Consent requires an affirmative act or statement by each participant. If coercion, intimidation, threats and/or physical force are used, there is no consent. If a person is mentally or physically incapacitated or impaired so that the person

cannot understand the fact, nature or extent of the sexual situation, there is no consent; this includes conditions due to alcohol or drug consumption or being asleep or unconscious. Whether one has taken advantage of a position of influence over another may be a factor in determining consent.

## Notification

With the consent of the victim, allegations of sexual assault received by University offices or personnel shall be communicated promptly to the Department of Public Safety, 711 Serra Street, telephone 9-911 for emergency response or (650) 723-9633 during normal business hours.

## Emergency Services Available to Victims

Victims of sexual assault are urged to seek immediate attention from emergency police, medical, and counseling services. On the Stanford campus and in the immediate vicinity, the following provide 24-hour response and will arrange for police assistance, medical assistance, emotional support services, and advocacy and support:

- "911" Emergency Network: dial 9-911 from University phones or 911 from outside phones
- Santa Clara Valley Medical Center, 751 South Bascom Avenue, San Jose, telephone (408) 885-5000
- YWCA Stanford Hotline, for students, telephone (650) 725-9955
- Stanford Hospital and Clinics, 300 Pasteur Drive, Stanford, telephone (650) 723-5111
- Residence and Graduate Life Deans, page through 723-8222, extension 25085

## Non-Emergency Resources

Office of Sexual Assault & Relationship Abuse Education & Response (SARA) (725-1056) provides comprehensive and consistent response to incidents of sexual and relationship violence to the campus community. SARA provides case consultation to students and staff, case management for reported assaults and information and referrals to services on and off campus. The office also assists with educational outreach and training to increase awareness, sensitivity, and community accountability in the prevention of these acts. Online information is available at <http://studentaffairs.stanford.edu/sara>.

Additional resources for students are available at Vaden Health Service at (650) 723-3785, including short-term counseling, referral to long-term therapy, follow-up pregnancy testing, and testing and treatment for sexually transmitted diseases. Additional services for faculty and staff are available at the University's HELP Center, Galvez House (723-4577), including general counseling, information, support, and referral. The University ombudsperson (723-3682) is available to all in the Stanford community for general counseling, advice, and advocacy. Rosa Gonzalez, Title IX Coordinator, Director of Diversity and Access Office, Mariposa House, 585 Capistrano Way, Stanford University, Stanford CA, 94305-8230, (650) 723-0755 (voice), (650) 723-1216 (TTY), (650) 723-1791 (fax), [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu) (email), is available to assist students to address the effects of sexual harassment and sexual violence

## Confidentiality of Information

The University will make reasonable and appropriate efforts to preserve an individual's privacy and protect the confidentiality of information. However, because of laws relating to reporting and other state and federal laws, the University cannot guarantee confidentiality to those who report incidents of sexual violence except where those reports are privileged communications with those in legally protected roles (set forth below). The professional being consulted should, if possible, make these limits clear before any disclosure of facts.



An individual can speak confidentially with certain individuals in legally protected roles. They include sexual assault counselors such as those at the YWCA Sexual Assault Center at Stanford, the Help Center, Counseling and Psychological Services (CAPS) and clergy. Exceptions to maintaining confidentiality are set by law; for example, physicians and nurses who treat any physical injury sustained during a sexual assault are required to report it to law enforcement. In addition, physicians, nurses, psychologists, psychiatrists, teachers and social workers must report a sexual assault committed against a person under age 18.

Information shared with other individuals is not legally protected from being disclosed. Considerations with respect to a complainant's request for confidentiality include factors such as the University's ability to respond effectively, to prevent further harassment or to ensure the safety of the University community. For example, an advisor, the Dean of Student Life, a Residence Dean or a Resident Assistant may need to inform other individuals to protect their safety or rights, in fairness to the persons involved, or in response to legal requirements. As required by law, all disclosures to any University employee of an on-campus sexual assault must be reported for statistical purposes only (without personal identifiers) to the Stanford University Department of Public Safety, which has the responsibility for tabulating and annually publishing sexual assault and other crime statistics. Such reports are for statistical purposes and do not include individual identities.

State law permits law enforcement authorities to keep confidential the identity of a person officially reporting a sexual assault. The Stanford University Department of Public Safety policy is to maintain such confidentiality. However, if the District Attorney files a criminal charge, confidentiality might not be maintained.

If a complaint is filed with the Office of Judicial Affairs then the accused student must be provided with the name of the alleged victim and witnesses, if applicable. However, accommodations can be made to protect the victim's privacy, as described on the website for the Office of Judicial Affairs.

## Information about Options

The University offices responding to allegations of sexual misconduct or sexual assault will inform affected individuals, at a minimum, of the options of: criminal prosecution, civil prosecution, the disciplinary process, the appropriate Title IX grievance procedure, alternative housing assignments, and academic assistance alternatives.

## Political Activities

For the complete text of the currently applicable version of this policy, see Administrative Guide Memo 15.1, Political Activities, available at [http://adminguide.stanford.edu/15\\_1.pdf](http://adminguide.stanford.edu/15_1.pdf).

### Summary

The following summarizes the policy on Political Activities:

Stanford University, as a charitable entity, is subject to federal, state, and local laws and regulations regarding political activities: campaign activities, lobbying, and the giving of gifts to public officials.

While all members of the University community are naturally free to express their political opinions and engage in political activities to whatever extent they wish, it is very important that they do so only in their individual capacities and avoid even the appearance that they are speaking or acting for the University in political matters.

In the limited circumstances where individuals must speak or act on behalf of the University in the political arena, they must do so in accordance with the provisions of this Guide Memo.

### Policy

The following is quoted from the policy:

#### 1. Summary of Legal Requirements and Restrictions

A. Campaign Activities: contributions of money, goods, or services to candidates for political office and in support of or opposition to ballot measure campaigns are subject to a wide variety of political laws. Depending on the jurisdiction and the campaign, political contributions may be prohibited or limited and, in nearly all cases, are subject to a complicated series of disclosure rules. Because of the University's tax-exempt status, the University is legally prohibited from endorsing candidates for political office or making any contribution of money, goods, or services to candidates. It is important, therefore, that no person inadvertently cause the University to make such a contribution.

B. Lobbying: lobbying can generally be described as any attempt to influence the action of any legislative body (for example, Congress, state legislatures, county boards, city councils, and their staffs) or any federal, state, or local government agency. Laws regulating lobbying exist at the federal, state, and local levels but can differ widely in scope, depending on the jurisdiction. Some laws, for example, only regulate lobbying of the legislative branch. Others, however, also cover lobbying of administrative agencies and officers in the executive branch (for example, lobbying for federally-funded grants). To one degree or another, however, most lobbying laws require registration and reporting by individuals engaged in attempts to influence governmental action.

Tax-exempt organizations are permitted to lobby, and the University engages in lobbying on a limited number of issues, mostly those affecting education, research, and related activities. There is usually some threshold of time or money spent on lobbying that triggers registration and reporting requirements. Regardless of thresholds, however, no University employee—other than the following individuals, on matters under their jurisdiction—may lobby on behalf of the University without specific authorization:

- President
- Provost
- Deans of the Seven Schools
- Vice Provost and Dean of Research
- Vice President for Business Affairs and Chief Financial Officer
- Executive Director of Human Resources
- Director of the Stanford Linear Accelerator Center
- Director of the Hoover Institution
- General Counsel
- Vice President for Public Affairs

The Vice Provost and Dean of Research may grant permission to faculty members to lobby on behalf of the University for specific purposes. The Director of Government and Community Relations may grant permission to staff members to lobby on behalf of the University for specific purposes. All lobbying on behalf of the University should be coordinated with the Director of Government and Community Relations.

C. Giving of Gifts to Public Officials and Staff: almost all jurisdictions have strict rules on the extent to which gifts and honoraria may be given to public officials (both elected and non-elected officials and, often, staff). In some cases gifts and honoraria are prohibited; in others they are limited; and in most cases they are subject to detailed disclosure. In addition, in some jurisdictions such as California, gifts to both state and local public officials can result in a public official's

disqualification from participation in any governmental action affecting the interests of the donor. Meals, travel, and entertainment are the most common types of gifts, but gift rules can also apply in cases where public officials attend a reception or receive tickets to sporting or other events.

As a non-profit organization, the University generally does not give gifts to public officials and, in those limited cases where it does give such gifts, it must do so in accordance with all applicable laws and regulations. Therefore, any University employee who, on behalf of the University, wishes to make a gift to a public official must receive prior approval from the Director of Government and Community Relations before making such a gift.

- D. Reporting of Political Activities: the University must report most of its political activities above certain thresholds. Therefore, any University employee engaging in such activities on behalf of the University should carefully review the remainder of this Guide Memo and should discuss the relevant activities in advance with the Director of Government and Community Relations.

## 2. Prohibited and Restricted Political Activities

### A. In General:

- i No person may, on behalf of the University, engage in any political activity in support of or opposition to any candidate for elective public office (including giving or receiving funds or endorsements), nor shall any University resources be used for such purpose.
- ii No person may, on behalf of the University, lobby (or use University resources to lobby) any federal, state, or local legislative or administrative official or staff member unless specifically authorized to do so. Any lobbying activity, even when authorized, must be conducted in compliance with this Guide Memo, other applicable University policies, and applicable law.
- iii No person may, on behalf of the University, give a gift (or use any University resources to give a gift) to any federal, state, or local official or staff member, except in compliance with this Guide Memo, other applicable University policies, and applicable law.
- iv No person supporting candidates for public office or engaging in other political activities may use University space or facilities or receive University support, except in the limited ways described in section 3A, below.
- v No person may use for lobbying activities federally-funded contract or grant money received by the University.

Even the foregoing activities that are only restricted, rather than prohibited, may be subject to limitations imposed by law. Therefore, any person engaging in the activity, or contemplating doing so, should consult with the Director of Government and Community Relations.

- B. Guidelines for Avoiding Prohibited Partisan Political Activities: the following guidelines should assist in preventing the involvement or apparent involvement of the University in political activities in support of or opposition to any candidate for elective public office, that is, partisan political activities. Except in the limited circumstances set forth in section 3.b., below:

- i Use of Name and Seal: neither the name nor seal of the University or of any of its schools, departments, or institutions should be used on letters or other materials intended for partisan political purposes.
- ii Use of Address and Telephones: no University office should be used as a return mailing address for partisan political mailings, and telephone service that is paid by the University, likewise, should not be used for partisan political purposes. (Obviously, a student's dormitory room and telephone service that are personal to the student may be used for these purposes.)
- iii Use of Title: the University title of a faculty or staff member or other person should be used only for identification and should be accompanied by a statement that the person is speaking as an individual and not as a representative of the University.
- iv Use of Services and Equipment: University services, such as Interdepartmental Mail; equipment, such as duplicating machines, computers, and telephones; and supplies should not be used for partisan political purposes.
- v Use of Personnel: no University employee may, as part of his or her job, be requested to perform tasks in any way related to partisan political purposes.

## 3. Permissible Activities

- A. In General: as noted above, the federal, state, and local laws which limit the partisan political activities that can take place in University facilities and with University support in no way inhibit the expression of personal political views by any individual in the University community. Nor do they forbid faculty, students, or staff from joining with others in support of candidates for office or in furtherance of political causes. There is no restriction on discussion of political issues or teaching of political techniques. Academic endeavors which address public policy issues are in no way affected.

Because the University encourages freedom of expression, political activities which do not reasonably imply University involvement or identification may be undertaken so long as regular University procedures are followed for use of facilities. Examples of permissible activities are:

- i Use of areas, such as White Plaza, for tables, speeches, and similar activities.
- ii Use of auditoriums for speeches by political candidates, but subject to rules of the Internal Revenue Service, the Federal Election Commission, and the California Fair Political Practices Commission, and other applicable laws. Arrangements must be made with University Events and Services. (See also Guide Memo 82.1, Public Events ([http://adminguide.stanford.edu/82\\_1.pdf](http://adminguide.stanford.edu/82_1.pdf)), for more information.)

To reiterate, because tax and political compliance laws impose restrictions, and even prohibitions, on certain political activities and on the use of buildings and equipment at a non-profit institution such as the University, any such activities must be in compliance with these legal requirements. Individuals taking political positions for themselves or groups with which they are associated, but not as representatives of the University, should clearly indicate, by words and actions, that their

positions are not those of the University and are not being taken in an official capacity on behalf of the University.

- B. Limited University Political Activities: limited activities relating to specific federal, state, or local legislation or ballot initiatives are permissible where (1) the subject matter is directly related to core interests of the University's activities; (2) the President has determined that the University should take a position; and (3) the individuals who speak or write on the University's behalf are specifically authorized to do so.

4. Responsibility for Interpretation: the Director of Government and Community Relations, in consultation with the General Counsel, is the administrative officer responsible for interpretation and application of the above guidelines. Questions on whether planned student activities are consistent with the University's obligations should be directed to the Dean of Students, who will consult with the Director of Government and Community Relations and/or the General Counsel. All other questions on whether planned activities are consistent with the University's obligations should be addressed directly to the Director of Government and Community Relations or the General Counsel.

## Campus Disruptions

The University's policy on campus disruption applies to students, faculty, and staff. It is published in its complete form on the Office of the General Counsel ([http://www.stanford.edu/dept/legal/su\\_links.html](http://www.stanford.edu/dept/legal/su_links.html)) web site.

### Policy

The following is quoted from the policy:

Because the rights of free speech and peaceable assembly are fundamental to the democratic process, Stanford firmly supports the rights of all members of the University community to express their views or to protest against actions and opinions with which they disagree.

All members of the University also share a concurrent obligation to maintain on the campus an atmosphere conducive to scholarly pursuits, to preserve the dignity and seriousness of University ceremonies and public exercises, and to respect the rights of all individuals.

The following regulations are intended to reconcile these objectives.

It is a violation of University policy for a member of the faculty, staff, or student body to:

1. prevent or disrupt the effective carrying out of a University function or approved activity, such as lectures, meetings, interviews, ceremonies, the conduct of University business in a University office, and public events.
2. obstruct the legitimate movement of any person about the campus or in any University building or facility.

Members of the faculty, staff, and student body have an obligation to leave a University building or facility when asked to do so in the furtherance of the above sections by a member of the University community acting in an official role and identifying himself or herself as such; members of the faculty, staff, or student body also have an obligation to identify themselves, when requested to do so by such a member of the University community who has reasonable grounds to believe that the person(s) has violated section (1) or (2) of this policy and who has so informed the person(s).

The policy has been applied to the following actions: refusal to leave a building which has been declared closed; obstructing the passage into or out of buildings by sitting in front of doorways; preventing University employees from entering their workplace; preventing members of a class

from hearing a lecture or taking an examination, or preventing the instructor from giving a lecture, by means of shouts, interruptions, or chants; refusing to leave a closed meeting when unauthorized to attend; and intruding upon or refusing to leave a private interview.

It should be understood that while the above are examples of extraordinarily disruptive behavior, the application of the Policy also takes situational factors into consideration. Thus, for example, conduct appropriate at a political rally might constitute a violation of the Policy on Campus Disruption if it occurred within a classroom.

Students found responsible for violating the Fundamental Standard in connection with this policy are subject to University discipline.

## Use of the Main Quadrangle and Memorial Court

### Policy

The following is quoted from the policy:

The Main Quadrangle and Memorial Court are part of Stanford University's academic preserve due to their locations at the heart of the campus. To protect and enhance their historic status, University policy limits activities primarily to established or traditional ceremonies and events.

To schedule an event, approval must be obtained in advance from the Office of Stanford Events (see below). Unscheduled events, protests, or activities are prohibited.

Requests for waivers to this policy must be submitted in advance and in writing to the Office of Stanford Events. Exceptions may be granted only in extraordinary cases.

### Resources

The following is a summary of resources available:

For instructions on use of the Main Quadrangle/Memorial Court, contact the Office of Special Events and Protocol (OSEP) at (650) 724-1387, or at the OSEP (<https://osep.stanford.edu>) web site.

Note: White Plaza is made available to Stanford students, faculty, and staff for events other than scheduled "established or traditional ceremonies and events" including those that may involve amplified sound. For further information on the use of such other venues, students should contact Student Activities and Leadership (SAL) at (650) 723-2733, or at the SAL (<http://studentaffairs.stanford.edu/sal>) web site. Faculty and staff should contact the Office of Special Events and Protocol (OSEP) (<https://osep.stanford.edu>).

## Oval Policy

The Oval is considered to be the initial and official visual entrance to the Stanford University campus. Given this historic and aesthetic status, it is in the best interests of the University community and visiting members of the public to maintain its open and pristine space, to help preserve its natural beauty and environmental integrity. The Oval also presents the formal academic image of the University, leading directly to departments, classrooms and other academic space, and faculty and graduate student offices, and thus is subject to the University's Noise Policy.

The University prohibits formal or informal events of any kind to take place in the Oval. Gatherings of Stanford students, faculty, and staff such as demonstrations, rallies, or dances may take place in White Plaza, which can be reserved through the Office of Student Activities. Weddings also are not allowed in the Oval but are in certain circumstances allowed in Memorial Church (refer to Memorial Church wedding ceremony guidelines (<http://www.stanford.edu/group/religiouslife/servicesWeddings.html>)).

The Oval is considered a pedestrian zone and appropriate use of its space includes walking, running, reading, relaxing, and other limited recreational

use of the lawn area (such as quiet, very small picnics and Frisbee), unless or until such use damages or otherwise harms the property.

Cooking food or use of any grill/barbecue or open flame is strictly prohibited. Fireworks or the use of other incendiary devices represent a safety hazard to the area and are therefore prohibited. Amplified sound from items such as boom boxes, musical instruments, or the use of bullhorns or amplified speakers is also prohibited. Only authorized Stanford service vehicles are permitted inside the Oval areas.

As the official entrance to the University, the Oval offers public access to general parking spaces in the marked areas surrounding the outer perimeter of the Oval; drivers are expected to obey all traffic signs and limitations. Buses are subject to additional restrictions.

For further information regarding this policy, contact the Executive Director of Special Events and Protocol, 724-1387 or see the Office of Special Events & Protocol (<http://osep.stanford.edu/policies/oval.html>) web site.

## Noise and Amplified Sound Policy

The following is quoted from the policy:

Stanford is not only an academic institution but a residential community as well. It is the responsibility of all faculty, students, and staff to moderate noise especially during an event or activity held on campus. Supporting the mission of the University and respecting those who are studying, researching, or otherwise carrying out academic-related activities is a Stanford priority. The campus must require a conducive atmosphere to ensure these endeavors are accomplished and supported. Disturbing noise in or around a residence or other campus buildings which infringe on the rights of other residents or members of the University community is considered a violation of this policy. As part of the event planning process, the event sponsor must obtain all appropriate approvals regarding the use of amplified sound during an event or activity.

### Resources

Information regarding whether and how the use of amplified sound is permitted is available from the following sources, which must be consulted for prior approval:

1. The Office of Student Activities: phone: 723-2733, or see <http://studentaffairs.stanford.edu/sal/policies/noise>
2. Registrar's Scheduling Office: email [reg-events@stanford.edu](mailto:reg-events@stanford.edu), or see <http://studentaffairs.stanford.edu/registrar/faculty/events>.
3. Office of Special Events and Protocol (OSEP) at (650) 724-1387, or see <http://stanfordevents.stanford.edu>.

## Prohibition of the Possession of Dangerous Weapons on Campus

The University's policy prohibiting weapons on campus is published in its complete form on the Judicial Affairs Office (<http://stanford.edu/dept/vpsa.judicialaffairs>) web site.

### Policy

The following is quoted from the policy:

Except for authorized academic purposes, the knowing possession by any student on any Stanford campus of the following is prohibited: firearms, explosives, or any instrument or weapon of the kind commonly known as blackjack, slingshot, billy club, sandclub, sandbag, or metal knuckles.

Notwithstanding the paragraph above, a student who is a resident of a Stanford campus may store a weapon on such campus if both of the following conditions are met:

1. The student has complied with all state and federal regulations regarding the use and possession of said weapon, or, in the case of a foreign campus, with the laws of the country in which the campus is located.
2. The student stores such weapons with the Stanford Department of Public Safety (SDPS) or, in the case of a foreign campus, in a facility provided by the director of such campus.

Students may remove their weapons from storage only in accordance with regulations established by the SDPS or by the director of the foreign campus at which the weapon is stored. A student who is a resident of a Stanford campus may bring any of the above weapons on campus for purposes of storage only if the student has previously notified the SDPS of the intention to do so, but in no event more than six hours after arrival on the campus. When the student removes the weapon from storage, it must be taken off campus as soon as is practicable, but in no event more than one hour after such removal.

The term "Stanford campus" shall include all the lands and facilities of Leland Stanford Junior University, whether owned or leased, and whether located in the United States or abroad.

### Student Alcohol Policy

This document clarifies the University's expectations and approach related to the use of alcohol by students. The University's Controlled Substances and Alcohol Policy is also applicable. The full text is contained in the Controlled Substance and Alcohol ([http://adminguide.stanford.edu/23\\_6.pdf](http://adminguide.stanford.edu/23_6.pdf)) policy.

### Preamble

The Fundamental Standard has set the standard of conduct for students at Stanford since 1896. It states: "Students at Stanford are expected to show both within and without the University such respect for order, morality, personal honor and the rights of others as is demanded of good citizens." Implicit in the Standard is the understanding that students are responsible for making their own decisions and accepting the consequences of those decisions.

The University is committed to the health, safety and well-being of each member of the Stanford community. In order to further student learning, development and success and to promote the University's academic mission, Stanford fosters an environment of personal and collective responsibility and respectful citizenship. This means that all members of the university community—students, faculty and staff—have a role in safeguarding a healthy learning environment free of the consequences of alcohol misuse. The University also strives to create a culture that supports students who do not use alcohol and students who use alcohol in a safe, legal and responsible fashion.

### Legal Background

Members of the Stanford community are expected to abide by all federal, state and local laws, including those governing alcohol consumption and distribution. Under California law, it is illegal for anyone under the age of 21 to purchase alcohol or to possess alcohol in a public space. It is also illegal for anyone to furnish alcohol to an individual under the age of 21. Other state laws governing the use of alcohol are listed below.

While it is not the responsibility of most Stanford officials to enforce state law, it is the responsibility of the University's Department of Public Safety, and accordingly they enforce all state alcohol laws when they encounter violations. All community members should understand the law and, as individuals, ensure that they themselves do not violate it.

In addition, it is the responsibility of all community members to ensure that the University does not, through their actions, violate the law. Accordingly, official University functions, including events held by registered student groups, are not allowed to provide alcohol to those under 21, and no

University funds may be used to purchase alcohol for that purpose. Violations of this requirement can result in both criminal prosecution and University administrative action, including dismissal from the University.

#### Responsible Alcohol Use

Stanford students are expected to behave responsibly, both in the classroom and outside, both on campus and off. In particular, the University does not tolerate reckless drinking and its consequent harmful behaviors. The University is especially concerned about the misuse of distilled alcohol products ("hard alcohol"), and the dangers that arise from that misuse.

All students should understand the physical and behavioral effects of alcohol misuse, and should avoid such misuse themselves. In addition, they are expected to do their part to ensure the safety of fellow students whom they perceive to be engaged in reckless drinking behavior or to be suffering from its consequences.

The University provides educational resources to assure that students understand the effects of alcohol misuse and know how to respond when they perceive others to be engaged in dangerous behavior.

Reckless drinking and encouraging reckless drinking are violations of University policy, and may be subject to disciplinary action. Extreme or repeated violations may result in dismissal from the University.

More generally, students are expected to make legal, healthy, responsible choices concerning their personal use of alcohol and the University supports them in this endeavor through education and other resources. The University sponsors activities and programs focused on students who choose not to drink or to drink lightly, as well as resources and services to assist students who need help for themselves or others related to alcohol use.

#### Authority, Application and Enforcement

Responsibility for application of the Student Alcohol Policy resides with the Vice Provost for Student Affairs. The Office of Alcohol Policy and Education reports to the Vice Provost for Student Affairs and is expected to coordinate and implement alcohol programs. (The University's Controlled Substances and Alcohol Policy is also applicable. The full text is contained at the Controlled Substances and Alcohol ([http://adminguide.stanford.edu/23\\_6.pdf](http://adminguide.stanford.edu/23_6.pdf))) web site.

The Stanford University Department of Public Safety enforces federal, state and local laws among students, other community members, guests and visitors.

#### Alcohol Policy Violations

The Office of Alcohol Policy and Education will work with the following offices to address violations of the University's alcohol policy as determined by the specifics of each situation.

- The Office of Residential Education (<http://studentaffairs.stanford.edu/resed>) for undergraduate students, residential groups, fraternities and sororities
- Graduate Life Office (GLO) (<http://glo.stanford.edu>) for graduate students
- Student Activities and Leadership (SAL) (<http://studentaffairs.stanford.edu/sal>) for voluntary student organizations
- Department of Athletics, Physical Education and Recreation (DAPER) (<http://www.gostanford.com/school-bio/stan-administration.html>) for student athletes and athletic groups
- Such other offices as are appropriate under particular circumstances

Violations may be referred to the Office of Judicial Affairs (<http://judicialaffairs.stanford.edu>) (for individual students) and the Organization Conduct Board (<http://studentaffairs.stanford.edu/studentlife/ocb>) (for student groups). The Dean of Student Life (<http://studentaffairs.stanford.edu/studentlife>) may take action as well in certain circumstances.

Getting Help: Resources Available to Students

Students have access to a variety of University resources (<http://alcohol.stanford.edu/resources.html>).

#### Additional University Regulations

- Students living in University residences sign a residence agreement ([http://www.stanford.edu/dept/rde/shs/res\\_agree.htm](http://www.stanford.edu/dept/rde/shs/res_agree.htm)) that outlines housing policies and expectations for conduct. Violations of the residence agreement can lead to loss of housing. [[http://www.stanford.edu/dept/rde/shs/res\\_agree.htm](http://www.stanford.edu/dept/rde/shs/res_agree.htm)]
- All parties must be registered with the University, and availability of alcohol is regulated by party planning guidelines coordinated by the Office of Student Activities and Leadership. [<http://studentaffairs.stanford.edu/sal/planning/party>]

#### Other restrictions apply to particular circumstances

- Frosh Housing—Alcoholic beverages are prohibited at all-frosh house events in common area spaces.
- University Funds and the Purchase of Alcohol—No University funds or funds collected by the University may be used in a way that violates the alcohol policy. In student residences, house funds (funds collected by Student Financial Services or other University offices) may not be used to buy alcohol. Any decision to use student-collected funds to buy alcohol must be made lawfully, thoughtfully, fairly and in a way that respects the views of all students. Students must not be required to contribute to the purchase of alcohol.
- Dining Hall—Students may not possess or consume alcoholic beverages in Stanford Dining Halls during meal times and food service. University Dining staff can deny admission, access or meal service to anyone who is believed to be intoxicated by the Dining Management staff.
- White Plaza—Alcoholic beverages in White Plaza are prohibited.
- End of Quarter Period and Finals Week—No registered parties (with or without alcohol) can occur during the End of the Quarter Period (dead week) or Finals Week.
- Athletic Facilities—No alcohol is permitted inside Stanford athletic facilities public spaces during athletic events.
- Stanford Conferences and University Facilities—The University requires that event sponsors and student groups wishing to offer alcoholic beverages at their programs and events operate within state and local laws as provided by the Department of Alcohol and Beverage Control (ABC). Alcohol service is not allowed in classrooms.
- Admit Weekend—Stanford students are prohibited from providing, serving or in anyway making alcohol available to any prospective frosh (ProFro). All student groups/organizations and residences may host only alcohol-free parties or events during Admit Weekend. This specifically means that no alcohol is to be present, served or consumed at any student group/organization and/or dorm function during Admit Weekend.
- New Student Orientation (NSO) Period—At no time should any Stanford student provide, serve or in any way make alcohol available to any new, incoming undergraduate student (freshman or transfer). All undergraduate student groups/organizations and residences will host only alcohol-free parties or events during Orientation. This specifically means that no alcohol is to be present, served, or consumed at any student group/organization and/or dorm function during NSO.

#### California State Laws

Students should be familiar with California laws governing the consumption of alcohol. The following summarizes those laws most relevant to individuals.

- It is illegal for persons under the age of 21 to possess an alcoholic beverage in any public place or any place open to the public (CA Business and Professions Code 25662).

- Any person who furnishes, gives or sells any alcoholic beverage to someone under the age of 21 is guilty of a misdemeanor (CA Business and Professions Code 25658(a)).
- Any person under the age of 21 who attempts to purchase an alcoholic beverage is guilty of an infraction (CA Business and Professions Code 25658.5).
- Any person under the influence of alcohol in a public place and unable to exercise care for one's own safety or that of others is guilty of a misdemeanor (CA Penal Code 647(f)).
- It is illegal for persons to operate a motor vehicle while under the influence of alcohol or other intoxicants or with a blood alcohol level of .08% or higher (CA Vehicle Code Section 23152). NOTE: A golf cart is a motor vehicle.
- It is unlawful for a person under the age of 21 years who has 0.05 percent or more, by weight, of alcohol in his or her blood to drive a vehicle (CA Vehicle Code Section 23140(a)).
- It is illegal for a person under the age of 21 to drive a vehicle when he or she has a blood alcohol concentration (BAC) of .01% or higher (CA Vehicle Code Section 23136).
- It is a misdemeanor to ride a bicycle under the influence of alcohol, drugs or both (CA Vehicle Code Section 21200.5).
- It is an infraction to possess an open container of an alcoholic beverage while in a motor vehicle (CA Vehicle Code Section 23223).
- It is an infraction for an owner or driver of a motor vehicle to allow an open container of alcohol in the passenger area (CA Vehicle Code Section 23225).

#### Hazing Policy

Hazing is not permitted at Stanford University. No individual, recognized student organization, club, team, or any other Stanford-affiliated student group is permitted to plan, engage in, or condone hazing, on or off the Stanford campus.

#### Definition of Hazing at Stanford University

Hazing includes any activity done in connection with a student organization, regardless of whether the organization is officially recognized at Stanford, that causes or is reasonably likely to cause another student to suffer bodily danger, physical harm, or significant personal degradation or humiliation, even if no bodily danger, physical harm, or significant degradation or humiliation in fact results. Hazing might occur during initiation or pre-initiation into a student organization, but is not limited to these time frames. Any individual who plans or intentionally assists in hazing activity has engaged in hazing, regardless of whether that individual is present when the hazing activity occurs.

#### Consequences of a Violation

Stanford University expects its students to conduct themselves in socially responsible and respectful ways. Thus, participation in hazing, either as an individual or as part of any student group, may result in serious individual and organizational consequences including, but not limited to: disciplinary action up to and including expulsion; permanent loss of organizational recognition; and loss of eligibility to remain a member of any club, team, or other Stanford-affiliated student group. Consent, implied or expressed, is not a defense to any complaint or charge alleging a hazing violation.

A number of University offices may take institutional action, including: the Organizational Conduct Board; Judicial Affairs; or other University offices, such as the Vice Provost for Student Affairs or the Department of Athletics.

#### Applications

Stanford's hazing policy is distinct from and broader than California Penal Code section 245.6, which prohibits: "any method of initiation or preinitiation into a student organization or student body, whether or not the organization or body is officially recognized by an educational institution,

which is likely to cause serious bodily injury to any former, current, or prospective student of any school, community college, college, university or other educational institution in this state." A violation of Penal Code Section 245.6 that does not result in serious bodily injury is punishable as a misdemeanor, while a violation that results in death or injury is punishable as a felony or a misdemeanor.

Nothing in this hazing policy prevents Stanford from taking institutional action against hazing activity that falls outside the narrower definition of Penal Code section 245.6.

Stanford's hazing policy is not intended to prohibit student recruitment or new or continuing member activities that are positive and educational in nature, designed to instill a group ethos or unity. Its intent is to deter those behaviors that cause or are likely to cause danger, harm or humiliation to another student.

Stanford's hazing policy is not intended to apply to customary athletic events or other similar institutionally-approved contests or competitions.

Questions should be directed to the Office of Student Activities, (650) 723-2733.

#### Smoke-Free Environment

The University's policy on a smoke-free environment is published in its complete form in the Administrative Guide as Administrative Guide Memo 23.4 ([http://adminguide.stanford.edu/23\\_4.pdf](http://adminguide.stanford.edu/23_4.pdf)), and Judicial Affairs Office (<http://www.stanford.edu/dept/vpsa/judicialaffairs>) web site.

Applicability—This policy applies to all academic and administrative units of Stanford University, including the SLAC National Accelerator Laboratory, and all campus student housing. This policy does not supersede more restrictive policies which may be in force in compliance with federal, state, or local laws or ordinances.

Note also that the School of Medicine has adopted a more restrictive policy; see the Tobacco-free Campus Policy (<http://med.stanford.edu/tobaccofree>).

#### Policy

The following is quoted from the policy:

##### 1. Policy

It is the policy of Stanford University that the smoking of tobacco products in enclosed buildings and facilities and during indoor or outdoor events (and the selling of tobacco products) on the campus is prohibited.

##### 2. Guidelines

A. Smoking-Prohibited Areas—Specifically, smoking is prohibited in classrooms and offices, all enclosed buildings and facilities, in covered walkways, in University vehicles, during indoor and outdoor athletic events, and during other University sponsored or designated indoor or outdoor events.

i Ashtrays will not be provided in any enclosed University building or facility.

ii "Smoking Prohibited" signs will be posted.

B. Outdoor Smoking Areas—Smoking is permitted in outdoor areas, except during organized events. Outdoor smoking areas should be located far enough away from doorways, open windows, covered walkways, and ventilation systems to prevent smoke from entering enclosed buildings and facilities. To accommodate faculty, staff, and students who smoke, Vice Presidents, Vice Provosts, and Deans may designate certain areas of existing courtyards and patios as smoking areas in which case ashtrays must be provided. Costs associated with providing designated smoking areas and ashtrays will be absorbed by the specific academic or administrative unit(s).

3. Enforcement—This policy relies on the consideration and cooperation of smokers and non-smokers. It is the responsibility of all members of the University community to observe and follow this policy and its guidelines.
  - A. Smoking Cessation Information—Smoking cessation programs are available for faculty and staff through the Center for Research in Disease Prevention, and the Health Improvement Program (HIP). Students may contact the Health Promotion Program (HPP) through the Student Health Center for smoking cessation information or programs.
  - B. Repeated Violations—Faculty, staff, and students repeatedly violating this policy may be subject to appropriate action to correct any violation(s) and prevent future occurrences.
4. Implementation and Distribution—Copies of this policy will be disseminated by the Manager of HR Policy/Staff and Labor Relations and the Vice Provost for Student Affairs to all faculty, staff, and students, and to all new members of the University community.

#### Visitor Policy/University Statement on Privacy

Stanford University has an interest in ensuring that the privacy of its students, faculty, and staff is respected, and that no activities interfere with education, research, or residential life.

The University is private property; however, some areas of the campus typically are open to visitors. These areas include White Plaza, public eating areas (such as those at Tresidder Union), outdoor touring areas, and locations to which the public has been invited by advertised notice (such as for public educational, cultural, or athletic events). Even in these locations, visitors must not interfere with the privacy of students, faculty, and staff, or with educational, research, and residential activities. The University may revoke at any time permission to be present in these, or any other areas. Visitors should not be in academic or residential areas unless they have been invited for appropriate business or social purposes by the responsible faculty member, student, or staff member.

No commercial activity, including taking photos or similar audio or visual recordings that are sold to others or otherwise used for commercial purposes, may occur on the campus without the University's permission. Requests for permission should be submitted to the Director of University Communications or, as appropriate, the Dean of Students, the Department of Athletics, or the Office of Public Events. Recognized student groups and official units of the University will be granted such permission so long as they do not violate privacy or property interests of others; so long as any sale of their products is predominantly on campus to students, faculty, and staff; and so long as they comply with applicable University policies and procedures.

Violators of this policy may be subject to criminal and/or civil liability, as well as University disciplinary action.

#### Computer and Network Usage

For a complete text of the currently applicable version of this policy, see Administrative Guide Memo 62, Computer and Network Usage Policy (<http://adminguide.stanford.edu/62.pdf>).

#### Policy

The following is quoted from the policy:

Users of Stanford network and computer resources have a responsibility not to abuse the network and resources. This policy provides guidelines for the appropriate and inappropriate use of information technologies.

#### Summary

The following summarizes the policy on Computer and Network Usage:

In particular, the policy provides that users of University information resources must respect software copyrights and licenses, respect the integrity of computer-based information resources, refrain from seeking to gain or permitting others to gain unauthorized access, including by sharing passwords, and respect the rights of other computer users.

This policy covers appropriate use of computers, networks, and information contained therein. As to political, personal and commercial use, the University is a non-profit, tax-exempt organization and, as such, is subject to specific federal, state, and local laws regarding sources of income, political activities, use of property, and similar matters. It also is a contractor with government and other entities, and thus must assure proper use of property under its control and allocation of overhead and similar costs. For these reasons, University information resources must not be used for partisan political activities where prohibited by federal, state, or other applicable laws, and may be used for other political activities only when in compliance with federal, state, and other laws, and in compliance with applicable University policies. Similarly, University information resources should not be used for personal activities not related to appropriate University functions, except in a purely incidental manner. In addition, University information resources should not be used for commercial purposes, except in a purely incidental manner or except as permitted under other written policies of the University or with the written approval of a University officer having the authority to give such approval. Any such commercial use should be properly related to University activities, take into account proper cost allocations for government and other overhead determinations, and provide for appropriate reimbursement to the University for taxes and other costs the University may incur by reason of the commercial use. Users also are reminded that the .edu domain on the Internet has rules restricting or prohibiting commercial use, and thus activities not appropriately within the .edu domain and which otherwise are permissible within the University computing resources should use one or more other domains, as appropriate.

The University's Information Security Officer is authorized in appropriate circumstances to inspect or monitor private data (including email), such as when there is a reasonable cause to suspect improper use of computer or network resources.

For further information on the topic of peer-to-peer file sharing, see the section above on Copyright.

#### Protection of Sensitive Data

Stanford University maintains sensitive non-public data protected by laws and agreements, including Social Security numbers, financial information, health information, and student records. It is incumbent on every member of the Stanford community with access to such data to be familiar with and abide by Stanford's data classifications requirements provided at the Data Classification, Access, Transmittal and Storage ([http://www.stanford.edu/group/security/securecomputing/dataclass\\_chart.html](http://www.stanford.edu/group/security/securecomputing/dataclass_chart.html)) web site. Members of the Stanford community should also familiarize themselves with applicable laws and University policies on privacy as provided by the University, including Administrative Guide Memo 63, Information Security (<http://adminguide.%20stanford.edu/63.pdf>), Administrative Guide Memo 64, Identification and Authentication of Systems (<http://adminguide.stanford.edu/64.pdf>), Administrative Guide Memo 65, Electronic Commerce (<http://adminguide.stanford.edu/65.pdf>), and Administrative Guide Memo 67, Information Security Incident Response (<http://adminguide.stanford.%20edu/67.pdf>). For information on best practices for securing mobile computing devices, see the Guidelines for Securing Mobile Computing Devices ([http://www.stanford.edu/group/security/securecomputing/mobile\\_devices.html](http://www.stanford.edu/group/security/securecomputing/mobile_devices.html)) web site.

#### Campus Safety and Criminal Statistics

Stanford University complies with the Jeanne Clery Disclosure of Campus Security Policy and Crime Statistics Act. A copy of Stanford's policies and statistics under this act are posted on the Department of Public Safety (<http://stanford.edu/group/SUDPS/safety-report.shtml>) web site. A paper copy can be obtained by calling the Stanford Department of Public Safety at (650) 723-9633.

# Undergraduate Education

Established in 1995, the Office of the Vice Provost for Undergraduate Education (VPUE) comprises the Bing Overseas Studies Program, the Center for Teaching and Learning, Stanford Introductory Studies, and Undergraduate Advising and Research. VPUE's objective is to create and maximize opportunities for learning partnerships at Stanford. For undergraduates, VPUE serves as the nexus for key programs and initiatives and helps them define and achieve their intellectual ambitions at Stanford. Student opportunities within VPUE include investigative introductory courses, targeted classes in writing and rhetoric, specialized introductory seminars, intensive pre-term September studies programs, undergraduate research support, overseas studies programs, academic advising, and undergraduate scholarships and fellowships, as well as tutoring and learning skills support. The VPUE also serves as the primary conduit for faculty interested in furthering their interaction with undergraduates, developing innovative curriculum and pedagogy, and discovering ways in which working with undergraduates can enrich their own research agendas. We advocate for undergraduate education in collaboration with students, faculty, schools and departments across the university. All of our resources are dedicated to connecting students with Stanford, involving faculty with undergraduate education, and fully realizing a liberal education.

VPUE programs for first- and second-year students include New Student Orientation/Approaching Stanford, the Leland Scholars Program, Thinking Matters, Program in Writing and Rhetoric, Introductory Seminars, and Sophomore College. Programs for more advanced students include the Bing Overseas Studies Program, Writing in the Major, Undergraduate Research, Arts Intensive, and Bing Honors College. Undergraduate Advising, the Center for Teaching and Learning, the Hume Writing Center, and the speaking center serve undergraduates throughout their time at Stanford. The office of the VPUE works closely with the office of the vice provost for student affairs and the admissions office. The vice provost for undergraduate education reports to the provost.

Policies governing undergraduate education are formulated by Faculty Senate committees and voted into legislation by the Faculty Senate. The Committee on Undergraduate Standards and Policy (C-USP) addresses such topics as general education requirements, grading, awards, advising, and teaching evaluation. The Committee for the Review of Undergraduate Majors (C-RUM) oversees the initiation and review of undergraduate degree programs. Committee members include the vice provost for undergraduate education or his delegated staff (ex-officio) and representatives from the faculty at large, administration (such as the office of the university registrar), and students. The Associated Students of Stanford University (ASSU) nominations committee selects student members. The VPUE also maintains, by rule of the Faculty Senate, the Thinking Matters Governance Board and the Writing and Rhetoric Governance Board to oversee these university degree requirements. Finally, the Undergraduate Advisory Council (UGAC) was established by the provost in 1996 to serve as the main faculty advisory body for the vice provost for undergraduate education.

*Freeman-Thornton Vice Provost for Undergraduate Education:* Harry J. Elam, Jr.

Olive H. Palmer Professor in the Humanities

*Senior Associate Vice Provost for Undergraduate Education:* Martha Cyert  
Professor of Biology

*Associate Vice Provost for Undergraduate Education:* Sharon Palmer

*Director of Finance & Administration:* Scott Calvert

# Stanford Introductory Studies

## Stanford Introductory Studies

*Program Directors:* Marvin Diogenes, Ellen Woods

Offices: Sweet Hall

Email: stanfordintrostudies@stanford.edu

Web Site: <http://sis.stanford.edu>

Stanford Introductory Studies (SIS) offers courses taught by faculty from across the seven Schools of the University, and by SIS Lecturers. Some of these courses satisfy University Requirements (THINK, GER, and the Writing and Rhetoric Requirement) while others are electives especially designed for first- and second-year students including Introductory Seminars. Special residential programs such as Structured Liberal Education and September Studies (Leland Scholars, Sophomore College, Arts Intensive, and Bing Honors College) expand SIS curricular opportunities for students. The Hume Writing Center, which manages writing services such as tutorials and workshops for all students, is also part of SIS.

## Thinking Matters

*Faculty Director:* Russell A. Berman

*Director, Stanford Introductory Studies for Thinking Matters :* Ellen Woods

*Associate Director:* Parna Sengupta

*Affiliated Faculty:* Lanier Anderson (Philosophy), Russell Berman (Comparative Literature), Steven Block (Applied Physics), Chris Bobonich (Philosophy), Eavan Boland (English), Dominic Brookshaw (Comparative Literature), Scott Bukatman (Art and Art History), Steven Carter (Asian Languages), J.P. Daughton (History), Dan Edelstein (French and Italian), Russ Fernald (Biology), James Fishkin (Communication), Shelley Fisher Fishkin (English), Michael Friedman (Philosophy), Deborah Gordon (Biology), Robert Harrison (French and Italian), Allyson Hobbs (History), Ian Hodder (Archaeology and Anthropology), Susan Holmes (Statistics), Blair Hoxby (English), Caroline Hoxby (Economics), Pamela Karlan (School of Law), Rosemary Knight (Geophysics), Joshua Landy (French and Italian), Joseph Lipsick (School of Medicine), Henry Lowood (University Libraries, Science and Technology), David Magnus (School of Medicine), Hazel Markus (Psychology), Marsh H. McCall, Jr. (Classics), Paula Moya (English), Vijay Pande (Chemistry), Grant Parker (Classics), Jack Rakove (History), Rob Reich (Political Science), Eric Roberts (Computer Science), Orrin Robinson (German Studies), Gabriella Safran (Slavic Languages), Scott Sagan (Political Science), Richard Saller (Classics), Matthew Scott (School of Medicine), Nariman Skakov (Slavic Languages), Jan Skotheim (Biology), James Steyer (Center for Studies in Race and Ethnicity), Kenneth Taylor (Philosophy), Ravi Vakil (Mathematics), Ban Wang (East Asian Languages and Cultures), Allen Weiner (School of Law), Amir Weiner (History), Steven Weitzman (Religious Studies), Kären Wigen (History), Laura Wittman (French and Italian), Tobias Wolff (English), Lee Yearley (Religious Studies), Mark Zoback (Geophysics)

*Lecturers:* Ayca Alemdaroglu, Jessica Bardill, Jelena Batinic, Nicholas Bauch, Amos Bitzan, Tara Carter, John Chenoweth, Kathryn Ciancia,



Elizabeth Coggeshall, Melanie Conroy, John Corbally, Zenon Culverhouse, Matthew Daube, Julie Desjardins, Steffi Duttler, Dan Giberman, Jennifer Hart, Meiyu Hseih, Michael Hunter, Kiersten Jacobsen, Kevin Kim, Hania Köver, Sharon Luk, Nicole Martinez, Paul McMurdie, Lisa Nelis, Nate Olson, Inga Pierson, Anne Pollok, Katrinka Reinhardt, Tom Roberts, Jeff Schwegman, Patricia Slatin, Natalya Sukhonos, Kathleen Tierney, Matthew Walker, Terrance Wiley, Stacey Wirt, Gabriel Wolfenstein, Samantha Ying, Adam Zientek, Kari Zimmerman

Offices: Sweet Hall, Second Floor  
 Mail code: 3068  
 Phone: (650) 723-0944  
 Email: [thinkingmatters@stanford.edu](mailto:thinkingmatters@stanford.edu)  
 Web Site: <http://ual.stanford.edu/thinkingmatters>

Thinking Matters courses are listed under the subject code THINK on the Stanford Bulletin's ExploreCourses web site (<https://explorecourses.stanford.edu/search?view=catalog&catalog=71&page=0&q=THINK&filter-catalognumber-THINK=on&filter-coursestatus-Active=on>).

Thinking Matters offers courses that satisfy the one-quarter Freshman Requirement. Taught by faculty from a wide range of disciplines and fields, the *Thinking Matters* (THINK) requirement helps you develop the ability to ask rigorous and genuine questions that can lead to scientific experimentation or literary interpretation or social policy analysis. Through the study of these questions and problems, you will develop critical skills in interpretation, reasoning, and analysis as well as enhance your capacities for writing and discussion. The THINK requirement may be satisfied in three ways:

1. Thinking Matters courses:
  - a one quarter, 4-unit course taught by Academic Council faculty.
2. The Program in Structured Liberal Education
  - a three quarter, residence-based learning experience, which satisfies the THINK requirement, two of the University Writing and Rhetoric requirements and selected General Education Requirements. For information on the program, see the "Structured Liberal Education" section of this bulletin.
3. Education as Self-Fashioning courses
  - a one quarter, 7-unit course that satisfies both the Thinking Matters Requirement and the first-year Writing Requirement.

## Thinking Matters Courses Offered in 2012-13

- All Thinking Matters Courses Offered in 2012-13 (<http://explorecourses.stanford.edu/search?q=THINK&view=catalog&page=0&catalog=72&collapse=&filter-coursestatus-Active=on&filter-catalognumber-THINK=on>)
- Autumn Quarter (<http://explorecourses.stanford.edu/search?filter-term-Autumn=on&page=0&q=THINK&filter-coursestatus-Active=on&filter-catalognumber-THINK=on&view=catalog&catalog=72>) (click link to see Autumn course offerings)
- Winter Quarter (<http://explorecourses.stanford.edu/search?q=THINK&view=catalog&page=0&catalog=72&filter-term-Winter=on&collapse=&filter-coursestatus-Active=on&filter-catalognumber-THINK=on>) (click link to see Winter course offerings)
- Spring Quarter (<http://explorecourses.stanford.edu/search?q=THINK&view=catalog&page=0&catalog=72&filter-term-Spring=on&collapse=&filter-coursestatus-Active=on&filter-catalognumber-THINK=on>) (click link to see Spring course offerings)

## Structured Liberal Education

*Director:* Carolyn Lougee Chappell (History)

*Assistant Director:* Greg Watkins

*Lecturers:* Michael Bogucki, Yoon Sook Cha, Peter Mann, Jeremy Sabol, Nicole Stengel, Greg Watkins

Offices: Sweet Hall, Second Floor, and Florence Moore Hall  
 Mail Code: 94305-8581  
 Phone: (650) 723-0944  
 Email: [sle-program@stanford.edu](mailto:sle-program@stanford.edu)  
 Web Site: <http://sle.stanford.edu>

The Program in Structured Liberal Education (SLE) is a year-long residence-based great works course that satisfies several requirements at once: Thinking Matters, Writing and Rhetoric (both PWR1 and PWR2), and the Disciplinary Breadth GER in Humanities. The curriculum includes works of philosophy, literature, art, and music from the ancient world to the present. The program is interdisciplinary in approach; it emphasizes intellectual rigor and individualized contact between faculty and students.

SLE has two fundamental purposes: to develop a student's ability to ask effective questions of texts, teachers, the culture, and themselves; and to develop intellectual skills in critical reading, expository writing, logical reasoning, and group discussion. SLE encourages students to live a life of ideas in an atmosphere that stresses critical thinking and a tolerance for ambiguity. Neither the instructors nor the curriculum provides ready-made answers to the questions being dealt with; rather, SLE encourages a sense of intellectual challenge, student initiative, and originality.

The residence hall is the setting for lectures and small group discussions. SLE enhances the classroom experience with other educational activities, including a weekly film series, writing tutorials, occasional special events and field trips, and a student-produced play each quarter.

Freshmen interested in enrolling in SLE should indicate this preference for their Thinking Matters assignment. SLE is designed as a three quarter sequence, and students are expected to make a commitment for the entire year (8 units each quarter).

## SLE Courses Offered in 2012-13

		Units
SLE 91	Structured Liberal Education	8
SLE 92	Structured Liberal Education	8
SLE 93	Structured Liberal Education	8
SLE 299	Structured Liberal Education Capstone Seminar	1

## Program in Writing and Rhetoric (PWR)

*Faculty Director:* Nicholas Jenkins

*Director, Stanford Introductory Studies for PWR:* Marvin Diogenes

*Associate Director:* Zach Waggoner

*Lecturers:* Christine Alfano, Paul Bator, Shaleen Brawn, Russ Carpenter, Kevin DiPirro, Erik Ellis, Mark Feldman, Marissa Gemma, Chris Gerben, Wendy Goldberg, Patti Hanlon-Baker, Arturo Heredia, Donna Hunter, Chris Kamrath, John Lee, Sohui Lee, Kimberly Moekle, Gabrielle Moyer, Kelly Myers, Alyssa O'Brien, John Peterson, Sarah Pittock, Carolyn Ross, Kim Savelson, Susan Schuyler, Chandra Shekhar, Ruth Starkman, Jennifer Stonaker, Sigrid Streit, Rod Taylor, Andrew Todhunter, Susan Wyle

*Guest Lecturers:* Martin Shaw, Jonah Willihnganz

*Teaching Affiliates:* Jillian Hess (Aut), Becky Richardson (Aut), Vasile Stanescu (Aut), Whitney Trump (Aut), Ryan Zurowski (Win, Spr)

Offices: Sweet Hall, Third Floor

Mail Code: 94305-3069

Phone: (650) 723-2631

Email: [pwrcourses@stanford.edu](mailto:pwrcourses@stanford.edu)

Web Site: <http://pwrcourses.stanford.edu>

Courses offered by the Program in Writing and Rhetoric are listed under the subject code PWR on the Stanford Bulletin's ExploreCourses web site (<https://explorecourses.stanford.edu/search?q=PWR&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-coursestatus-Active=on&filter-catalogprint-Y=on&collapse=%2C16%2C&filter-catalognumber-PWR=on&filter-catalognumber-PWR=on>).

The Program in Writing and Rhetoric (PWR) designs and teaches courses that meet the Writing and Rhetoric requirement for undergraduates at Stanford as well as intermediate and advanced writing and rhetoric classes. For more information on the requirement, see the "Writing and Rhetoric Requirement ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Req.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Req.html))" page on the UAL website.

PWR courses engage students in rhetorical analysis of texts and research-based argument. Students in PWR courses learn and practice time-tested rhetorical principles to gain increasing control over the intellectual and stylistic elements of their writing; they learn to analyze the persuasive strategies of others and to apply those insights to their own writing.

Toward these ends, PWR 1 focuses on elements of academic argument: understanding a writer's stance; developing an argumentative thesis; discovering, developing, and deploying cogent proofs; making appropriate organizational and stylistic choices; and understanding the expectations of audiences. The course emphasizes research-based writing, including the effective use of primary and secondary sources and data based on fieldwork. Students enrolled in PWR 1 carry out significant research and use it as the basis for a persuasive research-based argument.

PWR 2 further develops students' skills in writing and oral presentation, emphasizing the ongoing development of content, organization, and style. The course addresses the dynamic interdependence of writing and speaking, as well as the importance of visual and multimedia elements in the effective presentation of research. Students enrolled in PWR 2 have opportunities to draft and revise written assignments and oral presentations as well as opportunities to present the results of scholarly inquiry, with an emphasis on how to work purposefully and well with a variety of presentation media.

As a general rule, students complete a minimum of three major assignments in both PWR 1 and 2. Written assignments vary from 5 to 15 pages in length, and students work intensively on revising each piece of writing. All assignments involve analyzing a range of texts as well as identifying, evaluating, and using multiple sources in support of research-based arguments. In-class work focuses on how to read with an increasingly critical eye, a range of generative writing and revision activities, and how to identify, evaluate, integrate, and cite sources effectively.

Writing and Rhetoric classes enroll no more than 15 students, and all classes are conducted as seminars in which participation is crucial. In-class activities include close reading of and responding to the writing of peers; these workshops are augmented by a minimum of three individual or small group conferences with the PWR instructor during the quarter.

## Courses

The Writing and Rhetoric requirement includes courses at three levels.

1. The first-level course, taken in the first year, can be satisfied by courses in PWR or Structured Liberal Education or by completion of the Education as Self-Fashioning course; the curriculum emphasizes analysis and research-based argument.

2. The second-level course, to be completed by the end of the sophomore year, is a writing and oral/multimedia presentation course taught by the Program in Writing and Rhetoric and by other programs and departments; courses taught outside of PWR may include experience in visual, oral, and/or multimodal communication.
3. The third-level course is a Writing in the Major (WIM) course taught in each major, providing students with systematic opportunities to develop skills for writing in their chosen fields. A list of certified WIM courses may be found in the table of "Undergraduate Major Unit Requirements (p. 32)" in section of this bulletin. WIM course descriptions may be found under individual department and program sections.

The sequence of required courses provides a coordinated approach responsive to how students mature as writers, researchers, and presenters during their undergraduate years. At each level, students develop greater sophistication in conducting inquiry and producing scholarly work in progressively more specific disciplinary contexts.

Before the term in which students enroll in the first two levels of the requirement, they review course descriptions on the PWR Courses and Registration ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html)) web site. After reviewing the offerings, students submit a list of top choices, and the PWR office assigns students to courses based on these preferences.

Students wishing to pursue advanced work in Writing and Rhetoric may enroll in electives offered by PWR. Topics vary; further information may be found in the PWR section of the Stanford Bulletin's ExploreCourses web site (<https://explorecourses.stanford.edu/search?q=PWR&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-coursestatus-Active=on&filter-catalogprint-Y=on&collapse=%2C16%2C&filter-catalognumber-PWR=on&filter-catalognumber-PWR=on>) or on the PWR advanced courses web page ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr)).

## Writing and Rhetoric 2 Requirement

The Writing and Rhetoric 2 requirement may be satisfied through completion of courses offered through PWR or by other programs and departments. In addition to PWR 2, some Introductory Seminars certified by the Writing and Rhetoric Governance Board satisfy the second-level Writing and Rhetoric requirement (Write-2). Courses offered as Introductory Seminars require an additional application form; see the Introductory Seminars ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_intro\\_seminars\\_IntroSemsCurrent.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_intro_seminars_IntroSemsCurrent.html)) web site.

## Hume Writing Center

Location: Building 460 (Margaret Jacks Hall), Room 20

Mail Code: 2085

Phone: (650) 723-0045

Email: [writingcenter@stanford.edu](mailto:writingcenter@stanford.edu)

Web Site: <http://hwc.stanford.edu>

The Hume Writing Center (HWC) works with all Stanford writers to help them develop rich and varied abilities in every aspect of writing and communication. In one-on-one sessions, HWC writing consultants help students get started on assignments; address and overcome writer's block; learn strategies for revising, editing, and proofreading; and understand academic conventions in their fields. The HWC emphasizes support for students' writing and multimedia compositions for PWR, Thinking Matters, and Introductory Seminars while also serving all Stanford undergraduates through individual and group tutorials, workshops, and seminars. The Center also works with students in Writing in the Major (WIM) courses and students writing Honors theses. Other events hosted by the Center include readings for Parents Weekend and Admit Weekend. For further details, see

the Hume Writing Center ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/hwc](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/hwc)) web site.

## PWR Pedagogy Program

PWR offers for all graduate students (TAs) from English, Modern Thought and Literature, and Comparative Literature who teach PWR courses as part of their graduate studies. Taught in the Autumn Quarter, the pedagogy seminar focuses on syllabus design, developing writing assignments, and responding to student writing. The history of rhetoric and writing supplies a theoretical foundation as well as practical lessons on how to teach writing and research most effectively. Elements of the pedagogy program include class visits; evaluation and revision of writing assignments; workshops and lectures; a library of teaching materials; and individual work with mentors and peers.

## Peer Writing Consultants

The Program in Writing and Rhetoric offers, for undergraduates chosen to serve as peer writing consultants in the Hume Writing Center and across the campus.

## PWR Courses Offered in 2012-13

- PWR 1 Courses (<http://explorecourses.stanford.edu/search?q=PWR+1&view=catalog&page=0&catalog=72&filter-ger-Writing1=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)
  - Autumn Quarter (<http://explorecourses.stanford.edu/search?q=PWR+1&view=catalog&page=0&catalog=72&filter-term-Autumn=on&filter-ger-Writing1=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)
  - Winter Quarter (<http://explorecourses.stanford.edu/search?q=PWR+1&view=catalog&page=0&catalog=72&filter-term-Winter=on&filter-ger-Writing1=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)
  - Spring Quarter (<http://explorecourses.stanford.edu/search?q=PWR+1&view=catalog&page=0&catalog=72&filter-term-Spring=on&filter-ger-Writing1=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)
- PWR 2 Courses (<http://explorecourses.stanford.edu/search?q=PWR+2&view=catalog&page=0&catalog=72&collapse=%2C5%2C&filter-coursestatus-Active=on>)
  - Autumn Quarter (<http://explorecourses.stanford.edu/search?q=PWR+2&view=catalog&page=0&catalog=72&filter-term-Autumn=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)
  - Winter Quarter (<http://explorecourses.stanford.edu/search?q=PWR+2&view=catalog&page=0&catalog=72&filter-term-Winter=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)
  - Spring Quarter (<http://explorecourses.stanford.edu/search?q=PWR+2&view=catalog&page=0&catalog=72&filter-term-Spring=on&collapse=%2C5%2C&filter-coursestatus-Active=on>)

## Advanced PWR Courses

Prerequisites: PWR 1 and PWR 2.

		Units
PWR 191	Advanced Writing	3
PWR 194	Topics in Writing and Rhetoric	4
PWR 5	Independent Writing	1-5
PWR 91	Intermediate Writing	3
PWR 91D	Intermediate Writing: Your American Life	3
PWR 91S	Intermediate Writing: Communicating Science	3

## Introductory Seminars

*Faculty Director:* Russell Berman, Comparative Literature and German Studies

*Director, Stanford Introductory Studies for Introductory Seminars:* Ellen Woods

*Associate Directors:* Joyce Moser, Lee West

Faculty: Over 200 faculty from more than 60 departments in all Schools of the University teach an SIS Introductory Seminar.

Offices: Sweet Hall, 229B, Second Floor

Mail Code: 3069

Phone: (650) 724-2405

Email: [introsems@stanford.edu](mailto:introsems@stanford.edu)

Web Site: <http://introsems.stanford.edu>

Introductory Seminars provide opportunities for first- and second-year students to work closely with their peers and faculty in a small group setting of up to 16 students per class. Together they engage in the study of topics of mutual interest related to the research and scholarship of the professor teaching the seminar. Introductory Seminars aim to intensify the intellectual experience of freshmen and sophomores by fostering faculty-student relationships in a spirit of mentorship. Seminars require little or no formal background and allow freshmen and sophomores to discover the joys of learning in a vast range of fields. Over 200 faculty from more than 60 departments take part in the program. The courses provide department credit toward graduation, and many count towards a major as well as fulfill General Education Requirements (GERs) including the second level Writing and Rhetoric Requirement (Write 2).

For a list of Introductory Seminars offered in 2012-13, see the online catalog and application site (<http://vcais.stanford.edu>). For information about applying and updates, see the Introductory Seminars (<http://introsems.stanford.edu>) web site for undergraduates. Since courses are offered through the departments, specific scheduling or requirement certifications should be checked via the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-component-IDS=on&filter-component-ISF=on&filter-component-ISS=on&collapse=%2C6%2C&filter-coursestatus-Active=on>).

Due dates for Introductory Seminar applications in 2012-13 are at 5 p.m. on:

- Autumn Quarter: September 4, 2012
- Winter Quarter: November 26, 2012
- Spring Quarter: March 4, 2013

## Introductory Seminars Courses Offered in 2012-13

- Freshman Introductory Seminars (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-component-ISF=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)
  - Autumn Quarter (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-term-Autumn=on&filter-component-ISF=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)
  - Winter Quarter (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-term-Winter=on&filter-component-ISF=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)
  - Spring Quarter (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-term-Spring=on&filter-component-ISF=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)

- Sophomore Introductory Seminars (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-component-IDS=on&filter-component-ISS=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)
- Autumn Quarter (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-term-Autumn=on&filter-component-IDS=on&filter-component-ISS=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)
- Winter Quarter (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-term-Winter=on&filter-component-IDS=on&filter-component-ISS=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)
- Spring Quarter (<http://explorecourses.stanford.edu/search?q=%25&view=catalog&page=0&catalog=72&filter-term-Spring=on&filter-component-IDS=on&filter-component-ISS=on&collapse=%2C6%2C&filter-coursestatus-Active=on>)

## September Studies

*Director:* Marvin Diogenes

September Studies at Stanford allows students to be on-campus for three weeks prior to the beginning of Autumn Quarter to work with faculty on a focused area of study or artistic practice. The programs facilitate mentoring relationships between faculty and students and create vibrant learning communities. Leland Scholars are incoming first year students; Sophomore College participants have completed their first year and are rising sophomores; Arts Intensive participants are sophomores, juniors and seniors; and Bing Honors College participants are seniors.

## Sophomore College

Offices: Sweet Hall, Third Floor  
Mail code: 3069  
Phone: (650) 724-4667  
Email: [sophcollege@stanford.edu](mailto:sophcollege@stanford.edu)  
Web Site: <http://soco.stanford.edu>

Sophomore College is characterized by an atmosphere of intense academic exploration, in which entering sophomores study intensively with Stanford faculty before the beginning of autumn quarter. Students immerse themselves in a focused area of study, creating an intellectual community with peers, upper-class course assistants, and faculty. Sophomore College also offers students an opportunity to explore the full range of Stanford's academic resources both in workshops and individually. Each seminar accepts 12-15 students, who live together in a Stanford residence and receive two units of academic credit. Courses are announced in March, with applications due in April. For more information or to apply, see the Sophomore College (<http://exploreddegrees.stanford.edu/undergraduateeducation/introductorystudies/http://soco.stanford.edu>) web site.

## Arts Intensive

Offices: Sweet Hall, Third Floor  
Mail code: 3069  
Phone: (650) 724-4667  
Email: [artsintensive@stanford.edu](mailto:artsintensive@stanford.edu)  
Web Site: <http://artsintensive.stanford.edu>

The Arts Intensive (AI) Program offers rising sophomores, juniors, and seniors the opportunity to study intensively with Stanford arts faculty and small groups of other Stanford students. The Arts Intensive program takes place over three weeks in September before the start of Autumn Quarter.

Arts Intensive courses engage students in the theory and practice of a particular artistic discipline. Courses often include field trips, workshops, film screenings, studio sessions, or other arts events in the afternoons,

evenings, and on weekends. Courses are taught by Stanford arts faculty and often include contributions from professional visiting artists. Arts Intensive students live together in a common Stanford residence during the program, making for a rich immersion into a creative community. This unique opportunity allows students to focus on their art practice without the constraints of other coursework. Enrollment is by application and takes place in Spring quarter for the upcoming September program. Each Arts Intensive course enrolls ten to 20 students and offers 2 units of academic credit. For more information or to apply, see the Arts Intensive web site.

## Leland Scholars Program

Offices: Sweet Hall, Third Floor  
Mail code: 3069  
Email: [lendscholars@stanford.edu](mailto:lendscholars@stanford.edu)  
Web Site: <http://lendscholars.stanford.edu>

In recognizing the need to prepare first year students for the academic, intellectual, social, and personal challenges they will face at Stanford, the Leland Scholars Program (LSP) facilitates the transition to college for incoming freshmen intending to study in the STEM (Science, Technology, Engineering, Math) or pre-health fields. Scholars will participate in a three-week residential program in the summer prior to arrival on campus. This fully-funded program has a carefully crafted schedule of activities, coursework, discussions, and trips designed to support the transition to Stanford. During the academic year, Leland Scholars will have access to additional advising and freshman seminars that sustain the community and reinforce the skills and strategies acquired during the program.

## Bing Honors College

Offices: Sweet Hall, Third Floor  
Mail code: 3069  
Phone: (650) 724-4667  
Email: [binghonorscollege@stanford.edu](mailto:binghonorscollege@stanford.edu)  
Web Site: Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html))

BHC was inaugurated in 1993 as part of the Bing Teaching Initiative, a series of curricular innovations designed to improve the quality of undergraduate education at Stanford. Begun as a pilot program, it has grown steadily and currently accommodates over 100 students. The College brings students who are writing honors theses to campus in September before the start of Autumn quarter for a program of intensive scholarship and writing, guided by faculty from participating departments and programs. By concentrating solely on the thesis for nearly three weeks, students begin their senior year with a commitment to independent scholarship in an atmosphere of shared intellectual purpose. The College provides room and board. It also sponsors cross-disciplinary forums, such as writing workshops and faculty-led methodology panels, as well as residential activities and a celebratory concluding event to honor students and their research advisers.

If you are a prospective honors student and interested in joining Bing Honors College, please contact your department to find out whether it is participating.

## Overseas Studies

### Bing Overseas Studies Program

The Bing Overseas Studies Program (BOSP) provides opportunities for Stanford students to broaden their undergraduate education through study in another country and immersion in its culture. Regular programs in Australia, Beijing, Berlin, Cape Town, Florence, Kyoto, Madrid, Moscow, Oxford, Paris, and Santiago offer courses in social and natural sciences, humanities, and engineering with full Stanford credit. Many courses

also count toward major requirements and/or fulfill General Education Requirements. Students may enroll for one or more quarters at most locations. Academic or paid internships are available at the Beijing, Berlin, Florence, Kyoto, Madrid, Moscow, Paris, and Santiago programs. Research opportunities are available in various formats at different centers. Service-learning and community-based research opportunities are available in Cape Town. Minimum academic and language prerequisites are specific to each program. See the BOSP (<http://exploreddegrees.stanford.edu/undergraduateeducation/overseasstudies/http://bosp.stanford.edu>) web site for information on these requirements.

While studying overseas through BOSP, students remain registered at Stanford and pay regular tuition, along with the overseas fee, which is based on Stanford room and board rates. Regular financial aid applies, and may be increased to cover additional costs. At most centers, students live in a homestay or with local students.

In addition to regular programs offered for enrolled Stanford students, the University is a member of two consortia: the Consortium for Advanced Studies in Barcelona and the Kyoto Consortium for Japanese Studies. Overseas Studies also offers a limited number of special programs including, in 2012-13, eight three-week faculty-led seminars in various locations overseas.

Overseas Studies, located on the ground floor of Sweet Hall, has full-time staff members and student advisors to assist in planning for overseas study. Course information, while accurate at the time of publication, is subject to change. See the BOSP (<http://exploreddegrees.stanford.edu/undergraduateeducation/overseasstudies/http://bosp.stanford.edu>) web site for updated information.

## Locations

Courses offered by the Overseas Studies Program are listed on the Stanford Bulletin's (<http://explorecourses.stanford.edu>) ExploreCourses (<http://explorecourses.stanford.edu>) web site under subject codes beginning with OSP. Each BOSP location has its own subject code. Those subject codes, by location, are:

- Australia [OSPAUSTL] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPAUSTL&filter-catalognumber-OSPAUSTL=on>)
- Barcelona (Consortium for Advanced Studies ) [OSPBARCL] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPBARCL&filter-catalognumber-OSPBARCL=on>)
- Beijing [OSPBEIJ] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPBEIJ&filter-catalognumber-OSPBEIJ=on>)
- Berlin [OSPBER] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPBER&filter-catalognumber-OSPBER=on>)
- Cape Town [OSPCPTWN] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPCPTWN&filter-catalognumber-OSPCPTWN=on>)
- Florence [OSPFLOR] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPFLOR&filter-catalognumber-OSPFLOR=on>)
- Kyoto [OSPKYOTO] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPKYOTO&filter-catalognumber-OSPKYOTO=on>)
- Kyoto Consortium for Japanese Studies [OSPKYOCT] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPKYOCT&filter-catalognumber-OSPKYOCT=on>)
- Madrid [OSPMADRD] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPMADRD&filter-catalognumber-OSPMADRD=on>)
- Moscow [OSPMOSC] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPMOSC&filter-catalognumber-OSPMOSC=on>)
- Oxford [OSPOXFRD] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPOXFRD&filter-catalognumber-OSPOXFRD=on>)
- Paris [OSPPARIS] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPPARIS&filter-catalognumber-OSPPARIS=on>)
- Santiago [OSPSANTG] (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPSANTG&filter-catalognumber-OSPSANTG=on>)

## Program Director

*Program Director:* Ramón Saldivar

## Stanford Program in Australia

*Director:* Peter Mumby, School of Biological Sciences, University of Queensland

*Faculty-in-Residence:* Kevin Arrigo

*Program Faculty:* Claire Baker, Murray Johnson, Catherine Lovelock, Brian McIntosh, Selina Ward

## Stanford Program in Beijing

*Director:* Yuan Tian

*Faculty-in-Residence:* Zhi-Xun Shen, Xiaoze Xie

*Program Faculty:* Li Chen, Dou Ding, Wenxiang Gong, Anshan Li, Bobai Li, Kun Li, Hua Qian, Liyan Qin, Hui Wang, Suolao Wang, Yan Wang, Pei Zhang, Li-an Zhou, Xiaoya Zhu

## Stanford Program in Berlin

*Director:* Karen Kramer

*Faculty-in-Residence:* Regina Casper, Paul DeMarinis, Orrin Robinson

*Program Faculty:* Brigid Barton, Maria Biege, Diana Boebe, Ulrich Brückner, Martin Jander, Wolf-Dietrich Junghanns, Ingo Klein, Sylvia Kloetzer, Matthias Pabsch, Cemile Tat, Sylke Tempel, Jochen Wohlfeil

## Stanford Program in Cape Town

*Director:* Timothy Stanton

*Faculty-in-Residence:* Chris Edwards, Robert Siegel

*Program Faculty:* Mohamed Adhikari, Diane Cooper, Stephan Klingebiel, Janice McMillan, John Parkington, Chris Saunders, Mary Simons, Nolubabalo Tyam

## Stanford Program in Florence

*Director:* Ermelinda Campani

*Faculty-in-Residence:* Pamela Karlan, Marc Levenston, Michael Marmor

*Program Faculty:* Elena Baracani, Stefano Cannicci, Pompeo Della Posta, Paolo Galluzzi, Pier Francesco Indelli, Anthony Molho, Lapo Pistelli, Fiorenza Quercioli, Filippo Rossi, Augusto Valeriani, Monica Toraldo di Francia, Timothy Verdon

## Stanford Program in Kyoto

*Director:* Andrew Horvat

*Program Faculty:* Terry Moe

*Program Faculty:* Naoko Asami, Peter Duus, Kiyoko Eguchi, Toshihiko Hayashi, Yuko Kawahara, Catherine Ludvik, Terry MacDougall, Sally McLaren, Yasue Numaguchi, Kiyoko Tanaka, Hiroko Tayama, Rie Tsujino, Haruka Ueda

## Stanford Program in Madrid

*Director:* Santiago Tejerina-Canal

*Faculty-in-Residence:* Jonathan Rodden

*Program Faculty:* Almudena Ariza Armada, Francisco Javier Bobillo de la Peña, Miguel Buñuel, María Teresa Cambor Portilla, Julia Doménech, Sylvia Hilton, Sheila Klaiber, Miguel Larrañaga Zulueta, Pablo de Lora del Toro, Antonio Muñoz, Laura Murcia, Miguel Requena, Oscar Sánchez Fuster, Isidro Yerba Prada

## Stanford Program in Moscow

*Director:* Alexander Abashkin

*Faculty-in-Residence:* Xueguang Zhou

*Program Faculty:* Maxim Bratersky, Irina Dezhina, Galina Filatova, Elizaveta Kurganova, Vladimir Mau, Sergei Medvedev, Angelina Sidyganova

## Stanford Program in Oxford

*Director:* Geoffrey Tyack

*Faculty-in-Residence:* Thomas Fingar, Shelley Goldman, Ray McDermott, Walter Powell

*Program Faculty:* Anna Beer, Giovanni Capoccia, James Forder, Alison Kahn, Helen Kidd, Robert McMahon, Amanda Palmer, Emma Plaskitt, Richard Rowley, Mohammad Talib

## Stanford Program in Paris

*Director:* Estelle Halévi

*Faculty-in-Residence:* Joan Ramon Resina, Eric Roberts, Stanley Rockson, Lauren Rusk

*Program Faculty:* Valentin Bellassen, Laurie Boussaguet, Emmanuel Dayan, Jean-Marie Fessler, Benedicte Gady, Brigitte Gallini, Sonia Gourevitch, Patrick Guédon, Choukri Hmed, Tiphaine Karsenti, Eloi

Laurent, Florence Leca, Jacques Le Cacheux, Benoit Leguet, Elizabeth Molkou, Jean-Pierre Morgand, Pauline Reychman, Marie-Christine Ricci, Sylvie Strudel, Fabrice Virgili, Oscar Villegas-Paez

## Stanford Program in Santiago

*Director:* Iván Jaksic

*Faculty-in-Residence:* Jean-Marie Apostolides, Rodolfo Dirzo, Hans Ulrich Gumbrecht

*Program Faculty:* Mabel Abad, César Albornoz, Andrés Bobbert, Juan Luis Celis, Germán Correa, Alexander Galetovic, Rolf Lüders, Sergio Missana, Alvaro Palma, Iván Poduje, Hernan Pons, Sharon Reid, Pablo Emilio Rivano, Gloria Toledo, Alberto van Klaveren

## Undergraduate Advising and Research

### Undergraduate Advising and Research

*Dean:* To Be Announced

Program Office: Sweet Hall, first floor

Phone: (650) 723-2426

Fax: (650) 725-1436

Web Site: <http://ual.stanford.edu>

Email: [advising@stanford.edu](mailto:advising@stanford.edu), [vpue-research@stanford.edu](mailto:vpue-research@stanford.edu)

Appointments: (650) 723-2426

Undergraduate Advising and Research introduces students to the full intellectual richness of undergraduate study at Stanford, supports students in their academic and intellectual pursuits, and seeks to instill within them a deep sense of identity within and belonging to our community of scholars at Stanford. This means different things for different students at different times, leading to an emphasis on extended one-on-one interactions between students and advisers. The substance of these interactions flows from the scholarship and teaching of the broad intellectual community at Stanford.

The UAR staff includes professional advisers in Sweet Hall, the Athletics Academic Resource Center, and in the undergraduate residences. Freshmen are assigned to academic advisers (faculty and academic staff) according to their preliminary academic interest and residence. The professional advisers in Sweet Hall, the Athletics Academic Resource Center, and the undergraduate residences complement the role of the assigned advisers with a comprehensive understanding of the curriculum; they advise students broadly on their courses of study and long-term goals. Some freshmen receive enhanced academic support through participation in Expanded Advising Programs (EAP).

UAR functions include:

- overseeing the transition of freshmen/transfers into the university
- assistance with curriculum planning
- consultation on choosing a major
- advice on integrating research into an undergraduate program of study
- support for students considering and applying for merit-based scholarships and national fellowships

- practical advice on how to prepare for and apply to graduate and professional schools
- academic and personal advising related to academic performance
- guidance on policies and procedures concerning academic standing
- assistance with interpretation and application of academic rules and regulations
- referrals to campus tutoring resources and counseling offices

## Scholarships and Fellowships, and Post-Baccalaureate Studies

Together with advisers at the Overseas Resource Center (<http://stanford.edu/dept/icenter/orc>) and the Haas Center for Public Service (<http://studentaffairs.stanford.edu/haas>), UAR advisers help prepare students to compete for merit scholarships and post-baccalaureate fellowships. UAR also administers campus nomination competitions for the Beinecke, Carnegie, Center for the Study of the Presidency, Jack Kent Cooke, Goldwater, Liebmann, Merage, Mellon Mays, Truman, and Udall scholarships. Binders containing applications of past years' winners are available for review on the first floor of Sweet Hall and in the offices of Academic Directors.

UAR offers workshops and individual consultations on planning for graduate or professional studies (education, law, medicine, business) and on how to write personal statements, how to solicit letters of recommendation, and how to prepare for interviews.

## Undergraduate Research

UAR sponsors and supports programs that encourage undergraduates to work individually with faculty on research, advanced scholarship, and creative projects. Programs are designed to serve students new to research and those with considerable research experience who are able to take on advanced, independent projects. See the Research Opportunities ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_research\\_opps\\_ResearchOpportunities.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_research_opps_ResearchOpportunities.html)) web site for more information.

## Student Grant Programs

UAR offers research grants to registered Stanford undergraduates. Grants support faculty-mentored research projects, and are typically used to pay for research/creative supplies, travel, and room and board/ Major Grant and Chappell Lougee Scholarship recipients may include a stipend within their budget if they are working full-time on their project over the Summer Quarter.

For the 2012-13 academic year, students have access to the following grant programs:

- Small Grants provide for student projects that explore a topic of interest or contribute to the development of future intellectual pursuits. They are often used for smaller projects, preliminary research, and follow-up expenses associated with larger projects.
- Major Grants support larger projects that normally span several quarters. Funded projects typically culminate in an honors thesis or some other substantial capstone product that demonstrates a focused and intellectually rigorous perspective on the topic of interest. Major grant proposals are subject to a review process that includes input from faculty in the relevant departments.
- The Chappell Lougee Scholarship supports sophomores who wish to undertake research in the humanities, creative arts, and qualitative social sciences. Students receive a grant for full-time research under the supervision of a faculty mentor. In addition, UAR provides guidance for students to transform their research into a creative performance, a capstone or honors project, or post-baccalaureate study.

- Angel Grants assist students in producing a finished public creative work such as an art exhibit, film, stage production, or concert.
- Conference Travel Grants support students who have been invited to present their research at a professional or scholarly conference. The grants fund travel expenses to and from the conference, and normal conference registration. Students demonstrating financial need may also include conference-associated food and lodging in their budget. Normally, Conference Travel Grants are intended to match funds made available by the faculty mentor or some other source.

For current deadlines and program details, see the Student Grants for Research and Creative Projects ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_research\\_opps\\_Grants.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_research_opps_Grants.html)) web site.

The application for any student grant consists of:

1. a student-authored project proposal, including a line-item budget
2. a letter of support written by a qualified member of the Stanford faculty

UAR may also consult student transcripts as well as outside faculty reviewers. Proposals are judged on intellectual significance, rigor and feasibility of project design, and evidence of student preparedness. The program is competitive, and not all good proposals can be funded.

UAR provides advising support for students considering a research grant, including proposal writing and project design consultation and advice on administrative policies. Students can view sample proposals at the UAR office. For more information, see the Student Grants for Research and Creative Projects ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_research\\_opps\\_Grants.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_research_opps_Grants.html)) web site.

## Departmental and Faculty Sponsored Research Opportunities

Departments, interdisciplinary programs, and Stanford research centers use VPUE Departmental Grants for Undergraduate Research to support programs that provide undergraduates with mentorship and training in scholarship and research. Typically, departments pair students with a faculty member or faculty-led research group according to their mutual scholarly interests. Students conduct substantive, directed research on a particular aspect of the faculty member's research project, and they meet frequently with their faculty mentors to discuss progress and future directions for the project. For more information and the Request for Proposals, see Faculty Grants on the Undergraduate Research (<http://exploreddegrees.stanford.edu/undergraduateeducation/uar/http://vpuefacultygrants.stanford.edu>) web site. Students should consult directly with the departments and programs of interest to learn about these opportunities.

Similarly, individual faculty members may use VPUE Faculty Grants for Undergraduate Research. Faculty grants provide funding for undergraduates to work closely with faculty on a directed research project. Students gain valuable experience with the methods of inquiry and analysis in their chosen discipline, and are able to subsequently leverage this experience in pursuit of more independent projects or theses. For more information and the Request for Proposals, see Faculty Grants on the Undergraduate Research (<http://exploreddegrees.stanford.edu/undergraduateeducation/uar/http://vpuefacultygrants.stanford.edu>) web site.

# Center for Teaching and Learning

## Center for Teaching and Learning

The Center for Teaching and Learning is a University-wide resource on effective teaching and public speaking for faculty, lecturers, and teaching assistants, on public speaking for undergraduate and graduate students, and on effective learning for undergraduates. All courses listed with CTL promote acquisition of public speaking skills, enhanced learning skills, and/or teaching excellence. Courses offered by the Center for Teaching and Learning are listed under the subject code CTL on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CTL&filter-catalognumber-CTL=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CTL&filter-catalognumber-CTL=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CTL&filter-catalognumber-CTL=on>).

## CTL Services to Faculty, Lecturers, and Teaching Assistants

CTL provides the Stanford community with services and resources on effective teaching. The center's goals are to:

- engender and disseminate knowledge and understanding of the newest research on student learning
- network and support instructors seeking to share ideas and community around teaching
- stimulate faculty involvement in the scholarship of teaching and learning
- identify and involve successful faculty, lecturers, and TAs who are willing to share their talents with others
- provide those who are seeking to improve their teaching with the means to do so
- acquaint the Stanford community with important innovations and new technologies for teaching
- prepare new faculty and TAs for their responsibilities
- contribute to the professional development of teaching assistants
- expand awareness of the role of teaching at research universities
- increase the rewards for superior teaching.

CTL is also available to help departments/programs in the design of effective TA training programs.

Resources available to faculty, lecturers, and TAs include: videotaping, microteaching (simulated practice teaching), and consultation; small group and other forms of mid-quarter evaluation; workshops and lectures; a handbook on teaching and a library of teaching materials; quarterly teaching orientations; and work with individuals, groups, and departments on their specific needs. For further details, see the CTL (<http://ctl.stanford.edu>) web site.

For questions or requests, email [TeachingCenter@stanford.edu](mailto:TeachingCenter@stanford.edu).

## Oral Communication Program

The Oral Communication Program at CTL provides opportunities for undergraduates and graduate students to develop or improve their oral communication skills.

Courses and workshops offer a comprehensive approach to speech communication, including training in the fundamental principles of public speaking and the effective delivery of oral presentations. The goal is to enhance students' general facility and confidence in oral expression. The program also provides innovative, discipline-based instruction to help students refine their personal speaking styles in small groups and classroom settings.

Those interested in individualized instruction or independent study are invited to make an appointment to use the program's Speaking Center in Meyer Library, room 123, where trained student tutors, multimedia, and instructional resource materials are available on an ongoing basis.

Students with a passion for public speaking are encouraged to apply to become oral communication tutors; the application process takes place each January.

To schedule appointments, see the Oral Communication Program (<http://ctl.stanford.edu/speaking/oralcomm.html>) web site. For further details, call (650) 725-4149 or 725-7667 or email [speakinghelp@stanford.edu](mailto:speakinghelp@stanford.edu)

## CTL Services to Undergraduates

CTL provides academic coaching for undergraduates who want to enhance their study approaches and clarify their learning strategies. Through courses, individual counseling, and workshops, CTL helps students build skills that are the foundation for continuous improvement and lifelong learning. Students benefit from developing and applying individually crafted strategies that build on their existing strengths. Time management, test preparation, note taking, reading comprehension and retention, and procrastination are common topics for discussion. Contact [adinag@stanford.edu](mailto:adinag@stanford.edu) for more information.

Free tutoring is available to undergraduates in many subjects; see the Tutoring and Academic Support ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/ARS\\_](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/ARS_)) web site for details on where and when tutors can be found. Students with strong academic records, especially in the subject areas that they would like to tutor, may apply and, if accepted, are expected to take CTL's course on tutoring; the application process takes place each February.

*Associate Vice Provost for Undergraduate Education and Director:* Michele Marinovich

*Senior Associate Director for Science and Engineering:* Robyn Wright Dunbar

*Associate Director for Academic Support:* Adina Glickman

*Associate Director for Humanities:* Mariatte Denman

*Associate Director for Social Sciences and Technology:* Marcelo Clerici-Arias

*Associate Director for Teaching and Technology:* Amy Collier

*Assistant Director for Tutoring and Teaching Programs:* Tim Randazzo

*Oral Communication Program Director and Senior Lecturer:* Doree Allen

*Oral Communication Specialist and Tutor Manager:* Lindsey Yeager

*Lecturers:* Thomas Freeland, James Wagstaffe



# ROTC

## Reserve Officers' Training Corps (ROTC)

### Cross-Enrollment Agreements for ROTC

Stanford has cross-enrollment agreements for the Reserve Officers' Training Corps (ROTC) with the Navy and Marine Corps ROTC program at the University of California at Berkeley, the Army ROTC program at Santa Clara University, and the Air Force ROTC program at San Jose State University. These agreements allow Stanford students to engage in military training while working on their degrees from Stanford. Courses taken in ROTC programs are offered by and through UC Berkeley, Santa Clara, and San Jose State. Most courses count for academic or activity credit and count toward the 12-unit requirement for full-time registration status and satisfactory academic progress requirements for Stanford undergraduates.

Normally, students who participate in ROTC training complete a four-year course of instruction at the respective institution that consists of two years of basic courses during the freshmen and sophomore years, and an advanced course of instruction during the junior and senior years. Students who accept ROTC scholarships are generally subject to a service obligation, depending on the regulations of the particular service.

Stanford students who are enrolled in ROTC programs under the cross-enrollment agreements are eligible to compete for various scholarships that provide up to full tuition and a monthly stipend. Students normally compete for national scholarships as high school seniors, although current Stanford students may be eligible to enroll in ROTC on a non-scholarship basis. Non-scholarship ROTC students are eligible to compete for scholarships, and individual services may offer additional scholarship programs to current qualifying undergraduate and graduate students. Interested students should contact the appropriate military branch at the host institution to obtain information on these programs and to initiate application procedures.

Students who satisfactorily complete an ROTC program and are awarded a Stanford degree qualify for a commission as a Second Lieutenant in the U.S. Army, an Ensign in the U.S. Navy, a Second Lieutenant in the U.S. Marines, or a Second Lieutenant in the U.S. Air Force.

For additional questions concerning the ROTC programs, Stanford students should consult with one of the host units.

### Academic Credit

All three service programs have a mandatory lab course each quarter which carries 1 unit of activity credit for satisfactory completion of work. Although there is no limitation on the number of activity classes in which a student may enroll, no more than 8 units of these activity classes (and/or other university activity classes) may be applied toward undergraduate graduation requirements (see the Undergraduate Degrees (p. 28) section of this bulletin).

Upper level ROTC academic courses carry two units of credit for satisfactory completion of work and are graded on a credit/no credit basis. No more than 36 units without a letter grade may be applied toward undergraduate graduation requirements (see the Undergraduate Degrees (p. 28) section of this bulletin).

### Air Force ROTC

*Commanding Officer:* Lieutenant Colonel Donald McFtridge

Air Force ROTC courses are offered at San Jose State University. See also the SJSU website (<http://info.sjsu.edu/web-dbgen/catalog/departments/AS.html>).

Courses in the freshman year focus on the foundation of the United States Air Force and introduce students to the Air Force and AFROTC. Topics include the characteristics, missions, and organization of the Air Force, the qualities of an officer and professionalism, career opportunities, military customs and courtesies, and communication skills.

Courses in the sophomore year focus on the evolution of the United States air and space power. Students study air and space power through historical analysis and examine the capabilities, function, and doctrinal employment of aerospace forces. The course emphasizes oral and written communication skills.

Courses in the junior year focus on Air Force leadership studies. Topics include leadership, management fundamentals, professional knowledge, Air Force personnel system, ethics, and communications. Students apply knowledge and skills required of junior Air Force officers through case studies, practical exercises, and seminar discussion.

Senior year courses cover two subjects, national security affairs and preparation for active duty. Students learn about national security process, international and regional relations, advanced leadership ethics, Air Force doctrine with focus on the military as a profession, military justice, civilian control of the military, and current issues affecting the military. Preparation for active duty focuses on the role of the Air Force officer in contemporary society emphasizing skills to facilitate a smooth transition from civilian to military life.

The leadership laboratory is required for all students every quarter. Students participate in hands-on exercises to learn drill and ceremony; Air Force customs and courtesies; leadership and followership skills; and they hear from guest speakers on a variety of Air Force topics.

### Army ROTC

*Commanding Officer:* Lieutenant Colonel John Tao

Some Army ROTC courses are offered at Santa Clara University and some are offered on Stanford's campus. See also the Army ROTC web site (<http://www.scu.edu/rotc>).

Freshman year courses introduce students to leadership and personal development and provide foundations for leadership. Course topics include personal challenges and competencies for effective leadership, goal setting, time management, physical fitness, and stress management related to leadership and officership. Students develop a personal fitness program under the guidance of an Army master fitness trainer. In addition, they learn leadership fundamentals such as setting direction, problem solving, listening, presenting briefs, providing feedback, and effective writing skills in the context of practical and interactive exercises.

Army courses taught in the sophomore year look at leadership through a variety of lenses using case study and interactive exercises. Topics include creative and innovative leadership strategies and styles, challenges of leading in contemporary operational environments along with crosscultural challenges, and team leading procedures.

In the junior year, students learn adaptive team leadership and situational leadership. They develop skills including decision making, persuading, and motivating team members when under fire in small-unit tactical operations scenarios.

Courses for seniors provide capstone leadership instruction and experiences in a practical and current event driven context. Students plan, execute, and assess complex operations, function as a member of staff, and provide leadership performance feedback to subordinates. They use case studies, scenarios, and exercises to prepare for their first unit assignment and the transition to commissioned officer in a modern world.

All students are also required to take a military history course focused on leadership. This course may be taken any year. The leadership laboratory is required for all students every quarter. In addition, students complete a four-day weekend field training exercise away from the University in the Autumn and Spring quarters, and a formal military dinner during an evening in the Winter Quarter.

## Naval ROTC

*Executive Officer:* Lieutenant Colonel Harold Eggers

Naval ROTC courses are offered at the University of California at Berkeley. See also the Naval ROTC web site.

Courses in the freshman year introduce students to the Navy and Marine Corps and to the NROTC program. They also study sea power from a historical and United States centered perspective.

In the sophomore year, students take their first leadership class with a focus on management and their first navigation class with a focus on the fundamentals of nautical navigation. Courses include case studies, student presentations, and practical exercises.

Juniors study introductory naval engineering with a focus on ship systems and modern weapons systems. Example topics include gas turbine propulsion systems, nuclear reactors, and radar and sonar theory.

During their senior year, students study advanced leadership topics within an ethics framework and advanced navigation and naval operations.

Students pursuing a commission in the Marine Corps do not take the two engineering courses or the two navigation courses. Marine option students take two Marine Corps specific courses that examine the history of littoral warfare and the evolution of warfare.

All students are required to take the weekly professional development laboratory course (drill) at UC Berkeley every quarter.

# Graduate Education

The Vice Provost for Graduate Education (VPGE) plays a leadership role in initiating and managing policies and programs that enhance the quality of graduate education for master's, doctoral, and professional students across Stanford's seven schools. VPGE fosters academic innovation and supports the schools and programs that have primary responsibility for organizing and delivering graduate education. In addition to providing University-wide graduate policy direction, the VPGE office has four primary areas of program activity: administering University-wide graduate fellowship programs; advancing graduate student diversity; promoting cross-school educational opportunities (interdisciplinary learning and graduate professional development); and encouraging innovation in graduate programs. The Vice Provost for Graduate Education reports to the Provost.

## Graduate Policy

The Faculty Senate Committee on Graduate Studies (C-GS) formulates policy concerning the substance and process of graduate education as well as the evaluation and recording of graduate achievement, and reviews the implementation of such policy. The committee also monitors the academic quality and effectiveness of the University's graduate interdisciplinary and joint degree granting programs. Committee members include the Vice Provost for Graduate Education or her delegated staff (ex officio) and representatives from the faculty at large, administration such as the Office of the University Registrar, and students. The Graduate Student Council and the Nominations Committee of the Associated Students of Stanford University (ASSU) choose student members.

VPGE recommends, promulgates, and interprets University policies related to graduate education. VPGE oversees administrative and financial systems related to graduate student support, including policies related to requirements for research and teaching assistantships, and minimum compensation levels for those positions. For other policies related to graduate admissions and degree requirements, see relevant sections of this bulletin.

## Honor Code and Fundamental Standard

The Honor Code and Fundamental Standard establish the conditions for academic work at Stanford and represent an agreement between students and faculty about their responsibilities for learning and teaching. The Interpretations and applications of the Honor Code, the Student Judicial Charter of 1997, the Student Conduct Penalty Code, statistics, and other documents related to Judicial Affairs are available at the Judicial Affairs (<http://exploreddegrees.stanford.edu/graduateeducation/http://judicialaffairs.stanford.edu>) web site.

## Research Policies for Graduate Students

Graduate education and research are interrelated enterprises. Many Stanford graduate students conduct research under the guidance and sponsorship of Stanford faculty members. The Dean of Research has primary responsibility for oversight of the research enterprise. Several policies in that arena are particularly relevant to graduate students. These include:

### Academic Authorship

Guidelines related to academic authorship, such as the allocation of responsibility and credit for scholarly publications. For complete text of the guidelines, see Research Policy Handbook memo 2.8, On Academic Authorship (<http://rph.stanford.edu/2-8>).

## Intellectual Property

Policies on copyrights and patents resulting from University work. Graduate students and postdoctoral scholars, as well as all faculty, staff, and visitors engaged in research, must sign the Stanford University Patent and Copyright Agreement. For complete text of the currently applicable versions of these policies, see Research Policy Handbook chapter 5, Intellectual Property (<http://rph.stanford.edu/Chpt5>).

## Openness in Research

Policy on openness in research, such as the principle of freedom of access by all interested persons to the underlying data, processes, and final results of research. Stanford University does not accept funding for research projects that require secrecy. For complete text of the currently applicable version of this policy, see Research Policy Handbook memo 2.6, Openness in Research (<http://rph.stanford.edu/2-6>).

## Relationships between Students and Outside Organizations

Summary of policies on the establishment of relationships between students and outside entities, such as private companies or nonprofit organizations, as part of or outside the student's academic program at Stanford. This covers open versus proprietary nature of the work, ownership of intellectual property, and possible conflicts of commitment and interest. For complete text of the currently applicable versions of these policies, see Research Policy Handbook memo 2.11, Relationships Between Students (Including Postdoctoral Scholars) and Outside Entities (<http://rph.stanford.edu/2-11>).

## Research Compliance

Several administrative panels review and approve research projects to safeguard the rights and welfare of all human research subjects, ensure the humane care and use of laboratory animals, and protect the safety of personnel and the general public in the areas of biosafety and radiological safety. For more information, contact the Research Compliance Office (<http://exploreddegrees.stanford.edu/graduateeducation/http://researchcompliance.stanford.edu>).

## Research Misconduct

Policy on allegations, investigations, and reporting of research misconduct. Each member of the University community has a responsibility to foster an environment which promotes intellectual honesty and integrity, and which does not tolerate misconduct in any aspect of research or scholarly endeavor. For complete text of the currently applicable version of this policy, see Research Policy Handbook memo 2.5, Research Misconduct: Policy on Allegations, Investigations and Reporting (<http://rph.stanford.edu/2-5>).

## Graduate Fellowship Programs

Several University-wide graduate fellowship programs are administered by the VPGE, including the Stanford Graduate Fellowships Program in Science and Engineering (SGF) and the Stanford Interdisciplinary Graduate Fellowship (SIGF) program. VPGE also administers several smaller University-wide fellowships programs to new and continuing doctoral students that require nomination by faculty or deans.

## Stanford Graduate Fellowships Program in Science and Engineering (SGF)

Web site: <http://sgf.stanford.edu>

SGF competitively awards approximately 100 two- and three-year fellowships providing tuition support and stipend to outstanding students pursuing a doctoral degree in the sciences and engineering. SGF fellows can explore labs in a variety of fields. Nominations for SGF fellowships are submitted by science and engineering departments and programs.

## Stanford Interdisciplinary Graduate Fellowships (SIGF)

Web Site: <http://sigf.stanford.edu>

The SIGF program awards fellowships on a competitive basis to doctoral students engaged in interdisciplinary research. The fellowships enable Stanford doctoral students to pursue questions that cross traditional disciplinary boundaries. Students in the first three years of their doctoral program are eligible to apply.

## Graduate Student Diversity

VPGE works to diversify the graduate student population by supporting recruitment and retention programs in collaboration with faculty and staff in each of the schools. VPGE funds recruitment activities to expand the pool of qualified applicants, such as visits to campus and travel grants. VPGE offers resources to groups within and across schools for activities that enhance the quality of students' educational experiences and improve retention. VPGE also works collaboratively to develop programs that cultivate interest in academic careers and diversify the pipeline for future faculty. The DARE Doctoral Fellowship Program, administered by VPGE, awards two-year fellowships on a competitive basis to Stanford doctoral students in their final two years who want to investigate and prepare for academic careers and whose presence will help to diversify the professoriate.

## Cross-School Learning Opportunities

VPGE provides seed funding to initiatives that foster cross-school interactions for graduate students. The Stanford Graduate Summer Institute (SGSI) offers noncredit interdisciplinary short courses exclusively for Stanford graduate students and postdoctoral scholars. VPGE also seeks to facilitate enrollment in courses outside of students' home departments and schools.

Leadership, pedagogy, communication, working in teams, career development and entrepreneurship are topics of interest to graduate students across the University. VPGE collaborates with other departments, such as the Center for Teaching and Learning, the Graduate Life Office, and the Hume Writing Center to raise the visibility and expand the breadth of offerings to help graduate students' professional development.

## Stanford Graduate Summer Institute (SGSI)

Web site: <http://sgsi.stanford.edu>

SGSI courses introduce graduate students to multidisciplinary and interdisciplinary thinking. Students from across the University have the opportunity to meet others outside their fields, create networks, and foster cross-disciplinary collaborations. Most SGSI courses are small and taught in an intensive workshop format at the end of Summer Quarter. Courses are non-credit bearing and free of tuition or fees.

## Innovation in Graduate Programs

Academic departments and programs are the foundation of graduate education, so VPGE supports innovation in degree-granting programs. VPGE awards funds to faculty members for program innovation with SCORE Innovation funds (<http://vpge.stanford.edu/programs/score.html>); these help faculty and graduate students to scrutinize long-existing practices and test new approaches for graduate education. Student Projects for Intellectual Community Enhancement (SPICE) funds (<http://vpge.stanford.edu/programs/spice.html>) support graduate students (master's, doctoral, or professional) to develop activities to expand the intellectual community and enhance the academic life of their department or program.

*Vice Provost for Graduate Education:* Patricia J. Gumport

*Associate Vice Provosts for Graduate Education:* John Boothroyd, Chris M. Golde, Sheri D. Sheppard

*Assistant Dean for Research and Graduate Policy:* Ann George

*Director of Fellowships and Programs:* Pat Cook

*Associate Director, Programs and Administration:* Rebecca Jantzen

# Graduate School of Business

The mission of the Stanford Graduate School of Business is to create ideas that deepen and advance the understanding of management, and with these ideas, develop innovative, principled, and insightful leaders who change the world.

The two-year Master of Business Administration (M.B.A.) degree program prepares change agents to make a meaningful impact in the world through leadership of business, government, and social-sector organizations. The general management curriculum rests on a foundation of social science principles and management functions, tailored to each student's background and aspirations. Interdisciplinary themes of critical, analytical thinking, creativity and innovation, and personal leadership development differentiate the Stanford M.B.A. experience. Each M.B.A. student undertakes a global experience to provide direct exposure to the world's opportunities. Stanford students can combine the M.B.A. with degrees in the schools of education (A.M.), law (J.D.), and medicine (M.D.), as well as interdisciplinary degrees in public policy (M.P.P.) and environment and resources (M.S.). The primary criteria for admission are intellectual vitality, demonstrated leadership potential, and personal qualities and contributions. No specific undergraduate major or courses are required for admission, but experience with analytic and quantitative concepts is important. Almost all students obtain one or more years of work experience before entering, but a few students enroll directly following undergraduate study.

The Stanford Advanced Masters Program is an intensive, one-year course of study for middle-management executives leading to the degree of Master of Science in management. Participants generally have eight or more years of work experience, with at least five years of management experience. Some students are sponsored by their company, but most are self-sponsored.

Those interested in college teaching and research in management disciplines are served by the Doctor of Philosophy program.

For detailed information on programs, curricula, and faculty, see the School's (<http://exploreddegrees.stanford.edu/graduateschoolofbusiness/> <http://gsb.stanford.edu>) web site.

*Emeriti: (Professors)* David P. Baron, William H. Beaver, Charles P. Bonini, Paul Brest,\*\* Alain C. Enthoven, Robert J. Flanagan, J. Michael Harrison, Charles A. Holloway,\* James E. Howell, Robert K. Jaedicke, Robert L. Joss,\* David M. Kennedy,\*\* Don Kennedy,\*\* James G. March, Joanne Martin, Arjay Miller, James R. Miller III, William F. Miller, David B. Montgomery, George G. C. Parker,\* Jerry I. Porras, Evan L. Porteus, Michael L. Ray, D. John Roberts, Channing R. Robertson,\*\* Henry S. Rowen, Myron S. Scholes,\* William F. Sharpe, James J. Sheehan,\*\* George P. Shultz, A. Michael Spence,\* Venkataraman Srinivasan, James C. Van Horne, Robert B. Wilson\*;  
(Associate Professor) Andrea Shepard;  
(Senior Lecturers) David L. Bradford,\* Steven Brandt, Kirk O. Hanson;  
(Lecturer)

*Dean:* Garth Saloner

*Senior Associate Deans:* Peter M. DeMarzo, Larissa Z. Tiedens, Madhav Rajan

*Associate Deans:* Gale H. Bitter, Rajkumar Chellaraj, Ranga Jayaraman, Claudia J. Morgan, Blair Shane

*Assistant Deans:* Derrick Bolton, Pulin Sanghvi, Priya Singh, Robert Urstein

*Professors:* Jennifer L. Aaker, Anat R. Admati, Susan Athey,+ William P. Barnett, Mary E. Barth, Jonathan Bendor, Lanier Benkard, Jonathan B. Berk, David W. Brady, Jeremy I. Bulow, Robert A. Burgelman, Glenn R. Carroll, Peter M. DeMarzo, J. Darrell Duffie, Yossi Feinberg, Francis J. Flynn, George Foster, Steven R. Grenadier, Deborah H. Gruenfeld, Michael

T. Hannan, Chip Heath, Guido Imbens, Charles I. Jones, Ron Kasznik, Daniel P. Kessler, Roderick M. Kramer, Keith Krehbiel, Ilan Kremer, David M. Kreps, David F. Larcker, James M. Lattin, Edward P. Lazear, Charles M.C. Lee, Hau L. Lee, Brian S. Lowery, John G. McDonald, Maureen F. McNichols, Haim Mendelson, Dale T. Miller, Benoit Monin, Margaret A. Neale, Charles A. O'Reilly III, Paul Oyer, James M. Patell, Jeffrey Pfeffer, Paul C. Pfleiderer, Erica L. Plambeck, Madhav Rajan, Hayagreeva Rao, Joshua Rauh, Stefan J. Reichelstein, Peter C. Reiss, Condoleezza Rice, Garth Saloner, Kathryn L. Shaw, Baba Shiv, Kenneth W. Shotts, Itamar Simonson, Kenneth J. Singleton, Andrzej Skrzypacz, Jesper Sørensen, Sarah A. Soule, Larissa Z. Tiedens, Lawrence W. Wein, Seungjin Whang, S. Christian Wheeler, Stefanos Zenios, Jeffrey H. Zwiebel

*Associate Professors:* Anne Beyer, Steven Callander, Wesley Hartmann, Dirk Jenter, Uzma Khan, Arthur G. Korteweg, Jonathan Levav, Neil Malhotra, Ian Martin, Elizabeth Mullen, Stefan Nagel, Harikesh S. Nair, Sridhar Narayanan, Michael Ostrovsky, Joseph D. Piotroski, Ilya A. Strebulaev, Robert P. Swinney, Zakary L. Tormala

*Assistant Professors:* Mohsen Bayati, Shai B. Bernstein, John L. Beshears, Konstantinos Bimpikis, Jules H. van Binsbergen, Elizabeth Blankespoor, T. Renee Bowen, Bradyn Breon-Drish, Katherine Casey, John-Paul Ferguson, Pedro Gardete, Amir Goldberg, Ilan Guttman, Sharique Hasan, John W. Hatfield, Dan A. Iancu, Joy Ishii, Saumitra Jha, Peter Koudijs, Nicholas S. Lambert, Kristin Laurin, Ivan Marinovic, Francisco Pérez-González, Mar Reguant-Rido, Navdeep Sahni, Stephan Seiler, Takuo Sugaya, Monic J. Sun, Ali Yurukoglu

*Professor (Teaching):* James A. Phills, Jr.

*Acting Assistant Professors:* Nir Halevy, David J. Hardisty

*Courtesy Professors:* Michele Barry, Eric P. Bettinger, Nicholas Bloom, Timothy F. Bresnahan, M. Kate Bundorf, Geoffrey L. Cohen, Robert M. Daines, Joseph Grunfest, Warren H. Hausman, Ronald A. Howard, Carolyn M. Hoxby, Mark G. Kelman, Jonathan D. Levin, Daniel A. McFarland, Debra E. Meyerson, Paul R. Milgrom, Walter W. Powell, Ilya Segal, Mitchell L. Stevens, Robert I. Sutton, Robb Willer, Paul Yock, Amy B. Zegart

*Lecturers:* Douglas Abbey, Matthew Abrahams, Laura K. Arrillaga-Andressen, Rick Aubry, Matthew Bannick, Sven Beiker, Kirk D. Bowman, Scott Bristol, Anne Casscells, Safra A. Catz, Jeffrey Chambers, Patricia Chang, Robert B. Chess, Michael Child, Stephen J. Ciesinski, Daniel Cooperman, Ryan Craig, Henri-Claude De Bettignies, David Demarest, Gary Dexter, David M. Dodson, Nicholas Donatiello, R. James Ellis, Nir Eyal, Richard P. Francisco, Prashant Fuloria, John Glynn, Jacob Goldfield, Andrew S. Grove, William Guttentag, Keith Hennessey, Mary Ann Huckabay, John Hurley, Franklin P. Johnson, Jr., Efrat Kasznik, Peter B. Kelly, Dan Klein, Stuart L. Klein, Mary Lang, Christopher Lehane, Mark Leslie, Peter Levine, Nori Lietz, Richard Lin, Leo E. Linbeck III, Ann Livermore, David Lockwood, Kevin Mak, Michael Marks, Karen Matthys, Kelly McGonigal, William L. McLennan, William F. Meehan III, Stephen Mellas, Pamela Miracle, John P. Morgridge, Mark Nagel, Jill G. Parker, Robert Pearl, John Powers, Andrew Rachleff, Theresia Ranzetta, Marci Reichelstein, Dan Reicher, Carole Robin, Dennis M. Rohan, Matthew Rothe, JD Schramm, Robert Seigel, Russell Siegelman, F. Victor Stanton, Phillip Stenberg, Mark A. Stevens, Kevin Taweel, Robert Urstein, Kevin Warsh, Jay Watkins, John G. Watson, Jane Wei-Skillern, Peter C. Wendell, Peter Ziebelman

*Consulting Professors:* Anthony S. Bryk, H. Irving Grousbeck, Joel C. Peterson, Mark A. Wolfson

*Visiting Professors:* Gregory Dees, John Van Reenen

\* Recalled to active duty. \*\* Emeritus Professor from another SU department recalled to active duty.

+ Appointment starts on 4/1/2013.

# School of Earth Sciences

Courses offered by the School of Earth Sciences are listed under the subject code EARTHSCI on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EARTHSCI&filter-catalognumber-EARTHSCI=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EARTHSCI&filter-catalognumber-EARTHSCI=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EARTHSCI&filter-catalognumber-EARTHSCI=on>). Courses offered by departments and programs of the school are linked on their separate sections, and are available at the ExploreCourses (<http://explorecourses.stanford.edu>) web site.

The School of Earth Sciences includes the departments of Geological and Environmental Sciences, Geophysics, Energy Resources Engineering (formerly Petroleum Engineering), and Environmental Earth System Science; and three interdisciplinary programs: the Earth Systems undergraduate and co-terminal M.S. program, the Emmett Interdisciplinary Graduate Program in Environment and Resources (E-IPER), and the Earth, Energy, and Environmental Sciences Graduate Program (EEES). The Earth Systems Program and E-IPER offer study in biophysical and social dimensions of environment and resources, while EEES is intended for students working across departments and disciplines within the School of Earth Sciences.

The aims of the school are:

1. to prepare students for careers in the fields of biogeochemistry, climate science, energy resource engineering, environmental science, geology, geochemistry, geomechanics, geophysics, geostatistics, hydrogeology, land science, oceanography, petroleum engineering, and petroleum geology
2. to conduct research in the Earth sciences
3. to provide opportunities for Stanford undergraduates to learn about the planet's history, to understand the energy and resource base that supports humanity, to appreciate the geological and geophysical hazards that affect human societies, and to understand the challenges and solutions related to the environment and sustainability.

To accomplish these objectives, the school offers a variety of programs adaptable to the needs of the individual student:

- four-year undergraduate programs leading to the degree of Bachelor of Science (B.S.)
- five-year programs leading to the coterminal Bachelor of Science and Master of Science (M.S.)
- graduate programs offering the degrees of Master of Science, Engineer, and Doctor of Philosophy.

Details of individual degree programs are found in the section for each department or program.

## Undergraduate Programs in Earth Sciences

Any undergraduate admitted to the University may declare a major in one of the Earth Science departments or programs by contacting the appropriate department or program office.

Requirements for the B.S. degree are listed in each department or program section. Departmental academic advisers work with students to define a career or academic goal and assure that the student's curricular choices

are appropriate to the pursuit of that goal. Advisers can help devise a sensible and enjoyable course of study that meets degree requirements and provides the student with opportunities to experience advanced courses, seminars, and research projects. To maximize such opportunities, students are encouraged to complete basic science and mathematics courses in high school or during their freshman year.

Each department offers an honors program involving research during the senior year. Each department also offers an academic minor for those undergraduates majoring in compatible fields. The Earth Systems Program also offers an honors program in Environmental Science, Technology, and Policy through the Woods Institute for the Environment.

## Coterminal Bachelor's and Master's Degrees in Earth Sciences

The Stanford coterminal degree plan enables an undergraduate to embark on an integrated program of study leading to the master's degree before requirements for the bachelor's degree have been completed. This may result in more expeditious progress towards the advanced degree than would otherwise be possible, making the program especially important to Earth scientists because the master's degree provides an excellent basis for entry into the profession. The coterminal plan permits students to apply for admission to a master's program after earning 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree.

Under the plan, the student may meet the degree requirements in the more advantageous of the following two ways: by first completing the 180 units required for the B.S. degree and then completing the three quarters required for the M.S. degree; or by completing a total of 15 quarters during which the requirements for the two degrees are completed concurrently.

In either case, the student has the option of receiving the B.S. degree upon meeting all the B.S. requirements or of receiving both degrees at the end of the coterminal program. Students earn degrees in the same department or program, in two different departments, or even in different schools; for example, a B.S. in Physics and an M.S. in Geological and Environmental Sciences. Students are encouraged to discuss the coterminal program with their advisers during their junior year. Additional information is available in the individual department offices.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4874.htm>)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Graduate Programs in Earth Sciences

### Admission to the Graduate Program

A student who wishes to enroll for graduate work in the school must be qualified for graduate standing in the University and also must be accepted by one of the school's four departments or one of the two interdisciplinary Ph.D. programs. One requirement for admission is submission of scores on the verbal and quantitative sections of the Graduate Record Exam. Admission to one department of the school does not guarantee admission to other departments.

## Faculty Adviser

Upon entering a graduate program, the student should report to the head of the department or program who arranges with a member of the faculty to act as the student's adviser. Alternatively, in several of the departments, advisers are established through student-faculty discussions prior to admission. The student, in consultation with the adviser(s), then arranges a course of study for the first quarter and ultimately develops a complete plan of study for the degree sought.

## Financial Aid

Detailed information on scholarships, fellowships, and research grants is available from the school's individual departments and programs. Applications should be filed by the various dates listed in the application packet for awards that become effective in Autumn Quarter of the following academic year.

*Dean:* Pamela A. Matson

*Associate Dean, Academic Affairs:* Stephan A. Graham

*Associate Dean, Multicultural Affairs:* Jerry M. Harris

*Assistant Dean, Academic Affairs:* Roni Holeton

*Assistant Dean, Multicultural Affairs:* Tenea M. Nelson

# Earth, Energy, and Environmental Sciences Graduate Program (EEES)

Courses offered by the Earth, Energy, and Environmental Sciences Program are listed under the subject code EEES on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EEES&filter-catalognumber-EEES=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EEES&filter-catalognumber-EEES=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EEES&filter-catalognumber-EEES=on>).

The Earth, Energy, and Environmental Sciences Graduate Program (EEES) is not accepting new students. The program continues to provide courses and advising for students already enrolled.

The goal of Earth, Energy, and Environmental Sciences (EEES) is to complement the disciplinary Earth Science and Engineering programs offered within the departments of the School of Earth Sciences and to train graduate students to integrate knowledge from these disciplines through tools and methods needed to evaluate the linkages among physical, chemical, and biological systems of the Earth, and understand the dynamics or evolution of these integrated systems and the resources they provide.

Students in EEES must make significant headway in, and combine insights from, more than one scientific discipline. For example, a student whose goal is to understand the structure of the Earth's interior using computational methods might design a study plan that includes high-level mathematics, numerical modeling, and geophysical imaging techniques. A student interested in water management might integrate water flow analysis and modeling, geophysical imaging, geostatistics, and satellite remote sensing of changes in agricultural intensity and land use. A student

interested in marine carbon cycling might use knowledge and tools from numerical modeling, marine biogeochemistry and geochemistry, oceanography, and satellite imaging. The key to the program is its academic flexibility and ability to exploit an increasingly interdisciplinary faculty, particularly in the School of Earth Sciences, but also in the greater Stanford community.

## Graduate Programs in Earth, Energy, and Environmental Sciences

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

## Master of Science in Earth, Energy, and Environmental Sciences

The objective of the M.S. degree in Earth, Energy, and Environmental Sciences is to prepare the student either for a professional career or for doctoral studies.

Students in the M.S. degree program must fulfill the following requirements:

1. Complete EARTHSCI 300 Earth Sciences Seminar, during their first quarter of enrollment.
2. Complete a 45-unit program of study, of which a minimum of 30 units must be course work, with the remainder consisting of no more than 15 research units.
3. Course work units must be divided among two or more scientific and/or engineering disciplines and can include the three core courses required for the Ph.D. degree.
4. The program of study must be approved by the research adviser and the academic oversight committee.
5. Each candidate must either present and defend the results of his or her research at a public oral presentation attended by the candidate's advisor at least two faculty members, or submit a thesis/report to the candidate's adviser and at least two faculty members.

## Doctor of Philosophy in Earth, Energy, and Environmental Sciences

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin. The Interdepartmental Program in Earth, Energy, and Environmental Sciences has the following requirements:

1. Ph.D. students must complete EARTHSCI 300 Earth Sciences Seminar, during their first quarter of enrollment.
2. Students must complete a minimum of 13 courses, including the three core courses and five courses from each of the two areas of specialization. At least half of the ten non-core classes must be at a 200 level or higher, and all must be taken for a letter grade. Students obtaining their M.S. from within the program can apply all master's units toward Ph.D. requirements. Students with an M.S. degree or other specialized training from outside EEES may be able to waive some of the non-core course requirements, depending on the nature

of the prior courses or training. The number and distribution of courses to be taken by these students is determined with input from the research advisers and academic oversight committee.

3. Prior to the formation of a thesis committee, the student works with research advisers and the academic oversight committee to design a course of study with depth in at least two areas of specialization and preparation in analytical methods and skills. Students can select other courses from departments of the School of Earth Sciences and other University departments as appropriate. All courses must be approved by the student's thesis committee or by the academic oversight committee. The research advisers and academic oversight committee have primary responsibility for the adequacy of the course of study.
4. During Spring Quarter of each year, students must undergo an annual review by their thesis committee to allow the committee to monitor the progress of the student and make recommendations, where necessary.
5. Prior to taking the oral qualifying examination at or before the end of the sixth academic quarter, the student must have completed 24 units of letter-graded course work, developed a written crossdisciplinary dissertation proposal suitable for submission to a funding organization, and selected a thesis committee.
6. To be admitted to candidacy for the Ph.D. degree, the student must pass an oral qualifying examination. At least two of the minimum four-member examining committee must be faculty within the School of Earth Sciences. During the exam, students present and defend their proposed thesis research work; the exam generally takes the form of a 20-30 minute presentation by the student, followed by 1-2 hours of questioning.
7. The research advisers and two other faculty members comprise the dissertation reading committee. Upon completion of the thesis, the student must pass a University Oral Examination in defense of the dissertation.

Additional information may be found in the Graduate Academic Policies and Procedures (<http://gap.stanford.edu>) handbook.

*Director:* Kevin R. Arrigo

*Academic Oversight Committee:* Kevin Arrigo (Environmental Earth System Science), Biondo Biondi (Geophysics), Jef Caers (Energy Resources Engineering), Louis Durlofsky (Energy Resources Engineering), Scott Fendorf (Environmental Earth System Science)

# Earth Systems

Courses offered by the Earth Systems Program are listed under the subject code EARTHSYS on the (<https://explorecourses.stanford.edu/search?q=EARTHSYS&view=catalog&page=0&catalog=&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-EARTHSYS=on&filter-catalognumber-EARTHSYS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EARTHSYS&filter-catalognumber-EARTHSYS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EARTHSYS&filter-catalognumber-EARTHSYS=on>).

## Mission of the Undergraduate Program in Earth Systems

The Earth Systems Program is an interdisciplinary environmental science major. Students learn about and independently investigate complex environmental problems caused by human activities in interaction with natural changes in the Earth system. Earth Systems majors become skilled in those areas of science, economics, and policy needed to tackle the globe's most pressing environmental problems, becoming part of a generation of scientists, professionals, and citizens who approach and solve problems in a new way: a systematic, interdisciplinary way.

For students to be effective contributors to solutions for such problems, their training and understanding must be both broad and deep. To this end, Earth Systems students take courses in the fundamentals of biology, calculus, chemistry, geology, and physics, as well as economics, policy, and statistics. After completing breadth training, they concentrate on advanced work in one of five focus areas: biology, energy, environmental economics and policy, land systems, or oceanography. Tracks are designed to support focus and rigor but include flexibility for specialization. Examples of specialized focus have included but are not limited to environment and human health, sustainable agriculture, energy economics, sustainable development, business and the environment, and marine policy. Along with formal course requirements, Earth Systems students complete a 9-unit (270-hour) internship. The internship provides a hands-on academic experience working on a supervised field, laboratory, government, or private sector project.

The following is an outline of the sequential topics covered and skills developed in this major.

1. *Fundamentals:* The Earth Systems Program includes courses that describe the natural workings of the physical and biological components of the Earth, as well as courses that describe the human activities that lead to change in the Earth system. Training in fundamentals includes introductory course work in geology, biology, chemistry, physics, and economics. Depending on the Earth Systems track chosen, training may also include introduction to the study of energy systems, microbiology, oceans, or soils.
2. *System Interactions:* Focus in these courses is on the fundamental interactions among the physical, biological, and human components of the Earth system. The dynamics of the interplay between natural variation and human-imposed influences must be understood to achieve effective solutions to environmental problems.
  - A. Earth Systems courses that introduce students to the dynamic and multiple interactions that characterize global change problems include:
 

		Units
EARTHSYS 10	Introduction to Earth Systems	4
EARTHSYS 111	Biology and Global Change	4
EARTHSYS 112	Human Society and Environmental Change	4
  - B. Competence in understanding system-level interactions is critical to development as an Earth Systems thinker, so additional classes that meet this objective are excellent choices as electives.
3. *Skills Development:* Students take skills courses that help them to recognize, quantify, describe, and help solve complex problems that face society.



Field and laboratory methods can help students to recognize the scope and nature of environmental change. For example, training in satellite remote sensing and geographic information systems allows students to monitor and analyze large-scale spatial patterns of change. This training is either required or recommended for all tracks.

Quantification of environmental problems requires training in single and multivariable calculus, linear algebra, and statistics. Training in statistics is specific to the area of focus: geostatistics, biostatistics, econometrics.

Success in building workable solutions to environmental problems is linked to the ability to effectively communicate ideas, data, and results. Writing intensive courses (WIM) help students to communicate complex concepts to expert and non-expert audiences. All Stanford students must complete one WIM course in their major. The Earth Systems WIM courses are:

	Units
EARTHSYS 200 Sustaining Action: Research, Analysis and Writing for the Public	3
EARTHSYS 195 Natural Hazards and Risk Communication	3

Other Earth Systems courses also focus on effective written and oral communication and are recommended.

Effective solutions to environmental problems take into consideration natural processes as well as human needs. Earth Systems emphasizes the importance of interdisciplinary analysis and implementation of workable solutions through:

	Units
EARTHSYS 210A Senior Seminar	3
EARTHSYS 210B Senior Seminar	3
EARTHSYS 210C Senior Seminar	3
EARTHSYS 210D Senior Seminar	3
EARTHSYS 260 Internship	9

A comprehensive list of environmental courses, as well as advice on those that focus on problem solving, is available in the program office.

The Earth Systems Program provides an advising network that includes faculty, staff, and student peer advisers.

## Learning Outcomes (Undergraduate)

The program expects majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the program's undergraduate degree. Students are expected to:

1. demonstrate knowledge of foundational skills and concepts relevant to interdisciplinary study of the environment.
2. analyze environmental problems at the interface of natural and human systems in an interdisciplinary fashion.
3. demonstrate the ability to communicate complex concepts and data to expert and non-expert audiences.
4. apply relevant science, economics, engineering, and policy to problem analysis and proposed solutions, both independently and as part of a team.

## Learning Outcomes (Graduate)

The master's degree in Earth Systems provides the student with enhanced analytical tools to evaluate the disciplines most closely associated with

the student's focus area. Specialization is gained through course work and independent research work supervised by the M.S. faculty aAdviser.

# Bachelor of Science in Earth Systems

The B.S. in Earth Systems (EARTHSYS) requires the completion of courses divided into three categories: 1) core; 2) foundation and breadth; 3) track-specific requirements. Additionally, the student must carry out a senior-level research or internship project and participate in the Senior Seminar, as well as the writing in the major (WIM) requirement.

## Required Core

	Units
EARTHSYS 10 Introduction to Earth Systems	4
EARTHSYS 111 Biology and Global Change	4
EARTHSYS 112 Human Society and Environmental Change	4
Select one of the following:	3
EARTHSYS 210A Senior Seminar	
EARTHSYS 210B Senior Seminar	
EARTHSYS 210C Senior Seminar	
EARTHSYS 210D Senior Seminar	
EARTHSYS 260 Internship	9

## Required Foundation and Breadth Courses

	Units
<b>Biology (3-10)</b>	3-10
Select one of the following:	
BIO 41 Genetics, Biochemistry, and Molecular Biology	
BIO 43 Plant Biology, Evolution, and Ecology	
BIOHOPK 43 Plant Biology, Evolution, and Ecology	
BIO 101 Ecology	
EARTHSYS 5 Ecology for Everyone	
HUMBIO 2A & HUMBIO 2B Genetics, Evolution, and Ecology and Culture, Evolution, and Society	
<b>Chemistry (4-8)</b>	4-8
Select one of the following:	
CHEM 31X Chemical Principles	
CHEM 31A Chemical Principles I & CHEM 31B and Chemical Principles II	
<b>Economics (5)</b>	5
ECON 1A Introductory Economics A	
<b>Geology and Environmental Sciences (3-5)</b>	3-5
Select one of the following:	
GES 1A Introduction to Geology: The Physical Science of the Earth	
GES 1B Introduction to Geology: California Desert Geology	
GES 1C Introduction to Geology: Dynamic Earth	
GES 4 Evolution and Extinction: Introduction to Historical Geology	

**Mathematics (15)**

Select one of the following: 10

- MATH 19 Calculus & MATH 20 and Calculus & MATH 21 and Calculus
- or MATH 41 Calculus & MATH 42 and Calculus

MATH 51 Linear Algebra and Differential Calculus of Several Variables 5

**Probability and Statistics (3-5)** 3-5

Select one of the following:

- BIOHOPK 174H Experimental Design and Probability
- BIO 141 Biostatistics
- ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists
- EESS 160 Statistical Methods for Earth and Environmental Sciences: General Introduction
- EESS 161 Statistical Methods for the Earth and Environmental Sciences: Geostatistics
- STATS 60 Introduction to Statistical Methods: Precalculus
- STATS 110 Statistical Methods in Engineering and the Physical Sciences
- STATS 116 Theory of Probability

More extensive work in mathematics and physics may be valuable for those planning graduate study. Graduate study in ecology and evolutionary biology and in economics requires familiarity with differential equations, linear algebra, and stochastic processes. Graduate study in geology, oceanography, and geophysics may require more physics and chemistry. Students should consult their adviser for recommendations beyond the requirements specified above.

**Tracks**

**Anthrosphere**

Units

**Additional foundation and breadth courses (13-14)**

- ECON 50 Economic Analysis I 5
- ECON 155 Environmental Economics and Policy 5

Select one of the following (seek advice from Program leadership): 3-4

- One physics class from the PHYSICS 20 or 40 series
- EARTHSYS 70 How the Earth Works: Physics for Earth and Environmental Scientists

Select one course in each of the three following sub-categories, with a total of six required. At least one of the six must be a skills class marked with an asterisk (\*).

**Economics and Environmental Policy (3-5)** 3-5

- ECON 51 Economic Analysis II
- ECON 102B Introduction to Econometrics \*
- ECON 150 Economic Policy Analysis
- ECON 154 Law and Economics
- EARTHSYS 147 Controlling Climate Change in the 21st Century
- EARTHSYS 175 California Coast: Science, Policy, and Law
- MS&E 197 Ethics and Public Policy
- MS&E 243 Energy and Environmental Policy Analysis
- MS&E 248 Economics of Natural Resources
- MS&E 294 Climate Policy Analysis

MS&E 295 Energy Policy Analysis

**Social Entrepreneurship and the Environment (2-5)** <sup>1</sup> 2-5

- CEE 151 Negotiation
- MS&E 180 Organizations: Theory and Management
- MS&E 264 Sustainable Product Development and Manufacturing
- MS&E 277 Creativity and Innovation
- ME 206A Entrepreneurial Design for Extreme Affordability
- ME 377 Design Thinking Bootcamp: Experiences in Innovation and Design
- URBANST 132 Concepts and Analytic Skills for the Social Sector \*
- URBANST 133 Social Entrepreneurship Collaboratory

**Sustainable Development (3-5)** <sup>2</sup> 3-5

- ANTHRO 161 Human Behavioral Ecology
- ANTHRO 162 Indigenous Peoples and Environmental Problems
- ANTHRO 343 Culture as Commodity
- ANTHRO 349 Anthropology of Capitalism
- BIO 102 Demography: Health, Development, Environment
- CEE 124 Sustainable Development Studio (must be taken for at least 3 units)
- EARTHSYS 142A Negotiating Sustainable Development
- ECON 52 Economic Analysis III \*
- ECON 106 World Food Economy \*
- ECON 118 Development Economics
- HUMBIO 118 Theory of Ecological and Environmental Anthropology
- MS&E 491 Clean Energy Development
- POLISCI 337T Designing Liberation Technology
- URBANST 163 Land Use Control

**Elective Requirement (6-10)** 6-10

At least 2 higher-level courses offered for a minimum of 3 units each and approved by an adviser.

- 1 May also use ENGR 231, ME 221, ME 222 for this requirement. These courses are not offered this year.
- 2 May also use POLISCI 140, POLISCI 143 for this requirement. These courses are not offered this year.

**Biosphere**

Units

**Additional foundation and breadth courses (16-18)**

- BIO 41 Genetics, Biochemistry, and Molecular Biology 5
- Select one of the following: 4-5
- BIO 43 Plant Biology, Evolution, and Ecology
- BIOHOPK 43 Plant Biology, Evolution, and Ecology
- EARTHSYS 5 Ecology for Everyone
- CHEM 33 Structure and Reactivity 4
- PHYSICS 41 Mechanics 3-4

or EARTHSYS 70 How the Earth Works: Physics for Earth and Environmental Scientists

Choose at least one course from each of the following sub-categories below: total six required. You may not take more than two courses from any one sub-category.

**Biogeochemistry (3-4)** 3-4

BIO 216 Terrestrial Biogeochemistry  
EESS 155 Science of Soils

**Conservation Biology (1-4)** 1-4

BIOHOPK 173H Marine Conservation Biology  
HUMBIO 112 Conservation Biology

**Ecology (4-5)** 4-5

BIO 101 Ecology  
BIO 136 Evolutionary Paleobiology  
BIO 145 Behavioral Ecology  
BIO 164 Biosphere-Atmosphere Interactions  
BIO 175 Tropical Ecology and Conservation  
GES 123 Paleobiology

**Ecosystems and Society (3-5)**<sup>1</sup> 3-5

ANTHRO 162 Indigenous Peoples and Environmental Problems  
ANTHRO 165 Parks and Peoples: The Benefits and Costs of Protected Area Conservation  
HUMBIO 111 Human Dimensions of Global Environmental Change: Resilience, Vulnerability, and Environmental Justice  
HUMBIO 118 Theory of Ecological and Environmental Anthropology

**Elective Requirement (6-10)** 6-10

At least 2 higher-level courses offered for a minimum of 3 units each and approved by an adviser.

<sup>1</sup> May also use ANTHRO 166, HUMBIO 114 for this requirement. These courses are not offered this year.

## Energy, Science and Technology

**Additional Foundation and Breadth Courses (8)**

PHYSICS 43 Electricity and Magnetism 4  
PHYSICS 45 Light and Heat 4

**Energy Resources and Technology (12-16)**

CEE 176A Energy Efficient Buildings 3-4  
CEE 176B Electric Power: Renewables and Efficiency 3-4  
EARTHSYS 101 Energy and the Environment 3

Select one of the following: 3-5

CEE 215 Goals and Methods of Sustainable Building Projects  
CEE 226 Life Cycle Assessment for Complex Systems  
EARTHSYS 102 Renewable Energy Sources and Greener Energy Processes  
EARTHSYS 103 Energy Resources  
ENERGY 104 Transition to sustainable energy systems  
ENERGY 153 Carbon Capture and Sequestration  
MS&E 491 Clean Energy Development

**Energy Fundamentals (3)**

ENGR 30 Engineering Thermodynamics 3

**Energy Policy (3)**

Select one of the following: 3

EARTHSYS 147 Controlling Climate Change in the 21st Century  
MS&E 243 Energy and Environmental Policy Analysis  
MS&E 294 Climate Policy Analysis  
MS&E 295 Energy Policy Analysis

**Elective Requirement: At least 3 higher-level courses offered for a minimum of 3 units each and approved by an advisor. (9-15)** 9-15

## Land Systems

Units

**Additional foundation and breadth courses (8)**

EARTHSYS 144 Fundamentals of Geographic Information Science (GIS) 4  
PHYSICS 45 Light and Heat 4

Choose at least one course in each of the three sub-categories below, total six required:

**Land (3-5)** 3-5

BIO 144 Conservation Biology  
EARTHSYS 143J Climate Change in the West: A History of the Future  
ECON 106 World Food Economy  
EESS 155 Science of Soils  
HISTORY 254 Popular Culture and American Nature

**Water (3-4)** 3-4

CEE 101B Mechanics of Fluids  
CEE 166A Watersheds and Wetlands  
CEE 166B Floods and Droughts, Dams and Aqueducts  
CEE 171 Environmental Planning Methods  
CEE 177 Aquatic Chemistry and Biology  
EARTHSYS 104 The Water Course  
GEOPHYS 190 Near-Surface Geophysics  
GES 130 Soil Physics and Hydrology

**Urban (3-5)**<sup>1</sup> 3-5

CEE 115 Goals and Methods of Sustainable Building Projects  
CEE 124 Sustainable Development Studio (must be taken for at least 3 units)  
CEE 176A Energy Efficient Buildings  
URBANST 110 Utopia and Reality: Introduction to Urban Studies  
URBANST 113 Introduction to Urban Design: Contemporary Urban Design in Theory and Practice  
URBANST 163 Land Use Control

**Elective Requirement (6-10)** 6-10

At least 2 higher-level courses offered for a minimum of 3 units each and approved by an adviser.

<sup>1</sup> May also use URBANST 165 for this requirement. This course is not offered this year.

## Oceans

Units

**Additional Foundation and Breadth Courses (10-11)**

EESS 8	The Oceans: An Introduction to the Marine Environment	3
PHYSICS 41	Mechanics	3-4
or EARTHSYS 70	How the Earth Works: Physics for Earth and Environmental Scientists	
PHYSICS 45	Light and Heat	4
<b>Physics of the Sea (4)</b>		
CEE 164	Introduction to Physical Oceanography	4
<b>Remote Sensing of the Ocean (3-4)</b>		
EESS 141	Remote Sensing of the Oceans	3-4
or EARTHSYS 144	Fundamentals of Geographic Information Science (GIS)	
<b>Biological Oceanography (3-4)</b>		
BIOHOPK 163H	Oceanic Biology	3-4
or EARTHSYS 151	Biological Oceanography	
<b>Chemical Oceanography (3-4)</b>		
EARTHSYS 152	Marine Chemistry	3-4
<b>Additional Requirement: Away Experience (12-20)</b>		12-20
Select one of the following:		
EARTHSYS 323	Stanford at Sea	
One quarter abroad at the Stanford in Australia Program		
One quarter (or more) at the Hopkins Marine Station		
<b>Elective Requirement: At least 3 higher-level courses offered for a minimum of 3 units each and approved by an advisor. (9-15)</b>		9-15

## Earth System Science Track

A tailored interdisciplinary course of study constructed under the guidance of program Directors and the faculty adviser. See a co-Director for additional information.

## Summary of Course Requirements and Units

### For all students:

	Units
Earth Systems Introduction and Core	12
Required Foundation and Breadth Courses	33-48
Senior Research or Internship	9
Senior Seminar	3

### Track-Specific:

	Units
Anthrosphere Track	37-54
Biosphere Track	45-60
Energy, Science and Technology Track	35-45
Land Systems Track	33-46
Oceans Track	44-62

## Honors Program

The Earth Systems Honors program provides students with an opportunity to pursue individual research within a specific area or between areas of Earth Systems through a year-long mentored research project. This research must be mentored by one or more Earth Systems-affiliated faculty members, and it culminates in a written thesis.

To be admitted to the honors program, applicants must have a minimum GPA of 3.4 in Earth Systems course work. Potential honors students should complete the EARTHSYS 111 Biology and Global Change and EARTHSYS 112 Human Society and Environmental Change sequence by the end of the junior year. Qualified students can apply in Spring Quarter (due by the 3rd Friday of the quarter) of the junior year, or the fourth quarter before graduation, by submitting a detailed research proposal and a brief statement of support from a faculty research adviser. Students who elect to do an honors thesis should begin planning no later than Winter Quarter of the junior year.

A maximum of 9 units is awarded for thesis research through EARTHSYS 199 Honors Program in Earth Systems. Those 9 units may not substitute for any other required parts of the Earth Systems curriculum. All theses are evaluated for acceptance by the thesis faculty adviser and one additional member of the Earth Systems Committee of the Whole.

Honors students are encouraged to present their research through the School of Earth Sciences Annual Research Review, which highlights undergraduate and graduate research in the school during the annual visit of the School of Earth Sciences external Advisory Board. Faculty advisers are encouraged to sponsor presentation of student research results at professional society meetings.

## Coterminal B.S. and M.S. Degrees in Earth Systems

The Stanford coterminal degree enables an undergraduate to embark on an integrated program of study leading to the master's degree before requirements for the bachelor's degree have been completed. Undergraduates with a minimum 3.4 Stanford GPA may apply to work simultaneously toward B.S. and M.S. degrees. The M.S. degree in Earth Systems provides the student with enhanced tools to evaluate the primary literature of the discipline most closely associated with the student's track and allows an increased specialization through additional course work that may include 9 units of thesis research. Integration of Earth Systems concepts is furthered by participation in EARTHSYS 290 Master's Seminar or another approved course.

To apply, complete and return to the Earth Systems office an application that includes:

- The application for admission cover sheet
- A statement of purpose
- A resume
- A Stanford transcript
- Two letters of recommendation, one of which must be from the master's adviser (Earth Systems Committee of the Whole member)
- A list of courses that fulfill degree requirements signed by a co-Director and the master's adviser (Earth Systems Committee of the Whole member)

Applications must be submitted by the quarter preceding the anticipated quarter of graduation. An application fee is assessed by the Registrar's Office for coterminal applications.

Students may either:

1. complete 180 units required for the B.S. degree and then complete the three quarters required for the M.S. degree
2. or, complete a total of 15 quarters during which the requirements of the two degrees are fulfilled concurrently.

The student has the option of receiving the B.S. degree after completing that degree's requirements or receiving two degrees concurrently at the end of the master's program.

It is both assumed and required that all students applying for the Earth Systems coterminial M.S. degree (irrespective of the undergraduate major) will have met the B.S. degree requirements for Earth Systems.

These specific requirements must be fulfilled to receive an M.S. degree:

1. A minimum of 45 units of course work and/or research credit (upon approval). It is expected that the majority of the student's course work will be at the 200-level or above.

The student must devise a program of study that shows a level of specialization appropriate to the master's level, as determined in consultation with the adviser and a co-Director of Earth Systems. Students applying from an undergraduate major other than Earth Systems should meet with Julie Kennedy, Kevin Arrigo, Deana Fabbro-Johnston, or Katie Phillips to learn more about the Earth Systems M.S. degree program.

With the adviser's approval, up to 9 units may be in the form of research. This may culminate in the preparation of a master's thesis; however, a thesis is not required for the degree.

University requirements for the coterminial M.S. are described in the "Coterminial Bachelor's and Master's Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4874.htm>)" section of this bulletin. For University coterminial degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

*Co-Directors:* Julie Kennedy and Kevin Arrigo

*Associate Director, Administration:* Deana Fabbro-Johnston

*Committee of the Whole:* Nicole Ardoin (School of Education, Woods Institute for the Environment), Kevin Arrigo (Environmental Earth System Science), Gregory Asner (Department of Global Ecology, Carnegie Institution), Barbara Block (Biology, Hopkins Marine Station, Woods Institute for the Environment), Carol Boggs (Biology), Margaret Caldwell (Law, Woods Institute for the Environment), Karen Casciotti (Environmental Earth System Science), Page Chamberlain (Environmental Earth System Science), Lisa Curran (Anthropology, Woods Institute for the Environment), Gretchen Daily (Biology, Woods Institute for the Environment), Jenna Davis (Civil and Environmental Engineering, Woods Institute for the Environment), Mark Denny (Biology, Hopkins Marine Station), Noah Diffenbaugh (Environmental Earth System Science, Woods Institute for the Environment), Rodolfo Dirzo (Biology), Robert B. Dunbar (Earth Systems, Environmental Earth System Science, Woods Institute for the Environment), William Durham (Anthropology), Gary Ernst (Geological and Environmental Sciences, emeritus), Walter Falcon (Freeman Spogli Institute for International Studies, emeritus, Woods Institute for the Environment), Scott Fendorf (Environmental Earth System Science, Woods Institute for the Environment), Christopher Field (Department of Global Ecology, Carnegie Institution, Woods Institute for the Environment), Christopher Francis (Environmental Earth System Science), Zephyr Frank (History), David Freyberg (Civil and Environmental Engineering, Woods Institute for the Environment), Margot Gerritsen (Energy Resources Engineering), Deborah Gordon (Biology, Woods Institute for the Environment), Steven Gorelick (Environmental Earth System Science, Woods Institute for the Environment), Elizabeth Hadly (Biology), George Hilley (Geological and Environmental Sciences), David Kennedy (History, Woods Institute for the Environment), Donald Kennedy (Biology, Freeman Spogli Institute for International Studies, emeritus, Woods Institute for the Environment), Julie Kennedy (Earth Systems, Environmental Earth System Science, Woods Institute for the Environment), Rosemary Knight (Geophysics, Woods Institute for the Environment), Jeffrey Koseff (Civil and Environmental Engineering, Woods Institute for the Environment), Anthony Kovscek (Energy Resources Engineering), Eric Lambin (Environmental Earth System Science, Woods Institute for the Environment), David Lobell (Environmental Earth System Science, Woods Institute for the Environment), Gilbert Masters (Civil and Environmental Engineering), Pamela Matson (Dean, School of Earth Sciences, Freeman Spogli Institute

for International Studies, Woods Institute for the Environment), Stephen Monismith (Civil and Environmental Engineering, Woods Institute for the Environment), Harold Mooney (Biology, emeritus, Woods Institute for the Environment), Rosamond Naylor (Environmental Earth System Science, Freeman Spogli Institute for International Studies, Woods Institute for the Environment), Richard Nevle (School of Earth Sciences), Stephen Palumbi (Biology, Hopkins Marine Station, Woods Institute for the Environment), Jonathan Payne (Geological and Environmental Sciences), Kathleen Phillips (Earth Systems), Bala Rajaratnam (Environmental Earth System Science, Statistics), Gary Schoolnik (Medicine, Woods Institute for the Environment), George Somero (Biology, Hopkins Marine Station), James Sweeney (Management Science and Engineering, Woods Institute for the Environment), Paul Switzer (Environmental Earth System Science, Emeritus, Statistics, Emeritus), Leif Thomas (Environmental Earth System Science), Barton Thompson, Junior (Law, Woods Institute for the Environment), Peter Vitousek (Biology, Interdisciplinary Program in Environment and Resources, Woods Institute for the Environment), Virginia Walbot (Biology), Mark Zoback (Geophysics)

## Overseas Studies Courses in Earth Systems

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofearthsciences/earthsystems/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofearthsciences/earthsystems/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofearthsciences/earthsystems/http://bosp.stanford.edu>).

		Units
OSPAUSTL 10	Coral Reef Ecosystems	3
OSPAUSTL 30	Coastal Forest Ecosystems	3
OSPFLOR 57	Global Change and Italian Ecosystems: Management and Conservation for Mitigation	4
OSPPARIS 74	Climate Change Challenges in France and Europe: from Project to Policy	4
OSPSANTG 58	Living Chile: A Land of Extremes	5
OSPSANTG 85	Marine Ecology of Chile and the South Pacific	5

## Emmett Interdisciplinary Program in Environment and Resources (E-IPER)

Courses offered by the Emmett Interdisciplinary Program in Environment and Resources are listed under the subject code ENVRES on the Stanford

Bulletin's ExploreCourses web site (<http://explorecourses.stanford.edu/search;jsessionid=75B13D9BD401BF4435773811DC678716?view=catalog&catalog=&page=0&q=ENVRES&filter-catalognumber-ENVRES=on&filter-coursestatus-Active=on>).

## Mission of the Program

The Emmett Interdisciplinary Program in Environment and Resources develops the knowledge, skills, perspectives, and ways of thinking needed to understand and help solve the world's most significant environmental and resources sustainability challenges. E-IPER strives to be a model for interdisciplinary graduate education. E-IPER offers a Ph.D. in Environment and Resources or a Joint M.S., the latter exclusively for students in Stanford's Graduate School of Business, Stanford Law School, and School of Medicine. E-IPER's home is the School of Earth Sciences and affiliated faculty come from all seven Stanford schools.

## Graduate Programs in Environment and Resources

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The E-IPER Ph.D. and M.S. degrees are guided by comprehensive requirements created with faculty and student input and approved by E-IPER's executive committee. To access the current Ph.D. and M.S. degree requirement documents, see the E-IPER Academics (<http://e-iper.stanford.edu/academics>) web site.

## Learning Outcomes (Graduate)

Completion of the Ph.D. and M.S. degrees in Environment and Resources provides students with the knowledge, skills, perspectives, and ways of thinking needed to understand and help solve the world's most significant environmental and resources sustainability challenges.

## Master of Science in Environment and Resources

Students may not apply directly for the M.S. in Environment and Resources degree. The M.S. is an option exclusively for students currently enrolled in the joint degree programs with the M.B.A. in the Graduate School of Business, the J.D. with the Stanford Law School, or the M.D. in the School of Medicine; in special cases for students pursuing a Ph.D. in another Stanford department; or for E-IPER Ph.D. students who do not continue in the Ph.D. degree program.

## Joint Master's Degree

Students enrolled in a professional degree program in Stanford's Graduate School of Business or the Stanford Law School are eligible to apply for admission to the joint M.S. in Environment and Resources degree program (JDP). Enrollment in the joint M.S. program allows students to pursue an M.S. degree concurrently with their professional degree and to count a defined number of units toward both degrees, resulting in the award of joint M.B.A. and M.S. in Environment and Resources degrees or a joint J.D. and M.S. in Environment and Resources degrees.

The joint M.B.A./M.S. degree program requires a total of 129 quarter units to be completed over approximately eight academic quarters (compared to 105 units for the M.B.A. and 45 units for the M.S. if pursued as separate degrees).

The joint J.D./M.S. degree program requires a minimum of 111 quarter units, although it is possible that students may need to take additional units to satisfy the degree requirements for both the J.D. and M.S. The joint J.D./M.S. may be completed in three years.

The student's program of study is subject to the approval of the student's faculty adviser and E-IPER staff. The joint degrees are conferred when the requirements for both the E-IPER M.S. and the professional degree programs have been met. For application information, see the Admissions (<https://pangea.stanford.edu/programs/eiper/admissions>) page on the E-IPER website. For additional information, see the Joint MS Academics (<https://pangea.stanford.edu/programs/eiper/academics/joint-ms>) page on the E-IPER website.

In addition to requirements for the professional degree, requirements for the joint M.S. include:

1. Completion of required introductory core course:
2.

	<b>Units</b>
ENVRES 310 Environmental Forum Seminar *	1-2

\*Students enrolled in their first-year M.B.A. as of Autumn 2011-12 were required to take OIT 538 and OIT 540 or OIT 539 and OIT 540 (Environmental Science for Managers). Students enrolled in their first-year M.B.A. as of Autumn 2012-13 are required to enroll in the new core course(s) to be offered 2013-14. All other students are required to take ENVRES 310 Environmental Forum Seminar.
3. Completion and presentation of a capstone project that integrates the student's professional and M.S. degrees, as part of the required course ENVRES 290 Capstone Project Seminar in Environment and Resources.
4. Completion of a minimum of four letter-graded courses, while maintaining a 'B' average, from one joint M.S. course track (specific track course listings below):
  - Energy
  - Climate and Atmosphere
  - Cleantech
  - Land Use and Agriculture
  - Oceans and Estuaries
  - Freshwater
  - Global, Community, and Environmental Health
  - Sustainable Built Environment
  - Sustainable Design
5. Completion of at least four additional 3-5 unit graded elective courses at the 100-level or higher, which may be taken from one or more course tracks or elsewhere in the University, while maintaining a 'B' average.
6. Among the courses fulfilling requirements 3 and 4 above, completion of at least four courses at the 200-level or above. Individual study courses, directed reading, and independent research units may count as an elective for a maximum of 4 units for joint M.S. students (such as ENVRES 398 Directed Individual Study in Environment and Resources or ENVRES 399 Directed Research in Environment and Resources).

Restrictions on course work that may fulfill the joint M.S. degree include:

1. A maximum of 5 units from courses that are identified as primarily consisting of guest lectures, such as the Energy Seminar or the Environmental Law Workshop, may be counted toward the joint M.S. degree.
2. A maximum of 12 units from approved courses related to the environmental and resource fields from the student's professional school may be applied toward the M.S. See the E-IPER website for a

list of approved courses (<http://e-iper.stanford.edu/academics/joint-ms-curriculum>) from the Graduate School of Business and the School of Law.

approved courses (<http://e-iper.stanford.edu/academics/joint-ms-curriculum>) from the Graduate School of Business and the School of Law.

## Dual Master's Degree

Students in the School of Medicine, or in special cases, students pursuing a Ph.D. in another Stanford department may apply to pursue the M.S. in Environment and Resources degree. For the dual degree, students must meet the University's minimum requirements for the M.D. and complete an additional 45 units for the M.S. in Environment and Resources. Completion of the M.S. is anticipated to require at least three quarters in addition to the quarters required for the M.D. For additional information, see the Joint MS Academics (<https://pangea.stanford.edu/programs/eiper/academics/joint-ms>) page on the E-IPER website.

The student's program of study is subject to the approval of the student's faculty adviser and E-IPER staff. The two degrees are conferred when the requirements for both the E-IPER M.S. and the professional degree programs have been met. For application information, see the Admissions (<https://pangea.stanford.edu/programs/eiper/admissions>) page on the E-IPER website.

In addition to requirements for the M.D., requirements for the dual M.S. include:

1. Completion of a required introductory core course: ENVRES 310 Environmental Forum Seminar.
2. Completion and presentation of a capstone project that integrates the student's professional and M.S. degrees, as part of the required course ENVRES 290 Capstone Project Seminar in Environment and Resources.
3. Completion of a minimum of four graded courses, while maintaining a 'B' average, from one M.S. Course Track (specific track course listings below):
  - Energy
  - Climate and Atmosphere
  - Cleantech
  - Land Use and Agriculture
  - Oceans and Estuaries
  - Freshwater
  - Global, Community, and Environmental Health
  - Sustainable Built Environment
  - Sustainable Design
4. Completion of at least four additional 3-5 unit letter-graded elective courses at the 100-level or higher, which may be taken from one or more course tracks or elsewhere in the University, while maintaining a 'B' average.
5. Among the courses fulfilling requirements 3 and 4 above, completion of at least four courses at the 200-level or above. Individual study courses, directed reading, and independent research units may count as an elective for a maximum of 4 units for dual M.S. students (such as ENVRES 398 Directed Individual Study in Environment and Resources or ENVRES 399 Directed Research in Environment and Resources).

Restrictions on course work that may fulfill the Dual M.S. degree include:

1. A maximum of 5 units from courses that are identified as primarily consisting of guest lectures, such as the Energy Seminar or the Environmental Law Workshop may be counted toward the Dual M.S. degree.
2. A maximum of 12 units from courses related to the environmental and resource fields from the student's professional school may be applied toward the M.S. See the E-IPER website for a list of

## Joint M.S. and Dual M.S. Course Tracks

Students should consult Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site to determine course description, class schedule, location, eligibility, and prerequisites. Course tracks and other recommended courses are also available on the E-IPER web site (<https://pangea.stanford.edu/programs/eiper/?q=academics/joint-ms/joint-ms-course-tracks>).

### Energy

		Units
APPPHYS 219	Solid State Physics and the Energy Challenge	3
BIOE 454	Synthetic Biology and Metabolic Engineering	3
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 207A	Energy Resources	4-5
CEE 217	Renewable Energy Infrastructure	3
CEE 236	Green Architecture	4
CHEMENG 454	Synthetic Biology and Metabolic Engineering	3
EARTHSYS 101	Energy and the Environment	3
EARTHSYS 102	Renewable Energy Sources and Greener Energy Processes	3
EARTHSYS 232	Energy and Climate Cooperation in the Western Hemisphere	4
EE 293A	Fundamentals of Energy Processes	3-4
EE 293B	Fundamentals of Energy Processes	3
ENERGY 101	Energy and the Environment	3
ENERGY 102	Renewable Energy Sources and Greener Energy Processes	3
ENERGY 104	Transition to sustainable energy systems	3
ENERGY 120	Fundamentals of Petroleum Engineering	3
ENERGY 226	Thermal Recovery Methods	3
ENERGY 227	Enhanced Oil Recovery	3
ENERGY 253	Carbon Capture and Sequestration	3-4
ENERGY 267	Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties	3
ENERGY 269	Geothermal Reservoir Engineering	3
ENERGY 291	Optimization of Energy Systems	3
ENERGY 293A	Fundamentals of Energy Processes	3-4
ENERGY 293B	Fundamentals of Energy Processes	3
ENGR 120	Fundamentals of Petroleum Engineering	3
IPS 263	Energy and Climate Cooperation in the Western Hemisphere	4
MATSCI 256	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	3-4
MATSCI 302	Solar Cells	3
MATSCI 303	Principles, Materials and Devices of Batteries	3
MATSCI 316	Nanoscale Science, Engineering, and Technology	3
ME 260	Fuel Cell Science and Technology	3
ME 370A	Energy Systems I: Thermodynamics	3
ME 370B	Energy Systems II: Modeling and Advanced Concepts	4
MS&E 243	Energy and Environmental Policy Analysis	3

MS&E 295	Energy Policy Analysis	3
MS&E 491	Clean Energy Development	3

## Climate and Atmosphere

		Units
BIO 117	Biology and Global Change	4
BIO 247	Controlling Climate Change in the 21st Century	3
BIO 264	Biosphere-Atmosphere Interactions	4
CEE 172	Air Quality Management	3
CEE 263A	Air Pollution Modeling	3-4
CEE 263D	Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 272S	Green House Gas Mitigation	1-3
CEE 278A	Air Pollution Fundamentals	3-4
CEE 278B	Atmospheric Aerosols	3
CEE 278C	Indoor Air Quality	2-3
EARTHSYS 111	Biology and Global Change	4
EARTHSYS 233	Climate Change Law and Policy: From California to the Federal Government	3
EARTHSYS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
EARTHSYS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
EARTHSYS 247	Controlling Climate Change in the 21st Century	3
EARTHSYS 284	Climate and Agriculture	3-4
EESS 111	Biology and Global Change	4
EESS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
EESS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
EESS 284	Climate and Agriculture	3-4
ENERGY 253	Carbon Capture and Sequestration	3-4
GEOPHYS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
GEOPHYS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
HISTORY 243J	Climate Change in the West: A History of the Future	5
MS&E 294	Climate Policy Analysis	3

## Cleantech

		Units
APPPHYS 219	Solid State Physics and the Energy Challenge	3
BIOE 355	Advanced Biochemical Engineering	3
BIOE 454	Synthetic Biology and Metabolic Engineering	3
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 207A	Energy Resources	4-5
CEE 215	Goals and Methods of Sustainable Building Projects	3
CEE 217	Renewable Energy Infrastructure	3
CEE 226	Life Cycle Assessment for Complex Systems	3-4
CEE 274A	Environmental Microbiology I	3
CEE 274B	Microbial Bioenergy Systems	3
CEE 275B	Process Design for Environmental Biotechnology	3
CHEMENG 274	Environmental Microbiology I	3
CHEMENG 355	Advanced Biochemical Engineering	3

CHEMENG 454	Synthetic Biology and Metabolic Engineering	3
CHEMENG 456	Microbial Bioenergy Systems	3
ENERGY 253	Carbon Capture and Sequestration	3-4
ENERGY 267	Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties	3
ENERGY 269	Geothermal Reservoir Engineering	3
MATSCI 302	Solar Cells	3
MATSCI 316	Nanoscale Science, Engineering, and Technology	3
ME 260	Fuel Cell Science and Technology	3
MS&E 264	Sustainable Product Development and Manufacturing	3-4
MS&E 289	Designing for Sustainable Abundance	3-4
MS&E 491	Clean Energy Development	3

## Land Use and Agriculture

		Units
BIO 101	Ecology	4
BIO 117	Biology and Global Change	4
BIO 121	Biogeography	3
BIO 144	Conservation Biology	3-4
BIO 216	Terrestrial Biogeochemistry	3
BIO 264	Biosphere-Atmosphere Interactions	4
EARTHSYS 111	Biology and Global Change	4
EARTHSYS 143J	Climate Change in the West: A History of the Future	5
EARTHSYS 155	Science of Soils	3-4
EARTHSYS 233	Climate Change Law and Policy: From California to the Federal Government	3
EARTHSYS 242	Remote Sensing of Land	4
EARTHSYS 256	Soil and Water Chemistry	1-4
EARTHSYS 273	Aquaculture and the Environment: Science, History, and Policy	3
EARTHSYS 281	Concepts of Urban Agriculture	3
EARTHSYS 284	Climate and Agriculture	3-4
EESS 111	Biology and Global Change	4
EESS 155	Science of Soils	3-4
EESS 216	Terrestrial Biogeochemistry	3
EESS 256	Soil and Water Chemistry	1-4
EESS 262	Remote Sensing of Land	4
EESS 273	Aquaculture and the Environment: Science, History, and Policy	3
EESS 281	Concepts of Urban Agriculture	3
EESS 284	Climate and Agriculture	3-4
HISTORY 243J	Climate Change in the West: A History of the Future	5
HUMBIO 112	Conservation Biology	3-4
MS&E 289	Designing for Sustainable Abundance	3-4
URBANST 163	Land Use Control	4

## Oceans and Estuaries

		Units
BIO 274S	Hopkins Microbiology Course	3-12
BIOHOPK 263H	Oceanic Biology	4
BIOHOPK 272H	Marine Ecology	5
BIOHOPK 274	Hopkins Microbiology Course	3-12
BIOHOPK 285H	Ecology and Conservation of Kelp Forest Communities	10-12



CEE 262D	Introduction to Physical Oceanography	4
CEE 272	Coastal Contaminants	3-4
CEE 274S	Hopkins Microbiology Course	3-12
CEE 275A	California Coast: Science, Policy, and Law	3-4
EARTHSYS 208	Coastal Wetlands	3
EARTHSYS 241	Remote Sensing of the Oceans	3-4
EARTHSYS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
EARTHSYS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
EARTHSYS 258	Geomicrobiology	3
EARTHSYS 273	Aquaculture and the Environment: Science, History, and Policy	3
EARTHSYS 275	California Coast: Science, Policy, and Law	3-4
EESS 241	Remote Sensing of the Oceans	3-4
EESS 244	Marine Ecosystem Modeling	3
EESS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
EESS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
EESS 253S	Hopkins Microbiology Course	3-12
EESS 258	Geomicrobiology	3
EESS 273	Aquaculture and the Environment: Science, History, and Policy	3
GEOPHYS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
GEOPHYS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3

## Freshwater

		Units
CEE 101B	Mechanics of Fluids	4
CEE 177	Aquatic Chemistry and Biology	4
CEE 260A	Physical Hydrogeology	4
CEE 260C	Contaminant Hydrogeology	4
CEE 262A	Hydrodynamics	3-4
CEE 262B	Transport and Mixing in Surface Water Flows	3-4
CEE 262E	Lakes and Reservoirs	2-3
CEE 264A	Rivers, Streams, and Canals	3-4
CEE 265A	Sustainable Water Resources Development	3
CEE 265C	Water Resources Management	3
CEE 265D	Water and Sanitation in Developing Countries	1-3
CEE 266A	Watersheds and Wetlands	3
CEE 266B	Floods and Droughts, Dams and Aqueducts	3
CEE 266D	Water Resources and Water Hazards Field Trips	2
CEE 268	Groundwater Flow	3-4
CEE 270	Movement and Fate of Organic Contaminants in Waters	3
CEE 271A	Physical and Chemical Treatment Processes	3
CEE 273	Aquatic Chemistry	3
CEE 273A	Water Chemistry Laboratory	3
CEE 275B	Process Design for Environmental Biotechnology	3
EARTHSYS 143J	Climate Change in the West: A History of the Future	5
EARTHSYS 233	Climate Change Law and Policy: From California to the Federal Government	3
EARTHSYS 273	Aquaculture and the Environment: Science, History, and Policy	3

EESS 220	Physical Hydrogeology	4
EESS 221	Contaminant Hydrogeology	4
EESS 273	Aquaculture and the Environment: Science, History, and Policy	3
HISTORY 243J	Climate Change in the West: A History of the Future	5

## Global, Community, and Environmental Health

		Units
ANTHRO 173	Human Dimensions of Global Environmental Change: Resilience, Vulnerability, and Environmental Justice	3
ANTHRO 262	Indigenous Peoples and Environmental Problems	3-5
ANTHRO 263	Conservation and Evolutionary Ecology	5
ANTHRO 282	Medical Anthropology	3-5
BIO 102	Demography: Health, Development, Environment	3
BIO 117	Biology and Global Change	4
CEE 260C	Contaminant Hydrogeology	4
CEE 263A	Air Pollution Modeling	3-4
CEE 263D	Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 265A	Sustainable Water Resources Development	3
CEE 265C	Water Resources Management	3
CEE 265D	Water and Sanitation in Developing Countries	1-3
CEE 270	Movement and Fate of Organic Contaminants in Waters	3
CEE 272	Coastal Contaminants	3-4
CEE 274D	Pathogens and Disinfection	3
CEE 274E	Pathogens in the Environment	3
CEE 276	Introduction to Human Exposure Analysis	3
CEE 276E	Environmental Toxicants	2-3
CEE 278A	Air Pollution Fundamentals	3-4
CEE 278B	Atmospheric Aerosols	3
CEE 278C	Indoor Air Quality	2-3
EARTHSYS 111	Biology and Global Change	4
EARTHSYS 224	Environmental Justice: Local, National, and International Dimensions	4
EESS 111	Biology and Global Change	4
EESS 221	Contaminant Hydrogeology	4
HUMBIO 111	Human Dimensions of Global Environmental Change: Resilience, Vulnerability, and Environmental Justice	3
HUMBIO 119	Demography: Health, Development, Environment	3
HUMBIO 153	Parasites and Pestilence: Infectious Public Health Challenges	4
HUMBIO 166	Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context	4

## Sustainable Built Environment

		Units
CEE 100	Managing Sustainable Building Projects	4
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 177P	Sustainability in Theory and Practice	3
CEE 215	Goals and Methods of Sustainable Building Projects	3

CEE 224A	Sustainable Development Studio	1-5
CEE 226	Life Cycle Assessment for Complex Systems	3-4
CEE 236	Green Architecture	4
CEE 248	Real Estate Development	3
CEE 248G	Certifying Green Buildings	1
CEE 265A	Sustainable Water Resources Development	3
URBANST 160	Environmental Policy and the City in U.S. History	5
URBANST 163	Land Use Control	4

## Sustainable Design

		Units
BIOE 281	Biomechanics of Movement	3
CEE 226	Life Cycle Assessment for Complex Systems	3-4
ENGR 210	Perspectives in Assistive Technology	1-3
ENVRES 380	Collaborating with the Future: Launching Large Scale Sustainable Transformations	3-4
ME 216A	Advanced Product Design: Needfinding	3-4
ME 281	Biomechanics of Movement	3
ME 283	Introduction to Biomechanics	3
ME 315	The Designer in Society	3
ME 380	Collaborating with the Future: Launching Large Scale Sustainable Transformations	3-4
MS&E 289	Designing for Sustainable Abundance	3-4
POLISCI 337T	Designing Liberation Technology	3-4
PSYCH 380	Collaborating with the Future: Launching Large Scale Sustainable Transformations	3-4

## Master of Science

In exceptional circumstances, E-IPER offers a Master of Science degree for students in E-IPER's Ph.D. program who opt to complete their training with a M.S. degree or who do not advance to candidacy for the Ph.D. degree. Admission directly to the M.S. program is not allowed. Requirements for the M.S. include:

1. Completion of a minimum of 45 units at or above the 100-level, of which the majority of units should be at or above the 200-level.
2. Completion of the E-IPER Ph.D. core curriculum, each with a letter grade of 'B' or higher, comprising:

		Units
ENVRES 310	Environmental Forum Seminar	1-2
ENVRES 315	Environmental Research Design Seminar	1-2
ENVRES 320	Designing Environmental Research	3-4
ENVRES 330 & ENVRES 398	Research Approaches for Environmental Problem Solving and Directed Individual Study in Environment and Resources	4-12

Additional courses may be chosen from approved course lists in E-IPER's four focal areas (culture and institutions; economics and policy analysis; engineering and technology; or natural sciences) or from other courses approved by the student's lead advisers. Students may take no more than 6 of the required 45 units credit/no credit and must maintain at least a 'B' average in all courses taken for the M.S. degree. Directed research and independent study may count for a maximum of 8 units of the 45 unit M.S. The M.S. degree does not have an M.S. with thesis option. Students may write a M.S. thesis, but it is not formally recognized by the University.

## Doctor of Philosophy in Environment and Resources

E-IPER's Ph.D. requirements, updated annually at the E-IPER (<http://e-iper.stanford.edu/academics/phd>) web site, lay out a scaffold of advising meetings, core courses, program activities, and milestones to guide students' progress. Each student works with a faculty advising team, comprising at least two faculty from different disciplines, to design a course of study that allows the student to develop and exhibit: a) familiarity with analytical tools and research approaches for interdisciplinary problem solving, and a mastery of those tools and approaches central to the student's thesis work; b) interdisciplinary breadth in each of four focal areas: culture and institutions; economics and policy analysis; engineering and technology; and natural sciences; and c) depth in at least two distinct fields of inquiry.

Program specific Ph.D. requirements are outlined in detail in the current year requirements and are summarized below:

1. Completion of the Ph.D. core course sequence:

		Units
EARTHSCI 300	Earth Sciences Seminar	1
ENVRES 310	Environmental Forum Seminar	1-2
ENVRES 315	Environmental Research Design Seminar	1-2
ENVRES 320	Designing Environmental Research	3-4
ENVRES 330 & ENVRES 398	Research Approaches for Environmental Problem Solving and Directed Individual Study in Environment and Resources	4-12

2. Completion of the breadth requirement in all four focal areas (culture and institutions; economics and policy analysis; engineering and technology; and natural sciences) through a sequence of specified courses, independent study, and/or demonstration of proficiency through prior course work or experience. Specific requirements and approved courses that satisfy breadth in each of the four focal areas as of July 2012 are listed below and in the current Ph.D. requirements document. Updated course lists are available at the E-IPER (<http://e-iper.stanford.edu/academics/phd/phd-focal-areas>) web site. Fulfillment of the breadth requirement must be certified by the student's lead faculty advisers and the E-IPER faculty director.
3. Fulfillment of depth in the student's chosen fields of inquiry through additional courses, research, and/or independent studies. The student's lead faculty advisers must certify that a) the two fields of inquiry are sufficiently distinct such that work integrating the two is interdisciplinary; and b) the student's course work and independent study has provided the substantial depth of understanding normally expected at the Ph.D. level.
4. Completion of quarterly meetings with advisers during the first year, culminating in the Spring Quarter First Year Big Picture advising meeting; and at minimum, annual meetings thereafter, including the Spring Quarter Second Year Meeting of the Minds, prior to which students must formally identify their two lead advisers and two distinct fields of inquiry.
5. Submission of a candidacy plan by end of Spring Quarter of the second year, for review at the Second Year Meeting of the Minds and subject to the approval of E-IPER's faculty director. The candidacy plan should document how the student has fulfilled the program requirements to date and include a summary of research ideas and a list of faculty who might serve as qualifying exam committee members.
6. Completion of the oral qualifying exam and completion of the requirements for candidacy, including at least 25 graded graduate course units (200 level and above) with at least a 'B' average, by

the end of Winter Quarter of the third year. The oral qualifying exam committee should include the student's two lead advisers and 2-3 other faculty with expertise in the student's research area. The majority of the oral qualifying exam committee should be members of the Academic Council; the chair of the committee must be an Academic Council member and may not be one of the student's two lead advisers. In exceptional cases, the committee may include a member-at-large who is not a Stanford faculty member as a fourth or fifth member.

7. Completion of a written dissertation, approved by the student's dissertation reading committee consisting of the student's lead advisers and at least one other member, and passage of the University oral examination in defense of the dissertation following the guidelines outlined in the "Graduate Degrees" section of this bulletin. The University oral examination committee comprises the student's two lead advisers, at least two additional members, and a chair who is appointed in a department outside that of the lead advisers, all of whom are normally Academic Council members. Appointment of a non-Academic Council member must be petitioned and approved by the faculty director.

In addition to the requirements listed above, all Ph.D. students must:

1. Serve as a teaching assistant for at least one quarter in a course with a discussion section or with an opportunity to lecture in at least two class sessions, in any department or program, including ENVRES 320 Designing Environmental Research or ENVRES 330 Research Approaches for Environmental Problem Solving. Seminars, including Introductory Seminars, may not be used to fulfill this requirement. Students should fulfill the teaching requirement by the end of the third year unless they obtain a firm commitment from a faculty member to TA a future course.
2. On an ongoing basis, submit grant proposals for external funding, defined as fellowship and/or research funds provided by a government agency, a private foundation, or a University entity other than E-IPER or the School of Earth Sciences.
3. Participate each year in a Spring Quarter annual review in which the student and lead advisers submit progress reports for review by the E-IPER academic guidance committee.

The following courses may be taken to satisfy the breadth requirement in E-IPER's four focal areas. Updated lists are available at the E-IPER (<http://e-iper.stanford.edu/academics/phd/phd-focal-areas>) web site. Students should consult the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site to determine the course schedule, location, and prerequisites.

## Culture and Institutions Focal Area

At least two courses are required. In consultation with advisers, students may choose a course not listed below provided it meets the criteria for this focal area's subject knowledge. Students are advised to seek approval from their lead advisers in advance and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

		Units
ANTHRO 247	Nature, Culture, Heritage	5
ANTHRO 262	Indigenous Peoples and Environmental Problems	3-5
CEE 265D	Water and Sanitation in Developing Countries	1-3
CEE 275A	California Coast: Science, Policy, and Law	3-4
EARTHSYS 112	Human Society and Environmental Change	4
EARTHSYS 224	Environmental Justice: Local, National, and International Dimensions	4
EARTHSYS 275	California Coast: Science, Policy, and Law	3-4
ECON 164	Law, Economics and Politics of International Trade	5

ECON 228	Institutions and Organizations in Historical Perspective	2-5
EDUC 288	Organizational Analysis	4-5
EDUC 291X	Introduction to Survey Research	3-4
EDUC 332X	Theory and Practice of Environmental Education	3
EDUC 357X	Science and Environmental Education in Informal Contexts	3-4
EDUC 371X	Social Psychology and Social Change	2-3
EDUC 374	Philanthropy and Civil Society	1-3
EDUC 375A	Seminar on Organizational Theory	5
EDUC 375B	Seminar on Organizations: Institutional Analysis	3-5
EDUC 377	Comparing Institutional Forms: Public, Private, and Nonprofit	4
EESS 112	Human Society and Environmental Change	4
GSBGEN 346	Comparing Institutional Forms: Public, Private, and Nonprofit	4
HISTORY 103D	Human Society and Environmental Change	4
HISTORY 376	Modern Brazil	4-5
IPS 250	International Conflict: Management and Resolution	3
LAW 280	Toxic Harms	3
LAW 455	Energy Law	3
LAW 603	Environmental Law and Policy	3
LAW 656	International Conflict Resolution	3
MS&E 252	Decision Analysis I: Foundations of Decision Analysis	3-4
MS&E 383	Doctoral Seminar on Ethnographic Research	3
MS&E 389	Seminar on Organizational Theory	5
OB 630	Social Norms	4
OB 673	Perspectives on the Social Psychology of Organizations	3
OB 676	Social and Political Process in Organizations	4
POLISCI 334	Philanthropy and Civil Society	1-3
POLISCI 351A	Foundations of Political Economy	4
POLISCI 440A	Theories in Comparative Politics	5
POLISCI 440B	Political Economy of Development	5
POLISCI 440C	Methods in Comparative Politics	5
POLISCI 444	Comparative Political Economy: Advanced Industrial Societies	3-5
PSYCH 223	Social Norms	4
PSYCH 265	Social Psychology and Social Change	2-3
PSYCH 383	International Conflict: Management and Resolution	3
PUBLPOL 202	Organizations and Public Policy	4-5
PUBLPOL 294	Technology Policy	3-4
PUBLPOL 317	Comparing Institutional Forms: Public, Private, and Nonprofit	4
SOC 314	Economic Sociology	4-5
SOC 318	Social Movements and Collective Action	4-5
SOC 320	Foundations of Social Psychology	4-5
SOC 362	Organization and Environment	3
SOC 363A	Seminar on Organizational Theory	5
SOC 363B	Seminar on Organizations: Institutional Analysis	3-5
SOC 366	Organizational Analysis	4-5
SOC 367	Institutional Analysis of Organizations	3-5
SOC 374	Philanthropy and Civil Society	1-3
SOC 377	Comparing Institutional Forms: Public, Private, and Nonprofit	4

## Economics and Policy Analysis Focal Area

One of the prescribed course series listed below, or at least one intermediate course and one advanced course as defined below, satisfies the minimum breadth requirement. Note that any necessary prerequisites (e.g., ECON 50 Economic Analysis I, ECON 51 Economic Analysis II) are additions to the possible sequences below. Students are advised to seek approval from their lead advisers in advance and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

### Core Economics Series (regular or "N" series for non-economics Ph.D. students)

		Units
ECON 202	Core Economics: Modules 1 and 2	2-5
ECON 203	Core Economics: Modules 5 and 6	2-5
ECON 204	Core Economics: Modules 9 and 10	2-5

or

### Public Policy Series

		Units
PUBLPOL 301A	Microeconomics	4
PUBLPOL 301B	Cost-Benefit Analysis and Evaluation	4-5

or at least one intermediate course and at least one advanced course from the lists below:

### Intermediate Courses

		Units
ECON 106	World Food Economy	5
ECON 118	Development Economics	5
ECON 155	Environmental Economics and Policy	5
MS&E 241	Economic Analysis	3-4
MS&E 248	Economics of Natural Resources	3-4
PUBLPOL 202	Organizations and Public Policy	4-5
PUBLPOL 204	Economic Policy Analysis	4-5
PUBLPOL 302B	Economic Analysis of Law	4

### Advanced Courses

		Units
ECON 250	Environmental Economics	2-5
ECON 251	Natural Resource and Energy Economics	2-5
MS&E 243	Energy and Environmental Policy Analysis	3

Students who choose economics and/or policy analysis as a field of inquiry are encouraged, and may be required by their advisers, to complete one of the prescribed series in addition to taking one or more of the advanced courses listed above.

## Engineering and Technology Focal Area

At least one course is required. In consultation with advisers, students may choose a course not listed below provided it meets the criteria for this focal area's subject knowledge. Students are advised to seek approval from their lead advisers in advance and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

		Units
CEE 101B	Mechanics of Fluids	4
CEE 172	Air Quality Management	3
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 177	Aquatic Chemistry and Biology	4
CEE 201D	Computations in Civil and Environmental Engineering	3
CEE 207A	Energy Resources	4-5
CEE 210	Building Information Modeling	2-4
CEE 215	Goals and Methods of Sustainable Building Projects	3
CEE 229	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future	3
CEE 260A	Physical Hydrogeology	4
CEE 262B	Transport and Mixing in Surface Water Flows	3-4
CEE 263A	Air Pollution Modeling	3-4
CEE 263C	Weather and Storms	3
CEE 264A	Rivers, Streams, and Canals	3-4
CEE 265A	Sustainable Water Resources Development	3
CEE 266B	Floods and Droughts, Dams and Aqueducts	3
CEE 270	Movement and Fate of Organic Contaminants in Waters	3
CEE 275A	California Coast: Science, Policy, and Law	3-4
CS 448B	Data Visualization	3
EARTHYSYS 211	Fundamentals of Modeling	3-5
EARTHYSYS 275	California Coast: Science, Policy, and Law	3-4
EE 293A	Fundamentals of Energy Processes	3-4
EE 293B	Fundamentals of Energy Processes	3
EESS 211	Fundamentals of Modeling	3-5
EESS 220	Physical Hydrogeology	4
ENERGY 293A	Fundamentals of Energy Processes	3-4
ENERGY 293B	Fundamentals of Energy Processes	3
HISTORY 401A	Spatial History: Concepts, Methods, Problems	4-5
MS&E 250A	Engineering Risk Analysis	3

## Natural Sciences Focal Area

At least two courses are required. In consultation with advisers, students may choose a course not listed below provided it meets the criteria for this focal area's subject knowledge. Students are advised to seek approval from their lead advisers in advanced and are required to obtain their advisers' signatures on the breadth certification form as verification that they have met this requirement.

		Units
BIO 101	Ecology	4
BIO 102	Demography: Health, Development, Environment	3
BIO 117	Biology and Global Change	4
BIO 121	Biogeography	3
BIO 136	Evolutionary Paleobiology	4
BIO 139	Biology of Birds	3
BIO 144	Conservation Biology	3-4
BIO 175	Tropical Ecology and Conservation	5
BIO 216	Terrestrial Biogeochemistry	3
BIO 247	Controlling Climate Change in the 21st Century	3
BIO 264	Biosphere-Atmosphere Interactions	4
BIOHOPK 263H	Oceanic Biology	4
BIOHOPK 272H	Marine Ecology	5

CEE 260A	Physical Hydrogeology	4
CEE 262D	Introduction to Physical Oceanography	4
CEE 263C	Weather and Storms	3
CEE 266A	Watersheds and Wetlands	3
CEE 272	Coastal Contaminants	3-4
CEE 274A	Environmental Microbiology I	3
CEE 274B	Microbial Bioenergy Systems	3
CEE 275A	California Coast: Science, Policy, and Law	3-4
CHEMENG 274	Environmental Microbiology I	3
CHEMENG 456	Microbial Bioenergy Systems	3
EARTHSYS 104	The Water Course	3
EARTHSYS 111	Biology and Global Change	4
EARTHSYS 144	Fundamentals of Geographic Information Science (GIS)	4
EARTHSYS 155	Science of Soils	3-4
EARTHSYS 208	Coastal Wetlands	3
EARTHSYS 241	Remote Sensing of the Oceans	3-4
EARTHSYS 242	Remote Sensing of Land	4
EARTHSYS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
EARTHSYS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
EARTHSYS 247	Controlling Climate Change in the 21st Century	3
EARTHSYS 256	Soil and Water Chemistry	1-4
EARTHSYS 258	Geomicrobiology	3
EARTHSYS 275	California Coast: Science, Policy, and Law	3-4
EARTHSYS 284	Climate and Agriculture	3-4
EESS 111	Biology and Global Change	4
EESS 155	Science of Soils	3-4
EESS 164	Fundamentals of Geographic Information Science (GIS)	4
EESS 215	Earth System Dynamics	4
EESS 216	Terrestrial Biogeochemistry	3
EESS 220	Physical Hydrogeology	4
EESS 240	Advanced Oceanography	3
EESS 241	Remote Sensing of the Oceans	3-4
EESS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
EESS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
EESS 256	Soil and Water Chemistry	1-4
EESS 258	Geomicrobiology	3
EESS 259	Environmental Microbial Genomics	1-3
EESS 262	Remote Sensing of Land	4
EESS 284	Climate and Agriculture	3-4
GEOPHYS 104	The Water Course	3
GEOPHYS 246A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation	3
GEOPHYS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
GES 170	Environmental Geochemistry	4
HUMBIO 112	Conservation Biology	3-4
HUMBIO 119	Demography: Health, Development, Environment	3

*Director:* Peter Vitousek (Biology)

*Faculty:* Nicole Ardoin (Education, Woods Institute for the Environment), Kevin Arrigo (Environmental Earth System Science), Kenneth J. Arrow

(Economics, emeritus), Gregory Asner (Global Ecology, Carnegie Institution), Shilajeet Banerjee (Mechanical Engineering), Stephen Barley (Management Science and Engineering), William Barnett (Business), Michele Barry (Medicine), Sally M. Benson (Energy Resources Engineering, Global Climate and Energy Program), Sarah L. Billington (Civil and Environmental Engineering), Douglas W. Bird (Anthropology), Rebecca Bliege Bird (Anthropology), Barbara Block (Biology), Alexandria Boehm (Civil and Environmental Engineering), Carol Boggs (Biology), Jef Caers (Energy Resources Engineering), Ken Caldeira (Global Ecology, Carnegie Institution), Margaret Caldwell (Law), Karen Casciotti (Environmental Earth System Science), Page Chamberlain (Environmental Earth System Science), Joshua Cohen (Political Science), Craig S. Criddle (Civil and Environmental Engineering), Larry B. Crowder (Biology), Lisa Curran (Anthropology, Woods Institute for the Environment), Gretchen C. Daily (Biology), Jennifer Davis (Civil and Environmental Engineering, Woods Institute for the Environment), Noah Diffenbaugh (Environmental Earth System Science, Woods Institute for the Environment), Rodolfo Dirzo (Biology), Robert B. Dunbar (Environmental Earth System Science), William H. Durham (Anthropology), Anne Ehrlich (Biology), Paul Ehrlich (Biology), Gary Ernst (Geological and Environmental Sciences, emeritus), Walter Falcon (Freeman Spogli Institute for International Studies, emeritus), Scott Fendorf (Environmental Earth System Science), James Ferguson (Anthropology), Christopher B. Field (Global Ecology, Carnegie Institution), Martin Fischer (Civil and Environmental Engineering), Zephyr Frank (History), David Freyberg (Civil and Environmental Engineering), Oliver Fringer (Civil and Environmental Engineering), Tadashi Fukami (Biology), Margot Gerritsen (Energy Resources Engineering), Steven Gorelick (Environmental Earth System Science), Mark Granovetter (Sociology), Elizabeth Hadly (Biology), Dan Iancu (Business), Mark Jacobson (Civil and Environmental Engineering), James Holland Jones (Anthropology, Woods Institute for the Environment), Terry Karl (Political Science), David Kennedy (History), Donald Kennedy (Biology, emeritus, Woods Institute for the Environment), Julie Kennedy (Environmental Earth System Science), Herve Kieffel (Management Science and Engineering), Brian Knutson (Psychology), Jeffrey Koseff (Civil and Environmental Engineering, Woods Institute for the Environment), Anthony Kovscek (Energy Resources Engineering), Eric Lambin (Environmental Earth System Science, Woods Institute for the Environment), Raymond Levitt (Civil and Environmental Engineering), David Lobell (Environmental Earth System Science, Woods Institute for the Environment), Richard Luthy (Civil and Environmental Engineering), Janet Martinez (Law), Gilbert M. Masters (Civil and Environmental Engineering, emeritus), Michael D. Mastrandrea (Woods Institute for the Environment), Pamela Matson (Dean, School of Earth Sciences), Douglas McAdam (Sociology), Michael D. McGehee (Materials Science and Engineering), Lynn Meskell (Anthropology), Anna Michalak (Global Ecology, Carnegie Institution), Fiorenza Micheli (Biology), Grant Miller (Medicine), Stephen Monismith (Civil and Environmental Engineering), Harold Mooney (Biology), Clayton Nall (Political Science), Rosamond Naylor (Environmental Earth System Science), Leonard Ortolano (Civil and Environmental Engineering), Stephen Palumbi (Biology), Erica Plambeck (Business), Walter W. Powell (Education), Dariush Rafinejad (Management Science and Engineering), Ram Rajagopal (Civil and Environmental Engineering), Hayagreeva Rao (Business), Stefan J. Reichelstein (Business), Thomas N. Robinson (Medicine), Terry L. Root (Woods Institute for the Environment), Robert Sapolsky (Biology), Debra Satz (Philosophy), Gary Schoolnik (Medicine), Richard Scott (Sociology), Deborah Sivas (Law), Sarah A. Soule (Business), Charles Sprenger (Economics), Stephen Stedman (Freeman Spogli Institute for International Studies), James Sweeney (Management Science and Engineering, Precourt Energy Efficiency Center), Barton Thompson (Law, Woods Institute for the Environment), Shripad Tuljapurkar (Biology), Peter Vitousek (Biology), Michael Wara (Law), Jeremy Weinstein (Political Science), John Weyant (Management Science and Engineering, Precourt Energy Efficiency Center), Richard White (History), Jennifer Wilcox (Energy Resources Engineering), Michael Wilcox (Anthropology), Mark Zoback (Geophysics)

Lecturer: Thomas Hayden

# Energy Resources Engineering

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Courses offered by the Department of Energy Resources Engineering are listed under the subject code ENERGY on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENERGY&filter-catalognumber-ENERGY=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENERGY&filter-catalognumber-ENERGY=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENERGY&filter-catalognumber-ENERGY=on>).

The Department of Energy Resources Engineering (ERE) awards the following degrees: the Bachelor of Science, Master of Science, Engineer, and Doctor of Philosophy in Energy Resources Engineering. The department also awards the Master of Science, Engineer, and Doctor of Philosophy in Petroleum Engineering. Consult the ERE student services office to determine the relevant program.

Energy resources engineers are concerned with the design of processes for energy recovery. Included in the design process are characterizing the spatial distribution of hydrocarbon and geothermal reservoir properties, drilling wells, designing and operating production facilities, selecting and implementing methods for enhancing fluid recovery, examining the environmental aspects of petroleum and geothermal exploration and production, monitoring reservoirs, and predicting recovery process performance. The program also has a strong interest in related energy topics such as renewable energy, global climate change, CO<sub>2</sub> sequestration, clean energy conversions (e.g., "clean coal"), and energy systems. The Energy Resources Engineering curriculum provides a sound background in basic sciences and their application to practical problems to address the complex and changing nature of the field. Course work includes the fundamentals of chemistry, computer science, engineering, geology, geophysics, mathematics, and physics. Applied courses cover most aspects of energy resources engineering and some related fields such as geothermal engineering and geostatistics. The curriculum emphasizes the fundamental aspects of fluid flow in the subsurface. These principles apply equally well to optimizing oil recovery from petroleum reservoirs, geothermal energy production and remediating contaminated groundwater systems.

Faculty and graduate students conduct research in areas including: enhanced oil recovery by thermal means, gas injection, and the use of chemicals; geostatistical reservoir characterization and mathematical modeling; geothermal engineering; natural gas engineering; production optimization; data assimilation and uncertainty modeling; properties of petroleum fluids; well test analysis; carbon sequestration; clean energy conversions; and energy system modeling and optimization. Undergraduates are encouraged to participate in research projects.

The department is housed in the Green Earth Sciences Building. It operates laboratories for research in enhanced oil recovery processes, geological carbon storage operations, clean energy conversions, and geothermal engineering. Students have access to a variety of computers, computing platforms and software for research and course work.

## Mission of the Undergraduate Program in Energy Resources Engineering

The mission of the Energy Resources Engineering major is to provide students with the engineering skills and foundational knowledge needed to flourish as technical leaders within the energy industry. Such skills and knowledge include resource assessment, choices among energy alternatives, and carbon management, as well as the basic scientific background and technical skills common to engineers. The curriculum is designed to prepare students for immediate participation in many aspects of the energy industry and graduate school.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. apply skills developed in fundamental courses to engineering problems.
2. research, analyze, and synthesize solutions to an original and contemporary energy problem.
3. work independently and as part of a team to develop and improve engineering solutions.
4. apply written, visual, and oral presentation skills to communicate scientific knowledge.

## Graduate Programs in Energy Resources Engineering

The Energy Resources Engineering department offers two distinct degree programs at both the M.S and Ph.D. levels. One program leads to the degrees of M.S. or Ph.D. in Petroleum Engineering, and the other leads to the degrees of M.S. or Ph.D. in Energy Resources Engineering. The Engineer degree, which is offered in either Petroleum Engineering or Energy Resources Engineering, is an extended form of the M.S. degree with additional course work and research.

## Learning Outcomes (Graduate)

The objective is to prepare students to be technical leaders in the energy industry, academia and research organizations through completion of fundamental courses in the major field and in related sciences, as well as through independent research. Students are expected to:

1. apply skills developed in fundamental courses to engineering problems.
2. research, analyze, and synthesize solutions to an original and contemporary energy problem.
3. work independently and as part of a team to develop and improve engineering solutions.

4. apply written, visual, and oral presentation skills to communicate scientific knowledge.
5. MS students are expected to develop in-depth technical understanding of energy problems at an advanced level.
6. PhD students are expected to complete a scientific investigation that is significant, challenging and original.

## Bachelor of Science in Energy Resources Engineering

The four-year program leading to the B.S. degree provides a foundation for careers in many facets of the energy industry. The curriculum includes basic science and engineering courses that provide sufficient depth for a wide spectrum of careers in the energy and environmental fields.

One of the goals of the program is to provide experience integrating the skills developed in individual courses to address a significant design problem. In ENERGY 199 Senior Project and Seminar in Energy Resources, taken in the senior year, student teams identify and propose technical solutions for an energy-resource related problem of current interest.

### Program

The requirements for the B.S. degree in Energy Resources Engineering are similar, but not identical, to those described in the "School of Engineering" section of this bulletin. Students must satisfy the University general education, writing, and language requirements. The normal Energy Resources Engineering undergraduate program automatically satisfies the University General Education Requirements (GERs) in the Disciplinary Breadth areas of Natural Sciences, Engineering and Applied Sciences, and Mathematics.

Engineering fundamentals courses and Energy Resources Engineering depth and elective courses must be taken for a letter grade.

The Energy Resources Engineering undergraduate curriculum is designed to prepare students for participation in the energy industry or for graduate studies, while providing requisite skills to evolve as the energy landscape shifts over the next half century. The program provides a background in mathematics, basic sciences, and engineering fundamentals such as multiphase fluid flow in the subsurface. In addition, the curriculum is structured with flexibility that allows students to explore energy topics of particular individual interest and to study abroad.

In brief, the unit and subject requirements are:

	<b>Units</b>
Energy Resources Core	15-16
Energy Resources Depth	18
Mathematics	25
Engineering Fundamentals and Depth	20-24
Science	29-30
Technology in Society	3-5
University Requirements: IHUM, GERs, Writing, Language	60-70
<b>Total Units</b>	<b>170-188</b>

The following courses constitute the normal program leading to a B.S. in Energy Resources Engineering. The program may be modified to meet a particular student's needs and interests with the advisor's prior approval.

## Required Core in Energy Resources Engineering

**Units**

The following courses constitute the core program in Energy Resources Engineering (15-16)

ENERGY 101	Energy and the Environment	3
ENERGY 104	Transition to sustainable energy systems	3
ENERGY 120	Fundamentals of Petroleum Engineering	3
ENERGY 160	Modeling Uncertainty in the Earth Sciences	3
ENERGY 199	Senior Project and Seminar in Energy Resources (WIM)	3-4

### Mathematics (25)

Select one of the following Series (A or B): 10

#### Series A

MATH 41	Calculus
MATH 42	Calculus

#### Series B

MATH 19	Calculus
MATH 20	Calculus
MATH 21	Calculus

And the following:

MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
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or CME 100 Vector Calculus for Engineers

MATH 52	Integral Calculus of Several Variables	5
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or CME 104 Linear Algebra and Partial Differential Equations for Engineers

MATH 53	Ordinary Differential Equations with Linear Algebra	5
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or CME 102 Ordinary Differential Equations for Engineers

### Science (29-32)

CHEM 31A	Chemical Principles I	4-5
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or CHEM 31X Chemical Principles

CHEM 31B	Chemical Principles II	4-5
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or CHEM 31X Chemical Principles

CHEM 33	Structure and Reactivity	4
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PHYSICS 41	Mechanics	4
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PHYSICS 43	Electricity and Magnetism	4
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PHYSICS 45	Light and Heat	4
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PHYSICS 46	Light and Heat Laboratory	1
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GES 1A	Introduction to Geology: The Physical Science of the Earth	4-5
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or GES 1C Introduction to Geology: Dynamic Earth

### Engineering Fundamentals (20-24)

CS 106A	Programming Methodology	3-5
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or CS 106X Programming Abstractions (Accelerated)

CS 106B	Programming Abstractions	3-5
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or CS 106X Programming Abstractions (Accelerated)

ENGR 14	Intro to Solid Mechanics	4
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ENGR 30	Engineering Thermodynamics	3
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ENGR 60	Engineering Economy	3
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ME 70	Introductory Fluids Engineering	4
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Technology in Society, 1 course

## Earth and Energy Depth Concentration

Choose courses from the list below for a total of at least 18 units. At least one course must be completed in each category. Courses must be planned in consultation with the student's academic advisor. Appropriate substitutions are allowed with the consent of the advisor.

	Units
<b>Fluid Flow and the Subsurface (17)</b>	
ENERGY 120A Flow Through Porous Media Laboratory	1
ENERGY 121 Fundamentals of Multiphase Flow	3
ENERGY 130 Well Log Analysis I	3
ENERGY 175 Well Test Analysis	3
ENERGY 180 Oil and Gas Production Engineering	3
ENGR 62 Introduction to Optimization	4
<b>3D Modeling of Subsurface Structures (17-20)</b>	
ENERGY 125 Modeling and Simulation for Geoscientists and Engineers	3
ENERGY 141 Seismic Reservoir Characterization	3-4
ENERGY 146 Reservoir Characterization and Flow Modeling with Outcrop Data	3
GEOPHYS 112 Exploring Geosciences with MATLAB	1-3
GEOPHYS 182 Reflection Seismology	3
GES 151 Sedimentary Geology and Petrography: Depositional Systems	4
<b>Earth and Energy Systems (31-34)</b>	
ENERGY 102 Renewable Energy Sources and Greener Energy Processes	3
ENERGY 153 Carbon Capture and Sequestration	3-4
ENERGY 269 Geothermal Reservoir Engineering	3
ENERGY 191 Optimization of Energy Systems	3
ENERGY 301 The Energy Seminar	1
CEE 64 Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 70 Environmental Science and Technology	3
CEE 176B Electric Power: Renewables and Efficiency	3-4
GEOPHYS 104 The Water Course	3
GEOPHYS 150 Geodynamics: Our Dynamic Earth	3
MATSCI 156 Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	3-4

## Honors Program

The program in Energy Resources Engineering leading to the Bachelor of Science with Honors provides an opportunity for independent study and research on a topic of special interest and culminates in a written report and oral presentation.

The Honors Program is open to students with a grade point average (GPA) of at least 3.5 in all courses required for the ERE major and minimum of 3.0 in all University course work. Qualified students intending to pursue honors must submit an Honors Program Application to the Undergraduate Program Director no later than the eighth week of their ninth quarter, but students are encouraged to apply to the program during Winter Quarter of their junior year. The application includes a short form, an unofficial transcript, and a 2-3 page research proposal prepared by the student and endorsed by a faculty member who will serve as the research advisor.

Upon approval, students enroll in the Honors Program via Axxess. Students must enroll in a total of 9 units of ENERGY 193 Undergraduate Research Problems; these units may be spread out over the course of the senior year, and may include previous enrollment units for the same research project. Research undertaken for the Honors Program cannot be used as a substitute

for regularly required courses. A formal written report must be submitted to the student's research advisor no later than the fourth week of the student's final quarter, and the report must be read, approved, and signed by the student's faculty advisor and a second member of the faculty. Each honors candidate must make an oral presentation of his or her research results.

## Minor in Energy Resources Engineering

The minor in Energy Resources Engineering requires the following three courses plus three additional electives. Courses must be planned in consultation with an ERE advisor. Appropriate substitutions are allowed with the consent of the advisor.

### Required courses

	Units
ENERGY 101 Energy and the Environment	3
ENERGY 120 Fundamentals of Petroleum Engineering	3
ENERGY 160 Modeling Uncertainty in the Earth Sciences	3

### Elective courses

	Units
Select at least three of the following:	
ENERGY 102 Renewable Energy Sources and Greener Energy Processes	3
ENERGY 104 Transition to sustainable energy systems	3
ENERGY 121 Fundamentals of Multiphase Flow	3
ENERGY 125 Modeling and Simulation for Geoscientists and Engineers	3
ENERGY 130 Well Log Analysis I	3
ENERGY 141 Seismic Reservoir Characterization	3
ENERGY 146 Reservoir Characterization and Flow Modeling with Outcrop Data	3
ENERGY 153 Carbon Capture and Sequestration	3
ENERGY 269 Geothermal Reservoir Engineering	3
ENERGY 175 Well Test Analysis	3
ENERGY 180 Oil and Gas Production Engineering	3
GEOPHYS 182 Reflection Seismology	3
GES 151 Sedimentary Geology and Petrography: Depositional Systems	4

## Master of Science in Petroleum Engineering

The objective is to prepare the student for professional work in the energy industry, or for doctoral studies, through completion of fundamental courses in the major field and in related sciences as well as independent research.

Students entering the graduate program are expected to have an undergraduate-level engineering or physical science background. Competence in computer programming in a high-level language (CS 106X Programming Abstractions (Accelerated) or the equivalent) and knowledge of engineering and geological fundamentals (ENERGY 120 Fundamentals of Petroleum Engineering, ENERGY 130 Well Log Analysis I, and GES 151 Sedimentary Geology and Petrography: Depositional Systems) are prerequisites for taking most graduate courses.



The following are minimum requirements for a student in the Department of Energy Resources Engineering to remain in good academic standing regarding course work:

1. no more than one incomplete grade at any time
2. a cumulative grade point average (GPA) of 3.0
3. a grade point average (GPA) of 2.7 each quarter
4. a minimum of 15 units completed within each two quarter period (excluding Summer Quarter).

Unless otherwise stated by the instructor, incomplete grades in courses within the department are changed to 'NP' (not passed) at the end of the quarter after the one in which the course was given. This one quarter limit is a different constraint from the maximum one-year limit allowed by the University.

Academic performance is reviewed each quarter by a faculty committee. At the beginning of the next quarter, any student not in good academic standing receives a letter from the committee or department chair stating criteria that must be met for the student to return to good academic standing. If the situation is not corrected by the end of the quarter, possible consequences include termination of financial support, termination of departmental privileges, and termination from the University.

Students funded by research grants or fellowships from the department are expected to spend at least half of their time (a minimum of 20 hours per week) on research. Continued funding is contingent upon satisfactory research effort and progress as determined by the student's adviser. After Autumn Quarter of the first year, students receive a letter from the department chair concerning their research performance. If problems are identified and they persist through the second quarter, a warning letter is sent. Problems persisting into a third quarter may lead to loss of departmental support including tuition and stipend. Similar procedures are applied in subsequent years.

A balanced master's degree program including engineering course work and research requires a minimum of one maximum-tuition academic year beyond the baccalaureate to meet the University residence requirements. Most full-time students spend at least one additional summer to complete the research requirement. An alternative master's degree program based only on course work is available, also requiring at least one full tuition academic year to meet University residence requirements.

M.S. students who anticipate continuing in the Ph.D. program should follow the research option. M.S. students receiving financial aid normally require two academic years to complete the degree. Such students must take the research option.

The candidate must fulfill the following requirements:

1. Register as a graduate student for at least 45 units.
2. Submit a program proposal for the Master's degree approved by the adviser during the first quarter of enrollment.
3. Complete 45 units with a grade point average (GPA) of at least 3.0. This requirement is satisfied by taking the core sequence, selecting one of the seven elective sequences, an appropriate number of additional courses from the list of technical electives, and completing 6 units of master's level research. Students electing the course work only M.S. degree are strongly encouraged to select an additional elective sequence in place of the research requirement. Students interested in continuing for a Ph.D. are expected to choose the research option and enroll in 6 units of ENERGY 361 Master's Degree Research in Energy Resources Engineering. All courses must be taken for a letter grade.
4. Students entering without an undergraduate degree in Petroleum Engineering must make up deficiencies in previous training. Not more than 10 units of such work may be counted as part of the minimum total of 45 units toward the M.S. degree.

Research subjects include certain groundwater hydrology and environmental problems, energy industry management, flow of non-

Newtonian fluids, geothermal energy, natural gas engineering, oil and gas recovery, pipeline transportation, production optimization, reservoir characterization and modeling, carbon sequestration, reservoir engineering, reservoir simulation, and transient well test analysis.

## Recommended Courses and Sequences

The following list is recommended for most students. With the prior special consent of the student's adviser, courses listed under technical electives may be substituted based on interest or background.

### Core Sequence

		Units
ENERGY 175	Well Test Analysis	3
or ENERGY 130	Well Log Analysis I	
ENERGY 221	Fundamentals of Multiphase Flow	3
ENERGY 222	Advanced Reservoir Engineering <sup>1</sup>	3
ENERGY 246	Reservoir Characterization and Flow Modeling with Outcrop Data	3
ENERGY 251	Thermodynamics of Equilibria <sup>2</sup>	3
CME 200	Linear Algebra with Application to Engineering Computations	3
CME 204	Partial Differential Equations in Engineering	3
Total Units		21

### Elective Sequence

		Units
Select one of the following Series:		9-14
Crustal Fluids:		
GEOPHYS 200	Fluids and Flow in the Earth: Computational Methods	
EESS 220	Physical Hydrogeology	
EESS 221	Contaminant Hydrogeology	
Environmental:		
ENERGY 227	Enhanced Oil Recovery	
EESS 221	Contaminant Hydrogeology	
And two of the following:		
ENERGY 240	Geostatistics	
ENERGY 260	Modeling Uncertainty in the Earth Sciences	
CEE 270	Movement and Fate of Organic Contaminants in Waters	
CEE 273	Aquatic Chemistry	
CEE 274A	Environmental Microbiology I	
Enhanced Recovery:		
EESS 220	Physical Hydrogeology	
ENERGY 225	Theory of Gas Injection Processes	
ENERGY 226	Thermal Recovery Methods	
ENERGY 227	Enhanced Oil Recovery	
Geostatistics and Reservoir Modeling:		
ENERGY 240	Geostatistics	
ENERGY 241	Seismic Reservoir Characterization	
GEOPHYS 182	Reflection Seismology	
or GEOPHYS 262		
Geothermal:		
ENERGY 269	Geothermal Reservoir Engineering	

or ENERGY 293A	Fundamentals of Energy Processes
CHEMENG 120B	Energy and Mass Transport
ME 131A	Heat Transfer
<b>Reservoir Performance:</b>	
ENERGY 223	Reservoir Simulation
ENERGY 280	Oil and Gas Production Engineering
GEOPHYS 202	Reservoir Geomechanics
<b>Simulation and Optimization:</b>	
ENERGY 223	Reservoir Simulation
ENERGY 224	Advanced Reservoir Simulation
ENERGY 284	Optimization and Inverse Modeling
<b>Renewable Energy:</b>	
ENERGY 102	Renewable Energy Sources and Greener Energy Processes
ENERGY 293A	Fundamentals of Energy Processes
ENERGY 293B	Fundamentals of Energy Processes
<b>Total Units</b>	<b>9-14</b>

## Research Sequence

ENERGY 361	Master's Degree Research in Energy Resources Engineering <sup>1</sup>	Units 1-6
<b>Total Units</b>		<b>1-6</b>

<sup>1</sup> Students choosing the company sponsored course-work-only for the M.S. degree may substitute an additional elective sequence in place of the research.

## Technical Electives

Technical electives from the following list of advanced-level courses usually complete the M.S. program. In unique cases, when justified and approved by the adviser prior to taking the course, courses listed here may be substituted for courses listed above in the elective sequences.

		Units
ENERGY 130	Well Log Analysis I	3
ENERGY 224	Advanced Reservoir Simulation	3
ENERGY 230	Advanced Topics in Well Logging	3
ENERGY 260	Modeling Uncertainty in the Earth Sciences	3
ENERGY 267	Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties	3
ENERGY 269	Geothermal Reservoir Engineering	3
ENERGY 273	Special Topics in Petroleum Engineering	1-3
ENERGY 280	Oil and Gas Production Engineering	3
ENERGY 281	Applied Mathematics in Reservoir Engineering	3
ENERGY 284	Optimization and Inverse Modeling	3
ENERGY 301	The Energy Seminar	1
CME 204	Partial Differential Equations in Engineering	3
ENERGY 293A	Fundamentals of Energy Processes	3-4
ENERGY 293B	Fundamentals of Energy Processes	3
GEOPHYS 182	Reflection Seismology	3
GEOPHYS 190	Near-Surface Geophysics	3
GEOPHYS 202	Reservoir Geomechanics	3

# Master of Science in Energy Resources Engineering

The objective of the M.S. degree in Energy Resources Engineering is to prepare the student either for a professional career or for doctoral studies. Students in the M.S. degree program must fulfill the following:

- Complete a 45-unit program of study. The degree has two options:
  - a course work degree, requiring 45 units of course work
  - a research degree, of which a minimum of 39 units must be course work, with the remainder consisting of no more than 6 research units.
- Course work units must be divided among two or more scientific and/or engineering disciplines and can include the core courses required for the Ph.D. degree.
- All courses must be taken for a letter grade.
- The program of study must be approved by the academic adviser and the department graduate program committee.
- Students taking the research-option degree are required to complete an M.S. thesis, approved by the student's thesis committee.

## Recommended Courses and Sequences

The following list is recommended for most students. With the prior consent of the student's adviser, courses listed under technical electives may be substituted based on interest or background.

### Core Sequence

		Units
ENERGY 221	Fundamentals of Multiphase Flow	3
ENERGY 246	Reservoir Characterization and Flow Modeling with Outcrop Data	3
CME 200	Linear Algebra with Application to Engineering Computations	3
CME 204	Partial Differential Equations in Engineering	3
CS 106X	Programming Abstractions (Accelerated)	3-5
ENERGY 293A	Fundamentals of Energy Processes	3-4
ENERGY 293B	Fundamentals of Energy Processes	3
MS&E 248	Economics of Natural Resources	3-4
<b>Total Units</b>		<b>24-28</b>

### Subject Sequence Alternatives

		Units
Select one of the following Series:		15
<b>Geothermal:</b>		
ENERGY 223	Reservoir Simulation	
ENERGY 269	Geothermal Reservoir Engineering	
CHEMENG 120B	Energy and Mass Transport	
GES 217	Faults, Fractures, and Fluid Flow	
ME 131A	Heat Transfer	
ME 370A	Energy Systems I: Thermodynamics	
<b>Low Carbon Energy:</b>		
Select three of the following:		
ENERGY 104	Transition to sustainable energy systems	
ENERGY 223	Reservoir Simulation	

ENERGY 251	Thermodynamics of Equilibria
ENERGY 256	Electronic Structure Theory and Applications to Chemical Kinetics (formerly Energy 252)
ENERGY 269	Geothermal Reservoir Engineering
ENERGY 291	Optimization of Energy Systems
CHEMENG 130	Separation Processes
GES 170	Environmental Geochemistry
GES 171	Geochemical Thermodynamics
ME 370A	Energy Systems I: Thermodynamics
ME 370B	Energy Systems II: Modeling and Advanced Concepts
MATSCI 156	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution
Modeling Natural Resources:	
Select three of the following:	
ENERGY 240	Geostatistics
ENERGY 241	Seismic Reservoir Characterization
ENERGY 260	Modeling Uncertainty in the Earth Sciences
ENERGY 284	Optimization and Inverse Modeling
GEOPHYS 200	Fluids and Flow in the Earth: Computational Methods
Oil and Gas:	
ENERGY 104	Transition to sustainable energy systems
ENERGY 222	Advanced Reservoir Engineering
ENERGY 223	Reservoir Simulation
ENERGY 240	Geostatistics
or ENERGY 260	Modeling Uncertainty in the Earth Sciences
ENERGY 251	Thermodynamics of Equilibria

Total Units 15

## Technical Electives

	Units	
ENERGY 104	Transition to sustainable energy systems	3
ENERGY 120	Fundamentals of Petroleum Engineering	3
ENERGY 130	Well Log Analysis I	3
Any 200-level ENERGY course		
ENERGY 301	The Energy Seminar	1
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CME 206	Introduction to Numerical Methods for Engineering	3
CME 212	Advanced Programming for Scientists and Engineers	3
EARTHSYS 247	Controlling Climate Change in the 21st Century	3
ECON 250	Environmental Economics	2-5
ECON 251	Natural Resource and Energy Economics	2-5
GES 217	Faults, Fractures, and Fluid Flow	3
MATSCI 316	Nanoscale Science, Engineering, and Technology	3
ME 131A	Heat Transfer	3-4
ME 260	Fuel Cell Science and Technology	3
ME 370A	Energy Systems I: Thermodynamics	3
ME 370B	Energy Systems II: Modeling and Advanced Concepts	4
MS&E 248	Economics of Natural Resources	3-4

## Coterminal B.S. and M.S. Program in Energy Resources Engineering

The coterminal B.S./M.S. program offers an opportunity for Stanford University students to pursue a graduate experience while completing the B.S. degree in any relevant major. Energy Resources Engineering graduate students generally come from backgrounds such as chemical, civil, or mechanical engineering; geology or other earth sciences; or physics or chemistry. Students should have a background at least through MATH 53 Ordinary Differential Equations with Linear Algebra and CS 106A Programming Methodology before beginning graduate work in this program.

The two types of M.S. degrees, the course work only degree and the research degree, as well as the courses required to meet degree requirements, are described below in the M.S. section. Both degrees require 45 units and may take from one to two years to complete depending on circumstances unique to each student.

Requirements to enter the program are: two letters of recommendation from faculty members or job supervisors, a statement of purpose, scores from the GRE general test, and a copy of Stanford University transcripts. While the department does not require any specific GPA or GRE score, potential applicants are expected to compete favorably with graduate student applicants.

A Petroleum Engineering or Energy Resources Engineering master's degree can be used as a terminal degree for obtaining a professional job in the petroleum or energy industries, or in any related industry where analyzing flow in porous media or computer simulation skills are required. It can also be a stepping stone to a Ph.D. degree, which usually leads to a professional research job or an academic position.

Students should apply to the program any time after they have completed 105 undergraduate units, and in time to take ENERGY 120 Fundamentals of Petroleum Engineering, the basic introductory course in Autumn Quarter of the year they wish to begin the program. Contact the Department of Energy Resources Engineering to obtain additional information.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see the Publications and Online Guides web site.

## Doctor of Philosophy in Petroleum Engineering or Energy Resources Engineering

The Ph.D. degree is conferred upon demonstration of high achievement in independent research and by presentation of the research results in a written dissertation and oral defense.

The following are minimum requirements for a student in the Department of Energy Resources Engineering to remain in good academic standing regarding course work:

1. no more than one incomplete grade at any time
2. a cumulative grade point average (GPA) of 3.0
3. a grade point average (GPA) of 2.7 each quarter
4. a minimum of 15 units completed within each two quarter period (excluding Summer Quarter).

Unless otherwise stated by the instructor, incomplete grades in courses within the department are changed to 'NP' (not passed) at the end of the quarter after the one in which the course was given. This one quarter limit

is a different constraint from the maximum one-year limit allowed by the University.

Academic performance is reviewed each quarter by a faculty committee. At the beginning of the next quarter, any student not in good academic standing receives a letter from the committee or department chair stating criteria that must be met for the student to return to good academic standing. If the situation is not corrected by the end of the quarter, possible consequences include termination of financial support, termination of departmental privileges, and termination from the University.

Students funded by research grants or fellowships from the department are expected to spend at least half of their time (a minimum of 20 hours per week) on research. Continued funding is contingent upon satisfactory research effort and progress as determined by the student's adviser.

After Autumn Quarter of the first year, students receive a letter from the department chair concerning their research performance. If problems are identified and they persist through the second quarter, a warning letter is sent. Problems persisting into a third quarter may lead to loss of departmental support including tuition and stipend. Similar procedures are applied in subsequent years.

The Ph.D. degree is awarded primarily on the basis of completion of significant, original research. Extensive course work and a minimum of 90 units of graduate work beyond the master's degree are required. Doctoral candidates planning theoretical work are encouraged to gain experimental research experience in the M.S. program. Ph.D. students receiving financial assistance are limited to 10 units per quarter and often require more than three years to complete the Ph.D. beyond the M.S. degree.

In addition to University and the Department of Energy Resources Engineering basic requirements for the doctorate, the Petroleum Engineering Ph.D. and Energy Resources Engineering Ph.D. degrees have the following requirements:

1. Students must complete a minimum of 36 course units and 54 research units (a total of 90 units) beyond the M.S. degree. At least half of the classes must be at a 200 level or higher and all must be taken for a letter grade. Students with an M.S. degree or other specialized training from outside ERE are generally expected to include ENERGY 221 Fundamentals of Multiphase Flow, , and ENERGY 240 Geostatistics, or their equivalents. The number and distribution of courses to be taken is determined with input from the research advisers and department graduate program committee.
2. To achieve candidacy (usually during or at the end of the first year of enrollment), the student must complete 24 units of letter-graded course work beyond the M.S. degree, develop a written Ph.D. research proposal, and choose a dissertation committee.
3. The research adviser(s) and two other faculty members comprise the dissertation reading committee. Upon completion of the dissertation, the student must pass a University oral examination in defense of the dissertation.
4. Complete 135 units of total graduate work (usually 90 units beyond the M.S. degree).
5. Act as a teaching assistant at least once, and enroll in ENERGY 359 Teaching Experience in Energy Resources Engineering.

36 units of course work is a minimum; in some cases the research adviser may specify additional requirements to strengthen the student's expertise in particular areas. The 36 units of course work does not include required teaching experience (ENERGY 359 Teaching Experience in Energy Resources Engineering) nor required research seminars. Courses must be taken for a letter grade, and a grade point average (GPA) of at least 3.25 must be maintained.

The dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy. Candidates who fail to meet this deadline must submit an Application for Extension of Candidacy for approval by the department chair if they wish to continue in the program.

Ph.D. students entering the department are required to hold an M.S. degree in a relevant science or engineering discipline. Students wishing to follow the Ph.D. program in Petroleum Engineering must hold an M.S. degree (or equivalent) in Petroleum Engineering. Students following the Ph.D. program in Energy Resources Engineering must hold an M.S. degree (or equivalent), although it need not be in Energy Resources Engineering.

After the second quarter at Stanford, a faculty committee evaluates the student's progress. If a student is found to be deficient in course work and/or research, a written warning is issued. After the third quarter, the faculty committee decides whether or not funding should be continued for the student. Students denied funding after the third quarter are advised against proceeding with the Ph.D. proposal, though the student may choose to proceed under personal funding.

## Ph.D. Degree Qualification

The procedure for the Ph.D. qualification differs depending upon whether the student entered the department as an M.S. or Ph.D. student. In either case, previous written and oral exams have been replaced by a written Ph.D. proposal followed by a proposal defense.

### For students who complete an M.S. in the Energy Resources Engineering Department at Stanford

In the second year of the M.S. degree program, the student formally applies to the Ph.D. program. The student is considered for admission to the Ph.D. program along with external applicants. The admission decision is based upon course work and research progress. During or before the third quarter as a Ph.D. student, generally corresponding to Spring Quarter in the third year at Stanford, the student must pass a Qualifying Examination by presenting a Ph.D. proposal to a committee of three faculty members. This entails a written document, including material such as a literature review and proposed work outline, and an oral presentation. Following the presentation, the student is questioned on the research topic and general field of study. The student can pass, pass with qualifications requiring more classes or teaching assistantships, or fail. A student who substantially changes topics between the M.S. and Ph.D. may ask his/her advisor to petition for an extra quarter before presenting the Ph.D. proposal.

### For students who enter directly into the Ph.D. program after receiving an M.S. from another university

Direct entry Ph.D. students must present their Ph.D. proposal (qualifying exam) before the end of their fourth quarter at Stanford (not counting Summer Quarter).

## Course Work

The 36 units of course work may include graduate courses in Energy Resources Engineering (numbered 200 and above) and courses chosen from the following list. Other courses may be substituted with prior approval of the adviser. In general, non-technical courses are not approved.

Students who enter directly into the Ph.D. program after receiving an M.S. degree from another university are expected to show expertise in the core courses required for Stanford's M.S. degree in Energy Resources Engineering, either by including those courses in their Ph.D. degree or by showing that they have taken equivalent courses during their M.S. degree.

For a Ph.D. in Energy Resources Engineering, 12 of the 36 required course units must be completed from the following list of courses. If the student has not taken ENERGY 293A Fundamentals of Energy Processes, ENERGY 293B Fundamentals of Energy Processes or their equivalent during the

M.S., then these courses must be taken during the Ph.D. (they will satisfy 6 of the required 12 units).

		Units
Required to take 12 units from the following list:		
ENERGY 104	Transition to sustainable energy systems	3
ENERGY 253	Carbon Capture and Sequestration	3-4
ENERGY 256	Electronic Structure Theory and Applications to Chemical Kinetics (formerly Energy 252)	3
ENERGY 260	Modeling Uncertainty in the Earth Sciences	3
ENERGY 269	Geothermal Reservoir Engineering	3
ENERGY 291	Optimization of Energy Systems	3
ENERGY 293A	Fundamentals of Energy Processes	3-4
ENERGY 293B	Fundamentals of Energy Processes	3
ENERGY 301	The Energy Seminar	1
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 268	Groundwater Flow	3-4
CME 206	Introduction to Numerical Methods for Engineering	3
CME 302	Numerical Linear Algebra	3
CME 306	Numerical Solution of Partial Differential Equations	3
EESS 221/CEE 260C	Contaminant Hydrogeology	4
CHEMENG 130	Separation Processes	3
CHEMENG 340	Molecular Thermodynamics	3
EARTHSYS 247	Controlling Climate Change in the 21st Century	3
ECON 250	Environmental Economics	2-5
ECON 251	Natural Resource and Energy Economics	2-5
GES 170	Environmental Geochemistry	4
GES 171	Geochemical Thermodynamics	3
GES 217	Faults, Fractures, and Fluid Flow	3
GES 253	Petroleum Geology and Exploration	0
GEOPHYS 182	Reflection Seismology	3
GEOPHYS 202	Reservoir Geomechanics	3
ME 131A	Heat Transfer	3-4
ME 250	Internal Combustion Engines	3
ME 260	Fuel Cell Science and Technology	3
ME 335A	Finite Element Analysis	3
ME 335B	Finite Element Analysis	3
ME 335C	Finite Element Analysis	0
ME 370A	Energy Systems I: Thermodynamics	3
ME 370B	Energy Systems II: Modeling and Advanced Concepts	4
MATSCI 156	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	3-4
MATSCI 316	Nanoscale Science, Engineering, and Technology	3
MS&E 248	Economics of Natural Resources	3-4

## Ph.D. Minor in Petroleum Engineering or Energy Resources Engineering

To be recommended for a Ph.D. degree with Petroleum Engineering or Energy Resources Engineering as a minor subject, a student must take 20 units of graduate-level lecture courses in the department. These courses must include ENERGY 221 Fundamentals of Multiphase Flow and ENERGY 222 Advanced Reservoir Engineering for the Petroleum Engineering minor, or ENERGY 293A Fundamentals of Energy Processes

and ENERGY 293B Fundamentals of Energy Processes for the Energy Resources Engineering minor. The remaining courses should be selected from:

		Units
ENERGY 175	Well Test Analysis	3
ENERGY 223	Reservoir Simulation	3-4
ENERGY 224	Advanced Reservoir Simulation	3
ENERGY 225	Theory of Gas Injection Processes	3
ENERGY 227	Enhanced Oil Recovery	3
ENERGY 240	Geostatistics	2-3
ENERGY 241	Seismic Reservoir Characterization	3-4
ENERGY 251	Thermodynamics of Equilibria	3
ENERGY 253	Carbon Capture and Sequestration	3-4
ENERGY 256	Electronic Structure Theory and Applications to Chemical Kinetics (formerly Energy 252)	3
ENERGY 269	Geothermal Reservoir Engineering	3
ENERGY 280	Oil and Gas Production Engineering	3
ENERGY 281	Applied Mathematics in Reservoir Engineering	3
ENERGY 284	Optimization and Inverse Modeling	3

*Emeriti: (Professors)* Khalid Aziz (recalled to active duty), John W. Harbaugh, André Journel\* (recalled to active duty)

*Chair:* Anthony Kovscek

*Professors:* Sally M. Benson, Louis J. Durlofsky, Roland N. Horne, Anthony R. Kovscek, Franklin M. Orr, Jr.

*Associate Professors:* Jef Caers, Margot Gerritsen, Tapan Mukerji, Hamdi Tchelepi

*Assistant Professors:* Adam Brandt, Jennifer Wilcox

*Courtesy Professors:* Stephan A. Graham, Mark Jacobson

*Lecturers:* Louis M. Castanier, Denis V. Voskov

*Consulting Professors:* Alexandre Boucher, Warren K. Kourt, Robert G. Lindblom, Kiran Pande, Victor Pereyra, Marco R. Thiele

\* Joint appointment with Geological and Environmental Sciences

# Environmental Earth System Science

Courses offered by the Department of Environmental Earth System Science are listed under the subject code EESS on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EESS&filter-catalognumber-EESS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EESS&filter-catalognumber-EESS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EESS&filter-catalognumber-EESS=on>).

Environmental Earth System Science studies the planet's oceans, lands, and atmosphere as an integrated system, with an emphasis on changes occurring during the current period of overwhelming human influence, the Anthropocene. Faculty and students within the department use the principles of biology, chemistry, and physics to study problems involving processes occurring at the Earth's surface, such as climate change and

global nutrient cycles, providing a foundation for problem solving related to environmental sustainability and global environmental change.

# Graduate Programs in Environmental Earth System Science

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

## Learning Objectives (Graduate)

The objectives of the doctoral program in Environmental Earth System Science are to enable students to develop the skills needed to conduct original investigations in environmental and earth system sciences, to interpret the results, and to present the data and conclusions in a publishable manner. Graduates should develop strong communication skills with the ability to teach and communicate effectively with the public.

The objectives of the master's program in Environmental Earth System Science is to continue a student's training in one of the earth science disciplines and to prepare students for a professional career or doctoral studies.

## Master of Science in Environmental Earth System Science

The University's requirements for M.S. degrees are outlined in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. Additional departmental requirements include the following:

1. Completion of core course work:

		Units
EESS 211	Fundamentals of Modeling	3-5
EESS 212	Measurements in Earth Systems	4
EESS 215	Earth System Dynamics	4
EARTHSCI 300	Earth Sciences Seminar	1

3. Enrollment in EESS 301 Topics in Environmental Earth System Science, each quarter during the academic year.
4. A minimum of 45 units of course work at the 100 level or above.
5. Half of the courses used to satisfy the 45-unit requirement must be intended primarily for graduate students, usually at the 200 level or above.
6. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement.
7. Some students may be required to make up background deficiencies in addition to these basic requirements.
8. By the end of Winter Quarter of the first year in residence, a student must complete at least three courses taught by a minimum of two different department faculty members.
9. Serve as a teaching assistant in at least two quarters during their graduate career.

The department's graduate coordinator, in coordination with the departmental faculty, appoints an academic adviser prior to registration

with appropriate consideration of the student's background, interests, and professional goals. In consultation with the adviser, the student plans a program of course work for the first year. The faculty adviser is charged with designing the curriculum in consultation with the student specific to the research topic. Each student must complete a thesis describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis who must be approved by the graduate coordinator; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

## Master of Science, Course Work Only Option

The course-work-only M.S. for EESS Ph.D. students requires 45 unduplicated units of which all 45 must be course work (non-research, non-independent study, non-thesis units). All required units must be in courses at the 100-level or above, 50 percent of those units must be in graduate-level courses (generally, at the 200-level or above). No units are awarded for course work completed elsewhere (i.e., not eligible to transfer-in units). All 45 units can be applied to the 135 unit requirement for the Ph.D. The remaining 90 units can consist of all research units

## Doctor of Philosophy in Environmental Earth System Science

The University's requirements for the Ph.D. degree are outlined in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. A summary of additional department requirements follows:

1. Completion of core course work:
- 2.

		Units
EESS 211	Fundamentals of Modeling	3-5
EESS 212	Measurements in Earth Systems	4
EESS 215	Earth System Dynamics	4
EARTHSCI 300	Earth Sciences Seminar	1

3. Enrollment in EESS 301 Topics in Environmental Earth System Science, each quarter during the academic year.
4. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different departmental faculty members.
5. Completion of required courses in their individual program or in their specialized area of study with a grade point average (GPA) of 3.0 (B) or higher, or demonstrate that they have completed the equivalents elsewhere.
6. Completion of a minimum of four letter grade courses of at least three units each from four different faculty members on the Academic Council in the University.
7. Serve as a teaching assistant in at least four quarters during their graduate career.
8. During Spring Quarter of each year, students must undergo an annual review by their thesis committee to allow the committee to monitor the progress of the student and make recommendations, where necessary.
9. Qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty thesis adviser, preparation of a written research proposal, approval of this proposal by the thesis adviser, selection

of a committee for the Ph.D. qualifying examination, and approval of the membership by the graduate coordinator and chair of the department. The research examination consists of three parts: oral presentation of a research proposal; examination on the research proposal; and examination on subject matter relevant to the proposed research. The exam should take place prior to May 1 so that its outcome is known at the time of the annual spring evaluation of graduate students.

Upon qualifying for Ph.D. candidacy, the student and thesis adviser, who must be a department faculty member, choose a research committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the full research committee to present a progress report covering the past year and provide expected goals for the coming year.

Under the supervision of the research advisory committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research; curriculum must also be developed with the supervision of the committee, which should be designed to provide a rigorous foundation for the research area. The format of the dissertation must meet University guidelines. The student is urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.

The doctoral dissertation is defended in the University oral examination. The department appoints the research adviser and two other members of the research committee to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Upon obtaining this written certification, the student is permitted to schedule the University oral examination.

*Chair:* Scott Fendorf

*Associate Chair:* Kevin Arrigo

*Professors:* Kevin Arrigo, C. Page Chamberlain, Robert Dunbar, Scott Fendorf, Christopher Field \*, Steven Gorelick, Eric Lambin \*\*, Pamela Matson (Dean), Rosamond Naylor \*\*+

*Associate Professors:* Christopher Francis

*Assistant Professors:* Karen Casciotti, Noah Diffenbaugh \*\*, David Lobell \*\*+, Balakanapathy Rajaratnam \*\*\*, Leif Thomas

*Courtesy Professors:* Gregory Asner, Ken Caldeira, Anna Michalak, Peter Vitousek

*Consulting Professors:* Mary Lou Zoback

*Visiting Professors:* Anthony Barnosky, Susan Bell, Sharon Hall, Allison Steiner

\* Joint appointment with Biology

\*\* Joint appointment with Woods Institute for the Environment

\*\*\*Joint appointment with Statistics

+ Joint appointment with the Freeman Spogli Institute for International Studies

# Geological and Environmental Sciences

Courses offered by the Department of Geological and Environmental Sciences are listed under the subject code GES on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GES&filter-catalognumber-GES=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GES&filter-catalognumber-GES=on>).

The geological and environmental sciences are naturally interdisciplinary, and include: the study of earth materials, earth processes, and how they have changed over Earth's 4.56 billion year history. More specifically, courses and research within the department address: the chemical and physical makeup and properties of minerals, rocks, soils, sediments, and water; the formation and evolution of Earth and other planets; the processes that deform Earth's crust and shape Earth's surface; the stratigraphic, paleobiological, and geochemical records of Earth history including changes in climate, oceans, and atmosphere; present-day, historical, and long-term feedbacks between the geosphere and biosphere, and the origin and occurrence of our natural resources.

The department's research is critical to the study of natural hazards (earthquakes, volcanic eruptions, landslides, and floods), environmental and geological engineering, surface and groundwater management, the assessment, exploration, and extraction of energy, mineral and water resources, ecology and conservation biology, remediation of contaminated water and soil, geological mapping and land use planning, and human health and the environment.

A broad range of instrumentation for elemental and radiogenic/stable isotope analysis is available, including ion microprobe, electron microprobe, thermal and gas source mass spectrometry, inductively coupled plasma mass spectrometry and nuclear magnetic resonance. The Center for Materials Research and facilities at the SLAC National Accelerator Laboratory, Stanford Synchrotron Radiation Laboratory (SSRL), and the U.S. Geological Survey in nearby Menlo Park are also available for the department's research. Branner Library, devoted exclusively to the Earth Sciences, represents one of the department's most important resources. The department also maintains rock preparation (crushing, cutting, polishing), mineral separation, and microscopy facilities.

The purpose of the undergraduate program in Geological and Environmental Sciences is to provide students with a broad background in the fundamentals of the Earth sciences and the quantitative, analytical, and communications skills necessary to conduct research and think critically about questions involving the Earth. The major provides excellent preparation for graduate school and careers in geological and environmental consulting, land use planning, law, teaching, and other professions in which an understanding of the Earth and a background in science are important.

## Mission of the Undergraduate Program in Geological and Environmental Sciences

The purpose of the undergraduate program in Geological and Environmental Sciences is to provide students with a broad background in the fundamentals of the Earth sciences and the quantitative, analytical, and communications skills necessary to conduct research and think critically about questions involving the Earth. The major provides excellent preparation for graduate school and careers in geological and environmental consulting, land use planning, law, teaching, and other professions in which an understanding of the Earth and a background in science are important.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to develop and demonstrate:

1. an understanding of fundamental concepts in Earth science.
2. the ability to collect, analyze, and interpret geological and environmental data using a variety of techniques to test hypotheses.

3. the ability to address real geological and/or environmental problems in the field.
4. the ability to communicate scientific knowledge orally, visually, and in writing.

## Graduate Programs in Geological and Environmental Sciences

Graduate Studies in the Department of Geological and Environmental Sciences involve academic course work and independent research. Students are prepared for careers as professional scientists in research, education, or the application of the earth sciences to mineral, energy, and water resources. Programs lead to the M.S., Engineer, and Ph.D. degrees. Course programs in the areas of faculty interest are tailored to the student's needs and interests with the aid of his or her research adviser. Students are encouraged to include in their program courses offered in other departments in the School of Earth Sciences as well as in other departments in the University. Diplomas designate degrees in Geological and Environmental Sciences and may also indicate the following specialized fields of study: Geostatistics and Hydrogeology.

## Learning Outcomes (Graduate)

The purpose of the master's program in Geological and Environmental Sciences is to continue a student's training in one of a broad range of earth science disciplines and to prepare students for either a professional career or doctoral studies.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship, high attainment in a particular field of knowledge, and the ability to conduct independent research. To this end, the objectives of the doctoral program are to enable students to develop the skills needed to conduct original investigations in a particular discipline or set of disciplines in the earth sciences, to interpret the results, and to present the data and conclusions in a publishable manner.

## Bachelor of Science in Geological and Environmental Sciences

The major consists of five interrelated components:

1. Earth Sciences Fundamentals—Students must complete a set of core courses that introduce the properties of Earth materials, the processes that change the Earth, and the timescales over which those processes act. These courses provide a broad foundational knowledge that can lead to specialization in many different disciplines of the geological and environmental sciences.
2. Quantitative and Analytical Skills—Students must complete adequate course work in mathematics, chemistry, and physics or biology. In addition, they learn analytical techniques specific to the Earth sciences through the laboratory component of courses.
3. Advanced Course Work and Research—Students gain breadth and depth in upper-level electives and are encouraged to apply these skills and knowledge to problems in the Earth sciences through directed research.

4. Field Research Skills—Most GES courses include field trips and/or field-based projects. In addition, students must complete at least six weeks of field research through departmental offerings or through a faculty-directed field research project that involves learning and application of field techniques, field mapping, and the preparation of a written report.
5. Communication Skills—To fulfill the Writing in the Major requirement, students take a writing-intensive senior seminar (GES 150 Senior Seminar: Issues in Earth Sciences), in which they give both oral and written presentations that address current research in the earth sciences.

The major requires at least 80 units; letter grades are required in all courses if available. Students interested in the GES major should consult with the undergraduate program coordinator for information about options within the curriculum.

## Course Sequence (93-110 units total)

### Core Requirement

Students are required to take all of the following:

	Units
Select one of the following:	4-5
GES 1A Introduction to Geology: The Physical Science of the Earth	
GES 1B Introduction to Geology: California Desert Geology	
GES 1C Introduction to Geology: Dynamic Earth	
GES 4 Evolution and Extinction: Introduction to Historical Geology	4
GES 90 Introduction to Geochemistry	3-4
GES 102 Earth Materials: Introduction to Mineralogy	3
GES 102L Introductory Mineralogy Laboratory	1
GES 103 Earth Materials: Rocks in Thin Section	3
GES 104 Earth Materials: Introduction to Petrology	3
GES 104L Introductory Petrology Laboratory	1
GES 105 Introduction to Field Methods	3
GES 150 Senior Seminar: Issues in Earth Sciences	3
GES 190 Research in the Field (see below for more information)	2
<b>Total Units</b>	<b>30-32</b>

### Breadth in the Discipline Requirement

To gain understanding of the breadth of subject areas within the geological and environmental sciences, students are required to take one course from each of the following seven groups (22-28 units).

### Environmental Geology and Surface Processes

The chemical and physical properties of the solid, aqueous, and gaseous phases comprising Earth's surface environment, their natural compositional variations and biogeochemical interactions, and the processes that affect their distribution and stability.

	Units
EESS 155 Science of Soils	3-4
or GES 130 Soil Physics and Hydrology	
or GES 131 Hydrologically-Driven Landscape Evolution	
or GES 170 Environmental Geochemistry	



## Structural Geology and Tectonics

The nature, description, and modeling of deformation of earth materials in response to tectonic forces. Processes of plate tectonics, mountain building, and sedimentary basin formation. The origin and evolution of geologic structures including folds, faults, fabrics, and fractures.

GES 110	Structural Geology and Tectonics	Units	3-5
or GES 111	Fundamentals of Structural Geology		

## Earth Materials and Geochemistry

The materials that comprise the Earth and how they can be used to deduce geological processes over time. The fundamental chemical and geologic processes responsible for the abundance and distribution of elements and their isotopes.

GES 107	Journey to the Center of the Earth	Units	3-4
or GES 163	Introduction to Isotope Geochemistry		
or GES 180	Igneous Processes		
or GES 185	Volcanology		

## Sedimentary Systems

The processes of weathering, erosion, transportation, and deposition, interpretation of depositional environments, the formation and evolution of sediments and sedimentary basins, and the evolution of sedimentary systems over geologic time.

GES 151	Sedimentary Geology and Petrography: Depositional Systems	Units	4
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## Biogeosciences

The origin and evolution of life on Earth, the influence of biological processes on Earth's surface environments, and the role of geological processes in shaping large-scale evolutionary patterns.

GES 123	Paleobiology	Units	4
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## Geophysics

The integration of physics, mathematics, and geology to study Earth processes using remote sensing, modeling, experiments, and direct observations.

GEOPHYS 110	Earth on the Edge: Introduction to Geophysics	Units	3
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## Geospatial Statistics and Computer Science

Statistical techniques specific to the geosciences that facilitate analysis of three- and four-dimensional data; computer programming and modeling.

EARTHSCI 211	Introduction to Programming for Scientists and Engineers	Units	3-4
or CS 106A	Programming Methodology		
or ENERGY 125	Modeling and Simulation for Geoscientists and Engineers		
or ENERGY 160	Modeling Uncertainty in the Earth Sciences		
or EESS 161	Statistical Methods for the Earth and Environmental Sciences: Geostatistics		

or EESS 164 Fundamentals of Geographic Information Science (GIS)

or GEOPHYS 112 Exploring Geosciences with MATLAB

## Depth in the Discipline Requirement (10 Units)

To allow students to go into greater depth in the major, students must complete at least 10 units of electives drawn primarily from the list above and other upper-level courses in GES (including graduate-level courses). Additional courses in Geophysics, EESS, and ERE may be counted towards the elective units if they allow a student to pursue a topic in depth; these options should be discussed with an adviser. A maximum of 3 elective units may be fulfilled by:

GES 192 Undergraduate Research in Geological and Environmental Sciences

GES 197 Senior Thesis

GES 198 Special Problems in Geological and Environmental Sciences

Advanced Seminars

Honors research (GES 199 Honors Program) may fulfill up to 4 elective units.

## Required Supporting Mathematics (15 Units)

This requirement may also be fulfilled by Advanced Placement credit. Choose one of the following equivalent series:

Select one of the following series:

Series A

MATH 19	Calculus	Units	10
& MATH 20	and Calculus		
& MATH 21	and Calculus		

Series B

MATH 41	Calculus	Units	10
& MATH 42	and Calculus		

And one of the following:

MATH 51	Linear Algebra and Differential Calculus of Several Variables	Units	5
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or MATH 52 Integral Calculus of Several Variables

or MATH 53 Ordinary Differential Equations with Linear Algebra

## Required Supporting Cognate Sciences (15-23 Units)

Advanced placement credit may be accepted for these courses as determined by the relevant departments.

**Chemistry (7-13)**

CHEM 31A	Chemical Principles I	Units	4-10
& CHEM 31B	and Chemical Principles II		
or CHEM 31X	Chemical Principles		

or a score of 4-5 on the Chemistry AP exam

And one of the following:

CHEM 135	Physical Chemical Principles	Units	3
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or CHEM 171 Physical Chemistry

or GES 171 Geochemical Thermodynamics

In addition to chemistry, students may choose between introductory sequences in biology and physics. This choice should be made after discussion with an adviser and based on a student's interests.

**Biology (10)**

BIO 41 Genetics, Biochemistry, and Molecular Biology 5

And one of the following:

BIO 42 Cell Biology and Animal Physiology 5

or BIO 43 Plant Biology, Evolution, and Ecology

Or

**Physics (8-9)**

Select one of the following Series: 8-9

**Series A (8)**

PHYSICS 21 Mechanics and Heat 8

& PHYSICS 22 and Mechanics and Heat Laboratory

& PHYSICS 23 and Electricity and Optics

& PHYSICS 24 and Electricity and Optics Laboratory

**Series B (9)**

PHYSICS 41 Mechanics 9

& PHYSICS 43 and Electricity and Magnetism

& PHYSICS 44 and Electricity and Magnetism Lab

**Series C (9)**

PHYSICS 41 Mechanics 9

& PHYSICS 45 and Light and Heat

& PHYSICS 46 and Light and Heat Laboratory

**Field Research**

Field research skills are a critical component of the undergraduate curriculum in GES. The conventional and most straightforward way for undergraduates to meet the field requirement is to take the two GES courses (GES 105 Introduction to Field Methods and GES 190 Research in the Field) that are offered every year:

- GES 105 Introduction to Field Methods, is a two-week introduction to field techniques and geologic mapping that is taught every year in the White Mountains of eastern California prior to the start of Autumn Quarter in September. This course gives students the tools to undertake geologic research in the field. GES 105 Introduction to Field Methods is required of all GES majors and is the framework upon which all subsequent undergraduate field-related instruction is based.
- GES 190 Research in the Field, gives GES undergraduates additional training in field research. This course provides undergraduates with a team-based experience of collecting data to answer research questions and is directed by faculty and graduate students. Offered in June and/or September.

By taking GES 105 Introduction to Field Methods and two iterations of GES 190 Research in the Field, GES undergraduates develop the broad experience and confidence necessary to go out and evaluate a geological or environmental geology question by collecting field-based data. The main goal is that, upon graduation, GES undergraduates will be able to plan and execute independent field research.

It is also possible to customize GES 190 Research in the Field or substitute non-Stanford courses to allow flexibility in fulfilling the field requirement. One or two GES 190 Research in the Field requirements can be satisfied through customized courses with two possible approaches:

1. The first approach involves working on a project during the summer with a graduate student or professor. This may fulfill one GES 190 Research in the Field requirement. To receive credit for GES 190 Research in the Field, a proposal must be filed at the end of Winter Quarter with the field program committee which evaluates it for suitability.

2. A second approach is to take a modified version of an existing field-based course such as Stanford at Sea/Australia/Hawaii. This may also fulfill one GES 190 Research in the Field requirement.

In both cases, to receive credit for GES 190 Research in the Field, a proposal must be filed at the end of Winter Quarter with the field program committee which evaluates it for suitability. Students subsequently enroll in GES 190 Research in the Field with a specific instructor or their faculty mentor who evaluates the final report from the fieldwork.

GES 190 Research in the Field can also be satisfied by enrolling in a single four-to-six week geology field camp offered by another institution. This externally administered experience can substitute for two GES 190 courses, subject to approval by the Undergraduate Curriculum Committee.

# Engineering Geology and Hydrogeology Undergraduate Specialized Curriculum

The Engineering Geology and Hydrogeology curriculum is intended for undergraduates interested in the application of geological and engineering data and principles to the study of rock, soil, and water to recognize and interpret geological and environmental factors affecting engineering structures and groundwater resources. Students learn to characterize and assess the risks associated with natural geological hazards, such as landslides and earthquakes, and with groundwater flow and contamination. The curriculum prepares students for graduate programs and professional careers in engineering, environmental geology, geology, geotechnical engineering, and hydrogeology. Students interested in this curriculum should contact a faculty adviser: Professor Loague, Pollard, or Hilley.

GES majors who elect the Engineering Geology and Hydrogeology curriculum are expected to complete a core course sequence and a set of courses in supporting sciences and mathematics. The core courses come from Earth Sciences and Engineering. Any substitutions for core courses must be approved by the faculty adviser and through a formal petition to the undergraduate program director. In addition, four elective courses, consistent with the core curriculum and required of all majors, are to be chosen with the advice and consent of the adviser. Typically, electives are chosen from the list below. Letter grades are required if available.

## Course Sequence (85-101 Units Total)

### Required Geological and Environmental Sciences (33-35 Units)

		Units
GES 1A	Introduction to Geology: The Physical Science of the Earth	4-5
or GES 1B	Introduction to Geology: California Desert Geology	
or GES 1C	Introduction to Geology: Dynamic Earth	
GES 102	Earth Materials: Introduction to Mineralogy	3
GES 104	Earth Materials: Introduction to Petrology	3
GES 111	Fundamentals of Structural Geology	3
GES 115	Engineering Geology and Global Change	3
GES 150	Senior Seminar: Issues in Earth Sciences	3
EESS 164	Fundamentals of Geographic Information Science (GIS)	4
EESS 220	Physical Hydrogeology	4

ENERGY 160 or EESS 161	Modeling Uncertainty in the Earth Sciences Statistical Methods for the Earth and Environmental Sciences: Geostatistics	3-4
GEOPHYS 190	Near-Surface Geophysics	3
Total Units		33-35

## Required Engineering (18-21 Units)

		Units
CEE 101A	Mechanics of Materials	4
CEE 101B	Mechanics of Fluids	4
CEE 101C	Geotechnical Engineering	3-4
CS 106A	Programming Methodology	3-5
ENGR 14	Intro to Solid Mechanics	4
Total Units		18-21

## Required Supporting Sciences and Mathematics (23-29 Units)

		Units
CHEM 31A & CHEM 31B or CHEM 31X	Chemical Principles I and Chemical Principles II Chemical Principles	4-10
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 52	Integral Calculus of Several Variables	5
MATH 53	Ordinary Differential Equations with Linear Algebra	5
PHYSICS 41	Mechanics	4
Total Units		23-29

## Suggested Electives Electives (11-16 Units)

Choose four courses from the following list or, with faculty approval, four related courses:

		Units
CEE 101D	Computations in Civil and Environmental Engineering	3
CEE 180	Structural Analysis	4
CEE 270	Movement and Fate of Organic Contaminants in Waters	3
CEE 293	Foundation Engineering	3
CEE 296	Special Topics in Fluid-Solid Interactions	2
EESS 221	Contaminant Hydrogeology	4
ENGR 30	Engineering Thermodynamics	3
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	4
GEOPHYS 112	Exploring Geosciences with MATLAB	1-3
GES 102L	Introductory Mineralogy Laboratory	1
GES 104L	Introductory Petrology Laboratory	1
GES 130	Soil Physics and Hydrology	3
GES 131	Hydrologically-Driven Landscape Evolution	3
GES 217	Faults, Fractures, and Fluid Flow	3
GES 237	Surface and Near-Surface Hydrologic Response	3
MATSCI 151	Microstructure and Mechanical Properties	3-4
ME 80	Mechanics of Materials	4

## Honors Program

The honors program provides an opportunity for year-long independent study and research on a topic of special interest, culminating in a written thesis. Students select research topics in consultation with the faculty adviser of their choosing. Research undertaken for the honors program may be of a theoretical, field, or experimental nature, or a combination of these approaches. The honors program is open to students with a GPA of at least 3.5 in GES courses and 3.0 in all University course work. Modest financial support is available from several sources to help defray laboratory and field expenses incurred in conjunction with honors research. Interested students must submit an application, including a research proposal, to the department by the end of their junior year.

Upon approval of the research proposal and entrance to the program, course credit for the honors research project and thesis preparation is assigned by the student's faculty adviser within the framework of GES 199 Honors Program; the student must complete a total of 9 units over the course of the senior year. Up to 4 units of GES 199 Honors Program may be counted towards the elective requirement, but cannot be used as a substitute for regularly required courses.

Both a written and oral presentation of research results are required. The thesis must be read, approved, and signed by the student's faculty adviser and a second member of the faculty. In addition, honors students must participate in the GES Honors Symposium in which they present their research to the broader community. Honors students in GES are also eligible for the Firestone medal, awarded by Undergraduate Advising and Research (<http://ual.stanford.edu>) for exceptional theses.

## Minor in Geological and Environmental Sciences

The minor in GES consists of a small set of required courses plus 12 elective units. A wide variety of courses may be used to satisfy these elective requirements. All courses must be taken for a letter grade.

### Required Courses

		Units
GES 1A	Introduction to Geology: The Physical Science of the Earth	4-5
or GES 1B or GES 1C	Introduction to Geology: California Desert Geology Introduction to Geology: Dynamic Earth	
GES 4	Evolution and Extinction: Introduction to Historical Geology	4
GES 102	Earth Materials: Introduction to Mineralogy	3
GES 104	Earth Materials: Introduction to Petrology	3
Total Units		14-15

### Electives (12 Units)

Students must take a minimum of 12 additional units drawn primarily from the Breadth in the Discipline list in the GES major (<http://www.stanford.edu/dept/registrar/bulletin/5038.htm>); a majority of units must be from classes within the GES department. Up to 3 units of Stanford Introductory Seminars in GES may be counted.

Students pursuing a minor in GES are encouraged to participate in the senior seminar (GES 150 Senior Seminar: Issues in Earth Sciences) and in field research (GES 105 Introduction to Field Methods)

# Coterminal B.S. and M.S. Degrees in Geological and Environmental Sciences

The coterminal B.S./M.S. program offers students the opportunity to pursue graduate research and an M.S. degree concurrently with or subsequent to their B.S. studies. The M.S. degree can serve as an entrance to a professional degree in subdisciplines within the Earth sciences such as engineering geology and environmental geology, or to graduate course work and research as an intermediate step in pursuit of the Ph.D. Regardless of professional goals, coterminal B.S./M.S. students are treated as members of the graduate community and are expected to meet all of the standards set for regular M.S. students. Applicants must have earned no fewer than 120 units toward graduation, and must submit their application no later than the quarter prior to the expected completion of their undergraduate degree, normally the Winter Quarter prior to Spring Quarter graduation. The application includes a statement of purpose, a current Stanford transcript, official Graduate Record Examination (GRE) scores, letters of recommendation from two members of the Stanford faculty (at least one of whom must be in the GES department), and a list of courses in which they intend to enroll to fulfill the M.S. degree requirements. Specific research interests should be noted in the statement of purpose and discussed with a member of the GES faculty prior to submission of the application. Coterminal students must complete a thesis describing research results.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, also see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

Students must meet all requirements for both the B.S. and M.S. degrees. Students may either:

1. complete 180 units required for the B.S. degree and then complete three full-time quarters (45 units at the 100-level or above) for the M.S. degree
2. or. complete a total of fifteen quarters during which the requirements of the two degrees are fulfilled concurrently.

At least half of the courses used to satisfy the 45-unit requirement must be designated as being primarily for graduate students, normally at the 200-level or above. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement. Further information about this program may be obtained from the GES office.

## Admission

For admission to graduate work in the department, the applicant must have taken the Aptitude Test (verbal, quantitative, and analytical writing assessment) of the Graduate Record Examination. In keeping with University policy, applicants whose first language is not English must submit TOEFL (Test of English as a Foreign Language) scores from a test taken within the last 18 months. Individuals who have completed a B.S. or two-year M.S. program in the U.S. or other English-speaking country are not required to submit TOEFL scores.

# Master of Science in Geological and Environmental Sciences

## Objectives

The purpose of the master's program in Geological and Environmental Sciences is to continue a student's training in one of a broad range of earth science disciplines and to prepare students for either a professional career or doctoral studies.

## Procedures

The graduate coordinator of the department appoints an academic adviser during registration with appropriate consideration of the student's background, interests, and professional goals. In consultation with the adviser, the student plans a program of course work for the first year. The student should select a thesis adviser within the first year of residence and submit to the thesis adviser a proposal for thesis research as soon as possible. The academic adviser supervises completion of the department requirements for the M.S. program (as outlined below) until the research proposal has been accepted; responsibility then passes to the thesis adviser. The student may change either thesis or academic advisers by mutual agreement and after approval of the graduate coordinator.

## Requirements

The University's requirements for M.S. degrees are outlined in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. Practical training (GES 385 Practical Experience in the Geosciences) may be required by some programs, with adviser approval, depending on the background of the student. Additional department requirements include the following:

1. A minimum of 45 units of course work at the 100 level or above.
  - A. Half of the courses used to satisfy the 45-unit requirement must be intended as being primarily for graduate students, usually at the 200 level or above.
  - B. No more than 15 units of thesis research may be used to satisfy the 45-unit requirement.
  - C. Some students may be required to make up background deficiencies in addition to these basic requirements.
2. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different GES faculty members.
3. Each student must have a research adviser who is a faculty member in the department and is within the student's thesis topic area or specialized area of study.
4. Each student must complete a thesis describing his or her research. Thesis research should begin during the first year of study at Stanford and should be completed before the end of the second year of residence.
5. Early during the thesis research period, and after consultation with the student, the thesis adviser appoints a second reader for the thesis, who must be approved by the graduate coordinator; the thesis adviser is the first reader. The two readers jointly determine whether the thesis is acceptable for the M.S. degree in the department.

# Engineer Degree in Geological and Environmental Sciences

The Engineer degree is offered as an option for students in applied disciplines who wish to obtain a graduate education extending beyond that of an M.S., yet do not have the desire to conduct the research needed to obtain a Ph.D. A minimum of two years (six quarters) of graduate study is required. The candidate must complete 90 units of course work, no more than 10 of which may be applied to overcoming deficiencies in undergraduate training. The student must prepare a substantial thesis that meets the approval of the thesis adviser and the graduate coordinator.

# Doctor of Philosophy in Geological and Environmental Sciences

## Objectives

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship, high attainment in a particular field of knowledge, and the ability to conduct independent research. To this end, the objectives of the doctoral program are to enable students to develop the skills needed to conduct original investigations in a particular discipline or set of disciplines in the earth sciences, to interpret the results, and to present the data and conclusions in a publishable manner.

## Admission

For admission to graduate work in the department, the applicant must have taken the Aptitude Test (verbal, quantitative, and analytical writing assessment) of the Graduate Record Examination. In keeping with University policy, applicants whose first language is not English must submit TOEFL (Test of English as a Foreign Language) scores from a test taken within the last 18 months. Individuals who have completed a B.S. or two-year M.S. program in the U.S. or other English-speaking country are not required to submit TOEFL scores. Previously admitted students who wish to change their degree objective from M.S. to Ph.D. must petition the GES Admissions Committee.

## Requirements

The University's requirements for the Ph.D. degree are outlined in the "Graduate Degrees (<http://exploreddegrees.stanford.edu/graduatedegrees>)" section of this bulletin. Practical training (GES 385 Practical Experience in the Geosciences) may be required by some programs, with adviser approval, depending on the background of the student. A summary of additional department requirements is presented below:

1. Ph.D. students must complete the required courses in their individual program or in their specialized area of study with a grade point average (GPA) of 3.0 (B) or higher, or demonstrate that they have completed the equivalents elsewhere. Ph.D. students must complete a minimum of four letter-grade courses of at least 3 units each from four different faculty members on the Academic Council in the University. By the end of Winter Quarter of their first year in residence, students must complete at least three courses taught by a minimum of two different GES faculty members.
2. Each student must qualify for candidacy for the Ph.D. by the end of the sixth quarter in residence, excluding summers. Department procedures require selection of a faculty thesis adviser, preparation of a written research proposal, approval of this proposal by the

thesis adviser, selection of a committee for the Ph.D. qualifying examination, and approval of the membership by the graduate coordinator and chair of the department. The research examination consists of three parts: oral presentation of a research proposal, examination on the research proposal, and examination on subject matter relevant to the proposed research. The exam should be scheduled prior to May 1, so that the outcome of the exam is known at the time of the annual spring evaluation of graduate students.

3. Upon qualifying for Ph.D. candidacy, the student and thesis adviser, who must be a department faculty member, choose a research committee that includes a minimum of two faculty members in the University in addition to the adviser. Annually, in the month of March or April, the candidate must organize a meeting of the research committee to present a brief progress report covering the past year.
4. Under the supervision of the research advisory committee, the candidate must prepare a doctoral dissertation that is a contribution to knowledge and is the result of independent research. The format of the dissertation must meet University guidelines. The student is strongly urged to prepare dissertation chapters that, in scientific content and format, are readily publishable.
5. The doctoral dissertation is defended in the University oral examination. The research adviser and two other members of the research committee are determined to be readers of the draft dissertation. The readers are charged to read the draft and to certify in writing to the department that it is adequate to serve as a basis for the University oral examination. Upon obtaining this written certification, the student is permitted to schedule the University oral examination.

# Ph.D. Minor in Geological and Environmental Sciences

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in Geological and Environmental Sciences must complete, with a GPA of 3.0 (B) or better, 20 units in the geosciences in lecture courses intended for graduate students. The selection of courses must be approved by the student's GES adviser and the department chair.

*Emeriti: (Professors)* Robert Coleman, Robert R. Compton, Marco T. Einaudi, W. Gary Ernst,\* John W. Harbaugh, James C. Ingle, Jr.,\* Andre G. Journel,\* Juhn G. Liou,\* Ronald J. P. Lyon, Michael McWilliams, J. Michael Moldowan, George A. Parks, Irwin Remson

*Chair:* Gordon E. Brown, Jr.

*Associate Chair:* Elizabeth L. Miller

*Professors:* Dennis K. Bird, Gordon E. Brown, Jr., Stephan A. Graham, Keith Loague, Donald R. Lowe, Gail A. Mahood, Elizabeth L. Miller, David D. Pollard, Jonathan F. Stebbins

*Associate Professors:* George Hilley, Jonathan Payne

*Assistant Professors:* Katherine Maher, Wendy Mao, Jessica Warren

*Professors (Research):* Atilla Aydin, Martin J. Grove

*Courtesy Professors:* Page Chamberlain, Elizabeth Hadly, Simon L. Klemperer, Anders R. Nilsson, Alfred M. Spormann

*Lecturer:* Bob Jones

*Consulting Professors:* Brent R. Constantz, Thomas L. Holzer, Carolyn Lampe, Jack J. Lissauer, Leslie B. Magoon, Mark S. Marley, Timothy R. McHargue, Kristian E. Meisling, Kenneth Peters

*Consulting Associate Professor:* Jorge A. Vazquez

*Visiting Professors:* Craig M. Bethke, Nicolas J. Beukes, Jason Harvey, Jeremy K. Hourigan, Minik T. Rosing, Anat Shahar

\* Recalled to active duty

## Cognate Courses

Many courses offered within the School of Earth Sciences, as well as courses in other schools with a significant Earth sciences component, may be used in satisfaction of optional requirements for the Geological and Environmental Sciences degree. Undergraduates should discuss the options available to them with the undergraduate program coordinator; graduate students should discuss options with their advisers.

The following courses outside the School of Earth Sciences are particularly applicable:

		Units
BIO 121	Biogeography	3
BIO 136	Evolutionary Paleobiology	4
BIOHOPK 182H	Stanford at Sea	16
CEE 63	Weather and Storms	3
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 101A	Mechanics of Materials	4
CEE 101B	Mechanics of Fluids	4
CEE 101C	Geotechnical Engineering	3-4
CEE 161A	Rivers, Streams, and Canals	3-4
CEE 164	Introduction to Physical Oceanography	4
CEE 166A	Watersheds and Wetlands	3
CEE 173A	Energy Resources	4-5

## Geophysics

Courses offered by the Department of Geophysics are listed under the subject code GEOPHYS on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GEOPHYS&filter-catalognumber-GEOPHYS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GEOPHYS&filter-catalognumber-GEOPHYS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GEOPHYS&filter-catalognumber-GEOPHYS=on>).

Geophysics is the branch of Earth science concerned with exploring and analyzing active processes of the Earth through physical measurement. The undergraduate and graduate programs are designed to provide a background of fundamentals in science, and courses to coordinate these fundamentals with the principles of geophysics. The program leading to the Bachelor of Science (B.S.) in Geophysics permits many electives and a high degree of flexibility for each student. Graduate programs provide specialized training for professional work in resource exploration, research, and education, and lead to the degrees of Master of Science and Doctor of Philosophy.

The Department of Geophysics is housed in the Ruth Watis Mitchell Earth Sciences Building. It has numerous research facilities, among which are a state-of-the-art broadband seismic recording station, high pressure and temperature rock properties and rock deformation laboratories, various instruments for field measurements including seismic recorders, nine dual frequency GPS receivers, and field equipment for measuring in-situ stress at great depth. Current research activities include crustal deformation; earthquake seismology and earthquake mechanics; reflection, refraction, and tomographic seismology; rock mechanics, rock physics; seismic studies of the continental lithosphere; remote sensing; environmental geophysics; and synthetic aperture radar studies.

## Mission of the Undergraduate Program in Geophysics

The mission of the undergraduate program in Geophysics is to expose students to a broad spectrum of geophysics, including resource exploration, environmental geophysics, seismology, and tectonics. Students in the major obtain a solid foundation in the essentials of mathematics, physics, and geology, and build upon that foundation with advanced course work in Geophysics to develop the in-depth knowledge they need to pursue advanced graduate study and professional careers in government or the private sector.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. understand the physics and geology that form the basis for geophysical observation and measurement.
2. understand Earth structure and evolution.
3. identify the physical processes governing the behavior of common geophysical systems.
4. be able to explain the principles of applying geophysical methods to societally relevant problems, including natural hazards, resource exploration and management, and environmental issues.
5. be able to quantitatively describe the behavior of natural systems and the principles of geophysical measurement with physics-based mathematical models.
6. investigate these models by solving the governing equations with a combination of analytical and computational methods.
7. make their own observations with a variety of geophysical instruments, and reduce, model, and interpret their data and uncertainties.
8. effectively communicate their scientific knowledge through written and oral presentations.
9. be able to interpret and evaluate the published literature and oral and poster presentations at national meetings.

## Graduate Programs in Geophysics

University requirements for the M.S. and Ph.D. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. Lecture course units applied to graduate degree program requirements must be taken for a letter grade if the course is offered for a letter grade.

## Learning Outcomes (Graduate)

The objective of the graduate program in Geophysics is to prepare students to be leaders in the geophysics industry, academia, and research organizations through completion of fundamental courses in the major field

and in related sciences, as well as through independent research. Students are expected to:

1. apply skills developed in fundamental courses to geophysical problems.
2. research, analyze, and synthesize solutions to an original and contemporary geophysics problem.
3. work independently and as part of a team to develop and improve geophysics solutions.
4. apply written, visual, and oral presentation skills to communicate scientific knowledge.
5. master's students are expected to develop in-depth technical understanding of geophysics problems at an advanced level.
6. doctoral students are expected to complete a scientific investigation that is significant, challenging and original.

## Bachelor of Science in Geophysics

The following courses are required for the B.S. degree in Geophysics. A written report on original research or an honors thesis is also required through participation in and GEOPHYS 199 Senior Seminar: Issues in Earth Sciences in Autumn Quarter of the senior year. Seniors in Geophysics who expect to do graduate work should take the Graduate Record Examination (GRE) early in their final undergraduate year.

### Geophysics Core Courses (24-26 units)

Students must take all of the following:

		Units
GEOPHYS 110	Earth on the Edge: Introduction to Geophysics	3
GEOPHYS 120	Ice, Water, Fire	3-5
GEOPHYS 130	Introductory Seismology	3
GEOPHYS 150	Geodynamics: Our Dynamic Earth	3
GEOPHYS 160	Introduction to SES Computing (or equivalent knowledge)	2-3
GEOPHYS 190	Near-Surface Geophysics	3
GEOPHYS 196	Undergraduate Research in Geophysics	1-10
GEOPHYS 199	Senior Seminar: Issues in Earth Sciences	3
GEOPHYS 201	Frontiers of Geophysical Research at Stanford: Faculty Lectures	1
Total Units		22-34

### Geophysics Breadth Courses (12-14 units)

Choose four upper-level courses, one from each of the following four areas:

1. **Resources, hazards, and the environment**

		Units
Select one of the following:		
GEOPHYS 182	Reflection Seismology	3
GEOPHYS 183	Reflection Seismology Interpretation	
GEOPHYS 185	Rock Physics for Reservoir Characterization	

ENERGY 120 Fundamentals of Petroleum Engineering

GES 131 Hydrologically-Driven Landscape Evolution

Total Units 3

## 2. Whole-earth Geophysics

Select one of the following: 3

GEOPHYS 184 Journey to the Center of the Earth

GEOPHYS 170 Global Tectonics

GEOPHYS 186 Tectonophysics

Total Units 3

## 3. Numerical and computational methods

Select one of the following: 3-4

GEOPHYS 187 Environmental Soundings Image Estimation

GEOPHYS 281 Geophysical Inverse Problems

CME 200 Linear Algebra with Application to Engineering Computations

CME 204 Partial Differential Equations in Engineering

CME 206 Introduction to Numerical Methods for Engineering

CME 211 Introduction to Programming for Scientists and Engineers

EE 102A Signal Processing and Linear Systems I

ENERGY 160 Modeling Uncertainty in the Earth Sciences

Total Units 3-4

## 4. Geophysical fluid dynamics

Select one of the following: 3-4

GEOPHYS 181 Fluids and Flow in the Earth: Computational Methods

CEE 164 Introduction to Physical Oceanography

EESS 146A Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation

EESS 220 Physical Hydrogeology

ENERGY 121 Fundamentals of Multiphase Flow

GES 130 Soil Physics and Hydrology

Total Units 3-4

## Supporting Mathematics Courses

Students must take one of the following series (15 or 20 units):

		Units
Take one of the following series		
<b>CME Series (15)</b>		
CME 100	Vector Calculus for Engineers	5
CME 102	Ordinary Differential Equations for Engineers	5

CME 104	Linear Algebra and Partial Differential Equations for Engineers	5
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**MATH Series (20)**

MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
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MATH 51M	Introduction to MATLAB for Multivariable Mathematics (recommended in addition to MATH 51) <sup>1</sup>	
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MATH 52	Integral Calculus of Several Variables	5
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MATH 53	Ordinary Differential Equations with Linear Algebra	5
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and one of the following 5

CME 104	Linear Algebra and Partial Differential Equations for Engineers	
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CME 108	Introduction to Scientific Computing	
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GEOPHYS 112	Exploring Geosciences with MATLAB	
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<sup>1</sup> It is recommended that students take MATH 51M Introduction to MATLAB for Multivariable Mathematics (1 unit) if the MATH series is taken.

## Supporting Science Courses

Students must take all of the following (16-25 units):

Select one of the following:		<b>Units</b>
		4-5
GES 1A	Introduction to Geology: The Physical Science of the Earth	
GES 1B	Introduction to Geology: California Desert Geology	
GES 1C	Introduction to Geology: Dynamic Earth	
Select one of the following:		4-8
CHEM 31A & CHEM 31B	Chemical Principles I and Chemical Principles II	
CHEM 31X	Chemical Principles	
A score of 4-5 on the Chemistry AP exam		
PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
PHYSICS 45	Light and Heat	4
one additional PHYSICS class		4
Select one of the following:		4
PHYSICS 110	Advanced Mechanics	
PHYSICS 120	Intermediate Electricity and Magnetism I	
CEE 101A	Mechanics of Materials	
EE 141	Engineering Electromagnetics	
ME 80	Mechanics of Materials	
Select one additional approved geology class typically from the following:		3-5
GES 102	Earth Materials: Introduction to Mineralogy	
GES 110	Structural Geology and Tectonics	
GES 111	Fundamentals of Structural Geology	
GES 151	Sedimentary Geology and Petrography: Depositional Systems	
<b>Total Units</b>		<b>31-38</b>

## Honors Program

The department offers a program leading to the B.S. degree in Geophysics with honors. The guidelines are:

1. Select a research project, either theoretical, field, or experimental, that has the approval of an adviser.
2. Submit a proposal to the department, which decides on its suitability as an honors project. Necessary forms are in the department office.
3. Course credit for the project is assigned by the adviser within the framework of GEOPHYS 198 Honors Program.
4. The decision whether a given independent study project does or does not merit an award of honors is made jointly by the department and the student's adviser. This decision is based on the quality of both the honors work and the student's other work in Earth sciences.
5. The work done on the honors program cannot be used as a substitute for regularly required courses.

## Minor in Geophysics

The Geophysics minor provides students with a general knowledge of Geophysics in addition to a background in the related fields of physics, mathematics, and geology. The minor consists of one required class (3 units), two electives (6 units), and prerequisites in mathematics and physics. Minors require no fewer than 20 units and no more than 36 units.

### Curriculum

1. Required course:
2. 

GEOPHYS 110 Earth on the Edge: Introduction to Geophysics	<b>Units</b>
	3
3. Three additional approved upper-level (100 or higher) Geophysics lecture courses, typically chosen from:
4. 

Select three of the following:	<b>Units</b>
	9
GEOPHYS 120 Ice, Water, Fire	
GEOPHYS 130 Introductory Seismology	
GEOPHYS 150 Geodynamics: Our Dynamic Earth	
GEOPHYS 170 Global Tectonics	
GEOPHYS 184 Journey to the Center of the Earth	
GEOPHYS 190 Near-Surface Geophysics	
5. Supporting science:
6. 

Select one of the following Series:	<b>Units</b>
	8
<b>Series A</b>	
PHYSICS 21 Mechanics and Heat	
PHYSICS 22 Mechanics and Heat Laboratory	
PHYSICS 23 Electricity and Optics	
PHYSICS 24 Electricity and Optics Laboratory	
<b>Series B</b>	
PHYSICS 41 Mechanics	
PHYSICS 43 Electricity and Magnetism	



or PHYSICS Light and Heat  
45

Select one of the following: 5

GES 1A Introduction to Geology: The Physical Science  
of the Earth

GES 1B Introduction to Geology: California Desert  
Geology

GES 1C Introduction to Geology: Dynamic Earth

CME 100 Vector Calculus for Engineers

or MATH Linear Algebra and Differential Calculus of  
51 Several Variables

## Coterminal B.S./M.S. Program in Geophysics

The Department offers a coterminal M.S. degree for students wishing to obtain more specialized training in Geophysics than is normally possible during study for the B.S. degree alone. An M.S. degree should be considered as the professional degree in Geophysics, and is aimed at students wishing to work in a related industry, or students desiring more focused academic study in the field than the B.S. program allows.

The coterminal M.S. degree in Geophysics is offered in conjunction with any relevant undergraduate program at Stanford. Geophysics students often enter the department with degrees in Earth sciences, mathematics, physics, chemistry, or other natural science or engineering fields. Any of these are suitable for the coterminal Geophysics program, and interested students are encouraged to discuss their own background with a Geophysics faculty member.

The requirements for entry into the coterminal M.S. program are submission of a transcript, a statement of purpose, and at least one letter of recommendation. Applications with a letter of recommendation from a Geophysics faculty are generally considered the strongest. Additional letters from other academic or work-related persons also strengthen the application. There are no specific GPA requirements for entry, but the Department looks for proven performance in a rigorous undergraduate curriculum as a prerequisite for admission.

Undergraduates with at least junior-level standing may apply, and applications should be submitted by the Autumn Quarter of the senior year. The graduation requirements to obtain the degree are identical to those for the regular Geophysics master's degree. Contact the Department of Geophysics student services officer for additional information.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Registrar's Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Master of Science in Geophysics

### Objectives

To enhance the student's training for professional work in geophysics through the completion of fundamental courses, both in the major fields and in related sciences, and to begin independent work and specialization.

### Degree Requirements

The candidate must complete 45 units from the following groups of courses:

1. Complete 15 units of Geophysics lecture courses with at least 9 units numbered 200 or higher.
2. Complete six units numbered 100 or higher and three units of 200-level, non-Geophysics lecture courses in earth sciences.
3. Complete one to four electives selected from courses numbered 100 or higher from mathematics, chemistry, engineering, physics, relevant biology, computer science, ecology, hydrology, or Earth science. At least one course must be numbered 200 or higher.
4. At least 9, but not more than 18, of the 45 units must be independent work on a research problem resulting in a written report accepted and archived by the candidate's faculty adviser. Normally, this research is undertaken as part of the candidate's participation in multiple quarters of research seminar (GEOPHYS 385 series). A summer internship is encouraged as a venue for research, but no academic credit is given.
5. Submit a program proposal for approval by a faculty adviser in the first quarter of enrollment.
6. Each candidate must present and defend the results of his or her research at a public oral presentation attended by at least two faculty members; and turn in a thesis/report to adviser.
7. Students are required to attend department seminars.

## Doctor of Philosophy in Geophysics

### Objectives

The Ph.D. degree is conferred upon evidence of high attainment in Geophysics and ability to conduct an independent investigation and present the results of such research.

### Transfer Credit

An incoming student with a relevant master of science degree may apply for a departmental waiver of up to 12 units of the 30 lecture units required for the Ph.D. degree (see the "Doctor of Philosophy in Geophysics (<http://www.stanford.edu/dept/registrar/bulletin/5059.htm>)" section of this Bulletin), for certain courses as approved by the Departmental Graduate Faculty Adviser. Credit for courses generally requires that students identify an equivalent Stanford course and obtain the signature of the Stanford faculty responsible for that course, stating its equivalence.

### Requirements for the Degree

A minimum of 135 units of graduate study at Stanford must be satisfactorily completed. Required courses must be taken for a letter grade, if offered. Students are required to attend the department seminars, and to complete sufficient units of independent work on a research problem to meet the 135-unit University requirement. 12 units must be met by participation in the GEOPHYS 385 series, or equivalent series in other departments with approval of the adviser and graduate coordinator. Students are encouraged to participate in the GEOPHYS 385 series from more than one faculty member or group and relevant equivalent series in other departments. Students with a Master's degree may waive up to 12 units for approved courses.

ENGR 102M Technical/Professional Writing for Mechanical Engineers/ENGR 202W Technical Writing, is recommended but not required.

The student's record must indicate outstanding scholarship, and deficiencies in previous training must be removed. Experience as a teaching assistant (quarter-time for at least two academic quarters) is required for the Ph.D. degree. For more information, see the Geophysics Administrative Guide, section 1.4.1.

The student must pass the departmental oral examination by the end of the sixth academic quarter (third academic quarter for students with an M.S. degree); prepare under faculty supervision a dissertation that is a contribution to knowledge and the result of independent work expressed in satisfactory form; and pass the University oral examination.

The Ph.D. dissertation must be submitted in its final form within five calendar years from the date of admission to candidacy. Upon formal acceptance into a research group, the student and faculty adviser form a supervising committee consisting of at least three members who are responsible for overseeing satisfactory progress toward the Ph.D. degree. At least two committee members must be Geophysics faculty members. The committee conducts the department oral examination, and meets thereafter annually with the student to review degree progress. The Geophysics faculty monitors progress of all students who have not yet passed their department oral examination by carrying out an annual performance appraisal at a closed faculty meeting.

## Course requirements

1. *Geophysics*: 12 units, lecture courses numbered 200 and above, from 4 different Geophysics faculty with different research specializations. These units cannot be waived.
2. *Additional Geophysics*: 3 units, lecture courses numbered 150 and above
3. *School of Earth Sciences (non-Geophysics)*: 3 units, lecture courses numbered 100 or above
4. *Mathematics (numbered 100 or above), Science, and Engineering (non-School of Earth Sciences)*:—6 units, lecture courses numbered 200 or above
5. *Any of the above categories*: 6 units, lecture courses numbered 200 or above
6. *Total required units*: 30 units.

## Ph.D. Department Examination Requirement

1. One research proposal (10-20 pages) with a completed component that outlines a plan of research for 2 -3 years
2. Second scientific proposal or paper (4-10 pages) with a professor in another area
3. An oral presentation with the student's advising committee on both the research proposal (~30-40 min) and the second proposal/paper (~10 min), with questions by the committee constituting the qualifying exam.

The purpose of the second research project is to add breadth to Ph.D. study, and give the student the ability and confidence to teach or advise work in multiple areas. Both research projects must be in Geophysics or related disciplines. The two projects should be clearly distinct: neither the same methodology applied to two different datasets, nor two distinct methodologies applied to the same fundamental problem. The second project should clearly stand alone as a separate piece of work. The two projects must be supervised by different faculty in separate research groups, except in rare cases, as approved by the departmental graduate faculty adviser. The quality of each research project should be consistent with publication of a short journal article (typically achieved by additional work beyond the qualifying exam); although occasionally an extensive term paper deserving of presentation to the second project research group may be approved. The expected level of work on the second project should be about one academic quarter of full time effort.

*Emeriti*: Jon Claerbout, Antony Fraser-Smith,\* Robert Kovach, Amos Nur, Joan Roughgarden,\*\* George A. Thompson

*Chair*: Greg Beroza

*Associate Chair*: Biondo Biondi

*Professors*: Greg Beroza, Biondo Biondi, Jerry M. Harris, Simon Klemperer, Rosemary J. Knight, Paul Segall, Norman H. Sleep, Howard Zebker,\* Mark D. Zoback

*Assistant Professors*: Eric Dunham, Jesse Lawrence

*Professor (Research)*: Gerald M. Mavko

*Courtesy Professors*: Stephan A. Graham, Wendy Mao, David D. Pollard

*Consulting Professors*: Dimitri Bevc, Antoine Guitton, Peter Hennings, Dave Nichols, Shuki Ronen

*Consulting Associate Professor*: Stewart Levin

*Blaustein Visiting Assistant Professor*: Associate Professor Chandong Chang

*Cox Visiting Assistant Professor*: Adam Pidlisecky

*Senior Research Scientists*: Robert Clapp, Jack Dvorkin, Tiziana Vanorio

*Research Associate*: Youli Quan

\* Joint appointment with Electrical Engineering

\*\* Joint appointment with Biological Sciences

# School of Education

Courses offered by the School of Education are listed under the subject code EDUC on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EDUC&filter-catalognumber-EDUC=on>) web site.

Aiming towards the ideal of enabling all people to achieve maximum benefit from their educational experiences, the School of Education seeks to continue as a world leader in ground-breaking, cross-disciplinary inquiries that shape educational practices, their conceptual underpinnings, and the professions that serve the enterprise. The School of Education prepares scholars, teachers, teacher educators, policy analysts, evaluators, researchers, administrators, and other educational specialists. Two graduate degrees with specialization in education are granted by the University: Master of Arts and Doctor of Philosophy. While no undergraduate majors are offered, the school offers a number of courses for undergraduates, an undergraduate minor and undergraduate honors program, and a variety of tutoring programs.

The School of Education is organized into three program area committees: Curriculum Studies and Teacher Education (CTE); Developmental and Psychological Sciences (DAPS); and Social Sciences, Humanities, and Interdisciplinary Policy Studies in Education (SHIPS).

In addition, several cross-area programs are sponsored by faculty from more than one area. These programs include the doctoral Learning Sciences and Technology Design Program (LSTD); two master's level programs: the Stanford Teacher Education Program (STEP) and the Learning, Design, and Technology Program (LDT); and the undergraduate honors and minor programs.

These program area committees function as administrative units that act on admissions, plan course offerings, assign advisers, and determine program requirements. Various concentrations exist within most of these areas. Faculty members are affiliated primarily with one area but may participate in several programs. While there is a great deal of overlap and interdisciplinary emphasis across areas and programs, students are affiliated with one area committee or program and must meet its degree requirements.

Detailed information about admission and degree requirements, faculty members, and specializations related to these area committees and programs can be found in the Academics section of the School's website (<https://ed.stanford.edu/academics>).

The School of Education offers an eight-week summer session for admitted students only. The school offers no correspondence or extension courses, and in accordance with University policy, no part-time enrollment is allowed. Work in an approved internship or as a research assistant is accommodated within the full-time program of study.

## Undergraduate Programs in Education

The School of Education offers a minor and an honors program at the undergraduate level. Further information about these programs can be found at the School of Education (<https://ed.stanford.edu/academics>) web site.

Regardless of whether they are enrolled in one of these undergraduate programs, undergraduates are also welcome in many graduate-level courses.

## Graduate Programs in Education

The School of Education offers Master of Arts and Doctor of Philosophy degrees in several programs described below. University and School of Education requirements must be met for each degree. The University requirements are detailed in the "Graduate Degrees (<http://stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. Students are urged to read this section carefully, noting residency, tuition, and registration requirements. A student who wishes to enroll for graduate work in the School of Education must be admitted to graduate standing by one of the school's area committees and with the approval of the Associate Dean of Student Affairs.

Complete information about admissions procedures and requirements is available from Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>), or at the School of Education (<https://ed.stanford.edu/admissions>) web site. All applicants, except coterminal applicants, must submit scores from the Graduate Record Examination General Test (verbal, quantitative, and analytical or analytical writing areas); TOEFL scores are also required from those whose first language is not English. Applicants to the Stanford Teacher Education Program are also required to submit specific test scores or acceptable equivalents as required by the California Commission on Teacher Credentialing; see the section on STEP. Test information is available at the School of Education (<https://ed.stanford.edu/admissions>) web site.

## Honors Program in Education (Undergraduate)

An honors program in Education is available to undergraduates to supplement their regular majors outside the school. This program permits interested and qualified undergraduates at Stanford to build on the training received in their major field of study by pursuing additional courses and a research thesis in a related area in the study of education.

Students apply for entry during the junior year. Application information can be found at the School of Education (<http://ed.stanford.edu/academics/undergraduate/honors>) web site. The current Director of the Honors Program is Professor John Willinsky.

Students are also required to enroll in EDUC 140 Honors Research with their adviser and in EDUC 199A Undergraduate Honors Seminar, EDUC 199B Undergraduate Honors Seminar, and EDUC 199C Undergraduate Honors Seminar during the senior year.

Near the end of Spring Quarter, successful candidates for honors present brief reports of their work and findings at a mini-conference that all the honors students in Education as well as other members of the academic community attend.

At least one course must be taken from each of the following areas:

### 1. Educational Policy and History

Qualifying courses include:

EDUC 165	History of Higher Education in the U.S.	3-5
EDUC 201	History of Education in the United States	3-5
EDUC 202	Introduction to Comparative and International Education	4-5

### 2. Contemporary Issues in Education

Qualifying courses include:

EDUC 149	Theory and Issues in the Study of Bilingualism	3-5
EDUC 179	Urban Youth and Their Institutions: Research and Practice	4-5
EDUC 197	Education, Gender, and Development	4

### 3. Foundational Disciplines

Qualifying courses include:

EDUC 110	Sociology of Education: The Social Organization of Schools	4
EDUC 204	Introduction to Philosophy of Education	3

## Minor in Education (Undergraduate)

The Stanford University School of Education awards an undergraduate minor in the field of Education. The minor is structured to provide a substantial introduction to education through a broad-based and focused study of educational research, theory and practice. The goals of the minor are to allow undergraduates to develop an understanding of the core issues facing educators and policymakers, to make connections to their major programs of study, and to provide rigorous preparation for graduate studies in education.

Students interested in pursuing an undergraduate minor in Education begin by contacting the minor director (Jennifer Lynn Wolf, [jlwolf@stanford.edu](mailto:jlwolf@stanford.edu)), who is responsible for advising all candidates and approving each student's minor plan of study. Applications for the minor are due no later than the second quarter of the junior year.

The Education Minor requires three core courses to ensure coverage of the disciplines of the field, while allowing flexibility for students wanting to pursue specific interests within Education. In order to graduate with a minor in Education, students must complete the minor program of study as described here, for a total of not less than 20 units and not more than 30 units, with a minimum of six courses.

### Course Requirements and Distribution

- All minor students are required to take the minor core course:

		Units
EDUC 101	Introduction to Teaching and Learning	3-5

- All students are also required to take two foundational courses, such as the following:

		Units
EDUC 103B	Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices	3-5
EDUC 110	Sociology of Education: The Social Organization of Schools	4
EDUC 201	History of Education in the United States	3-5
EDUC 203	The Anthropology of Education	3-5
EDUC 204	Introduction to Philosophy of Education	3

- Each student identifies a subfield of study in which to take at least three elective courses. Established subfields of study within the School of Education include: Teaching and Learning; Education Research and Policy; and Educational Technology. Suitable elective courses include:

A. Subfield 1: Teaching and Learning—

		Units
EDUC 103A	Tutoring: Seeing a Child through Literacy	4

EDUC 111	The Young Adult Novel: A Literature For and About Adolescents	4
EDUC 116X	Service Learning as an Approach to Teaching	3
EDUC 149	Theory and Issues in the Study of Bilingualism	3-5
EDUC 165	History of Higher Education in the U.S.	3-5
EDUC 171	Early Childhood Education Practicum	2-4
EDUC 208B	Curriculum Construction	3-4
EDUC 218	Topics in Cognition and Learning: Induction, Proof, Discovery, and Statistics	3
EDUC 223	Good Districts and Good Schools: Research, Policy, and Practice	3-4
EDUC 256	Psychological and Educational Resilience Among Children and Youth	4
EDUC 283	Child Development In and Beyond Schools	2

A. Subfield 2: Education Research and Policy—

		Units
EDUC 104X	Conduct of Research with and in Communities	3-4
EDUC 113X	Gender and Sexuality in Schools	1-3
EDUC 122X	From Local to Global: Collaborations for International Environmental Education	2
EDUC 123X	Contexts that Promote Youth Development: Understandings of Effective Interventions	2-4
EDUC 197	Education, Gender, and Development	4
EDUC 223	Good Districts and Good Schools: Research, Policy, and Practice	3-4
EDUC 277	Education of Immigrant Students: Psychological Perspectives	4

A. Subfield 3: Educational Technology—

		Units
EDUC 106	Interactive Media in Education	3-5
EDUC 124	Collaborative Design and Research of Technology-integrated Curriculum	3-4
EDUC 208B	Curriculum Construction	3-4
EDUC 218	Topics in Cognition and Learning: Induction, Proof, Discovery, and Statistics	3
EDUC 283	Child Development In and Beyond Schools	2
EDUC 303X	Designing Learning Spaces	3-4
EDUC 333A	Understanding Learning Environments	3
EDUC 333B	Imagining the Future of Learning	3
EDUC 342	Child Development and New Technologies	1-3

- Course work completed for the Education Minor must meet the following criteria:

- All courses must be taken for a letter grade.
- All courses must be completed with a minimum GPA of 3.0.
- Courses used to fulfill the minor may not be used to fulfill any other department degree requirements (major or minor).
- All courses must be taken at Stanford University.

## Coterminal Bachelor's and Master's Program in Education

The School of Education admits a small number of students from undergraduate departments within the University into a coterminal

bachelor's and master's program. For information about the coterminal option through the Stanford Teacher Education Program (STEP), see the details under STEP. Students in this program receive the bachelor's degree in their undergraduate major and the master's degree in Education. Approval of the student's undergraduate department and admission to the School of Education M.A. program are required. Undergraduates may apply when they have completed at least 120 units toward graduation (UTG). The number of units required for the M.A. degree depends on the program requirements within the School of Education; the minimum is 45 units.

Applicants may learn more about the coterminal application process and download the application from the School of Education (<http://ed.stanford.edu/admissions/application-reqs>) web site.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Master of Arts in Education

The M.A. degree is conferred by the University upon recommendation of the faculty of the School of Education. The minimum unit requirement is 45 quarter units earned at Stanford as a graduate student. Students must maintain a grade point average (GPA) of 3.0 or better in courses applicable to the degree, and a minimum of 27 units must be taken in the School of Education. Students typically enroll in 15 to 18 units per quarter. They must enroll in at least 11 units of work each quarter unless their program makes special provision for a lower quarterly minimum. Master's students should obtain detailed program requirements from the Master's Handbook (<http://ed.stanford.edu/academics/masters-handbook>). Some programs require a final project or scholarly paper. Additional detailed information regarding program content, entrance, and degree requirements is available at the School of Education (<http://exploreddegrees.stanford.edu/schoolofeducation/%20http://ed.stanford.edu/admissions/application-reqs>) web site. Before the program begins, each student is assigned a faculty adviser from the appropriate area committee to begin early planning of a coherent program.

Master of Arts degrees are offered for the following specializations:

- Curriculum and Teacher Education. (The program in CTE is not a credentialing program; see STEP below.)
- International Comparative Education
- International Educational Administration and Policy Analysis
- Joint Degree Program with Graduate School of Business (M.B.A./M.A.)
- Joint Degree Program with Law School (J.D./M.A.)
- Learning, Design, and Technology
- Policy, Organization, and Leadership Studies

In addition, an M.A. degree with a teaching credential is offered in the Stanford Teacher Education Program.

## Stanford Teacher Education Program (STEP)

STEP is a twelve-month, full-time program leading to a Master of Arts and a preliminary California teaching credential. STEP offers two Master of Arts programs to prepare college graduates for careers as teachers in single- or multiple-subject classrooms. STEP-Secondary prepares humanities and sciences students to become teachers of English, languages (French, German, Japanese, Mandarin, Spanish), mathematics, science (biology, chemistry, earth science, physics), and history/social science. STEP-Elementary prepares students to be teachers in California multiple-subject classrooms. STEP seeks to prepare and support teachers to work with diverse learners to achieve high intellectual, academic, and social standards by creating equitable and successful schools and classrooms.

The 12-month STEP year begins in June with a Summer Quarter of intensive academic preparation and placement in a local summer school. During the academic year, students continue their course work and begin a year-long field placement under the guidance of expert teachers in local schools. The master's degree and teaching credential require a minimum of 45 quarter units, taken during four quarters of continuous residency.

Stanford undergraduates who enroll in STEP through the coterminal program must have their B.A. conferred prior to commencing the four quarters of the STEP program. Students complete their undergraduate degree prior to beginning in the STEP year, which concludes in a master's degree and a recommendation for a California teaching credential.

Applicants to the secondary program are required to pass the California Basic Educational Skills Test (CBEST) and must demonstrate subject matter competence in one of two ways: (1) by passing the California Subject Examination for Teachers (CSET) in their content area; or (2) by completing a California state-approved subject matter preparation program. Applicants to the elementary program are required to pass the California Basic Educational Skills Test (CBEST), the California Multiple Subject Examination for Teachers (CSET), and the Reading Instruction Competence Assessment Test (RICA) after admission to the program.

Further information regarding admission requirements, course work, and credential requirements is available at the School of Education website in the Academics and Admissions sections (<http://exploreddegrees.stanford.edu/schoolofeducation/http://ed.stanford.edu>).

## Doctoral Degrees in Education

The School of Education offers the Doctor of Philosophy (Ph.D.) degree in all program area committees. The degree is conferred by the University upon recommendation by the faculty of the School of Education and the University Committee on Graduate Studies. The Ph.D. requires a minimum of 135 units of course work and research completed at Stanford beyond the baccalaureate degree. Students may transfer up to 45 units of graduate course work. Students must consult with the doctoral programs officer if they intend to transfer prior course work. Students must maintain a grade point average (GPA) of 3.0 (B) or better in courses applicable to the degree.

Students should note that admission to the doctoral program does not constitute admission to candidacy for the degree. Students must qualify and apply for candidacy by the end of their second year of study and should obtain information about procedures and requirements during their first year from the doctoral programs officer in Cubberley 135.

The Ph.D. degree is designed for students who are preparing for research work in public school systems, branches of government, or specialized institutions; teaching roles in education in colleges or universities, and research connected with such teaching; or other careers in educational scholarship and research.

Ph.D. students must complete a minor in another discipline taught outside the school, or hold an acceptable master's degree outside the field of education, or complete an approved individually designed distributed minor that combines relevant advanced work taken in several disciplines outside the school.

Upon admission, the admitting area committee assigns an initial adviser from its faculty who works with the student to establish an appropriate and individualized course of study, a relevant minor, and project research plans. Other faculty members may also be consulted in this process. Details about administrative and academic requirements for each area committee and the School of Education, along with the expected time frame to complete program milestones, are given in the publication *School of Education Doctoral Degree Handbook*, available for download at <http://ed.stanford.edu/academics/doctoral-handbook>.

The following doctoral specializations, with their sponsoring area and concentration, are offered:

- Anthropology of Education (SHIPS)
- Developmental and Psychological Sciences (DAPS)
- Economics of Education (SHIPS)
- Educational Linguistics (SHIPS)
- Educational Policy (SHIPS)
- Elementary Education (CTE)
- Higher Education (SHIPS)
- History/Social Science Education (CTE)
- History of Education (SHIPS)
- International Comparative Education (SHIPS)
- Learning Sciences and Technology Design (CTE, DAPS, SHIPS)
- Linguistics (SHIPS)
- Literacy, Language, and English Education (CTE)
- Mathematics Education (CTE)
- Organizational Studies (SHIPS)
- Philosophy of Education (SHIPS)
- Race, Inequality, and Language in Education (SHIPS)
- Science Education (CTE)
- Sociology of Education (SHIPS)
- Teacher Education (CTE)

## Ph.D. Minor in Education

Candidates for the Ph.D. degree in other departments or schools of the University may elect to minor in Education. Requirements include a minimum of 20 quarter units of graduate course work in Education and a field of concentration. Students choosing to minor in Education should meet with the Associate Dean for Student Affairs to determine a suitable course of study early in their program.

*Emeriti: (Professors)* J. Myron Atkin, John Baugh, Edwin M. Bridges, Robert C. Calfee, Larry Cuban, Elliot W. Eisner, James Greeno, Michael Kamil, Michael W. Kirst, Henry M. Levin, Richard Lyman (President emeritus), James G. March, William F. Massy, Milbrey McLaughlin, Nel Noddings, Ingram Olkin, Denis C. Phillips, Thomas Rohlen, Richard J. Shavelson, Lee S. Shulman, George D. Spindler, Myra H. Strober, Carl E. Thoresen, David B. Tyack, Decker F. Walker, Hans Weiler

*Dean:* Claude Steele

*Associate Dean for Faculty Affairs:* Francisco O. Ramirez

*Associate Dean for Student Affairs:* Eamonn Callan

*Senior Associate Dean for Administration:* Stephen Olson

*Associate Dean for External Relations:* Rebecca T. Smith

*Assistant Dean for Academic Services:* Priscilla Fiden

*Assistant Dean for Information Technology and CTO:* Paul Kim

*Professors:* Arnetha Ball, Joanna Boaler, Hilda Borko, Eamonn Callan, Martin Carnoy, Geoffrey Cohen, William Damon, Linda Darling-Hammond, Claude Goldenberg, Pamela Grossman, Patricia J. Gumpert, Edward Haertel, Kenji Hakuta, Connie Juel, John D. Krumboltz, David F. Labaree, Teresa D. LaFromboise, Susanna Loeb, Raymond P. McDermott, Jonathan Osborne, Amado M. Padilla, Roy Pea, Walter Powell, Francisco O. Ramirez, Sean Reardon, Daniel Schwartz, Deborah J. Stipek, Guadalupe Valdés, John Willinsky, Sam Wineburg

*Associate Professors:* H. Samy Alim, Anthony L. Antonio, Brigid J. Barron, Eric Bettinger, Bryan Brown, Prudence Carter, Ari Y. Kelman, Daniel McFarland, Debra Meyerson, David Rogosa, Mitchell Stevens

*Assistant Professors:* Jennifer Adams, Nicole M. Ardoin, Maren Songmy Aukerman, Paulo Blikstein, Leah Gordon, Aki Murata, Jelena Obradovi#

*Professors (Teaching):* Shelley Goldman, Rachel Lotan

*Associate Professors (Teaching):* Ira Lit, Susan O'Hara, Christine Min Wotipka

*Professor (Research):* David Plank

*Assistant Professor (Research):* Michelle Reininger

*Courtesy Professors:* Stephen Barley, Albert Camarillo, Carol Dweck, Eric Hanushek, William Koski, Clifford Nass, Brad Osgood, John Rickford, Cecilia Ridgeway, Caroline Winterer

*Courtesy Associate Professors:* Stephen Cooper, Robert Reich

*Courtesy Associate Professor (Teaching):* Don Barr

*Courtesy Assistant Professor:* Shashank Joshi

*Senior Lecturers:* Gay Hoagland, Denise Pope, Ann Porteus, Jennifer Wolf

## Overseas Studies Courses in Education

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofeducation/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofeducation/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofeducation/http://bosp.stanford.edu>).

		Units
OSPOXFRD 46	Organizations and Society	3
OSPOXFRD 52	The Education of Immigrant and Minority Populations in England	4-5
OSPOXFRD 54	Understanding Learning Spaces	4-5

# School of Engineering

Mail Code: 94305-4027

Phone: (650) 723-5984

Web Site: <http://soe.stanford.edu>

Courses offered by the School of Engineering are listed under the subject code ENGR on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENGR&filter-catalognumber-ENGR=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENGR&filter-catalognumber-ENGR=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENGR&filter-catalognumber-ENGR=on>).

The School of Engineering offers undergraduate programs leading to the degree of Bachelor of Science (B.S.), programs leading to both B.S. and Master of Science (M.S.) degrees, other programs leading to a B.S. with a Bachelor of Arts (B.A.) in a field of the humanities or social sciences, dual-degree programs with certain other colleges, and graduate curricula leading to the degrees of M.S., Engineer, and Ph.D.

The school has nine academic departments: Aeronautics and Astronautics, Bioengineering, Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, Management Science and Engineering, Materials Science and Engineering, and Mechanical Engineering. These departments and one interdisciplinary program, the Institute for Computational and Mathematical Engineering, are responsible for graduate curricula, research activities, and the departmental components of the undergraduate curricula.

In research where faculty interest and competence embrace both engineering and the supporting sciences, there are numerous programs within the school as well as several interschool activities, including the Army High Performance Computing Research Center, Biomedical Informatics Training Program, Center for Integrated Systems, Center for Work, Technology, and Organization, Center on Polymer Interfaces and Macromolecular Assemblies, Collaboratory for Research on Global Projects, National Center for Physics-Based Simulation in Biology, Center for Position, Navigation, and Time, the Energy Modeling Forum, the NIH Biotechnology Graduate Training Grant in Chemical Engineering, and the Stanford Technology Ventures Program. Energy Resources Engineering (formerly Petroleum Engineering) is offered through the School of Earth Sciences.

The School of Engineering's Hasso Plattner Institute of Design (<http://dschool.stanford.edu>) brings together students and faculty in engineering, business, education, medicine, and the humanities to learn design thinking and work together to solve big problems in a human-centered way.

The Woods Institute for the Environment (<http://environment.stanford.edu>) brings together faculty, staff, and students from the schools, institutes and centers at Stanford to conduct interdisciplinary research, education, and outreach to promote an environmentally sound and sustainable world.

The School of Engineering has a summer internship program in China for undergraduate and graduate students. For more information, see <http://soe.stanford.edu/chinaintern>. The department also has an exchange program available to graduate students whose research would benefit from collaboration with Chinese academic institutions.

Instruction in Engineering is offered primarily during Autumn, Winter, and Spring quarters of the regular academic year. During the Summer Quarter, a small number of undergraduate and graduate courses are offered.

## Undergraduate Programs in the School of Engineering

The principal goals of the undergraduate engineering curriculum are to provide opportunities for intellectual growth in the context of an engineering discipline, for the attainment of professional competence, and for the development of a sense of the social context of technology. The curriculum is flexible, with many decisions on individual courses left to the student and the adviser. For a student with well-defined educational goals, there is often a great deal of latitude.

In addition to the special requirements for engineering majors described below, all undergraduate engineering students are subject to the University general education, writing, and foreign language requirements outlined in the first pages of this bulletin. Depending on the program chosen, students have the equivalent of from one to three quarters of free electives to bring the total number of units to 180.

The School of Engineering's Handbook for Undergraduate Engineering Programs is the definitive reference for all undergraduate engineering programs. It is available online at <http://ughb.stanford.edu> and provides detailed descriptions of all undergraduate programs in the school, as well as additional information about extracurricular programs and services. Because it is revised in the summer, and updates are made to the web site on a continuing basis, the handbook reflects the most up-to-date information on School of Engineering programs for the academic year.

### Accreditation

The Accreditation Board for Engineering and Technology (ABET) accredits college engineering programs nationwide using criteria and standards developed and accepted by U.S. engineering communities. At Stanford, the following undergraduate programs are accredited:

- Chemical Engineering,
- Civil Engineering
- Electrical Engineering
- Environmental Engineering
- Mechanical Engineering

In ABET-accredited programs, students must meet specific requirements for engineering science, engineering design, mathematics, and science course work. Students are urged to consult the School of Engineering Handbook for Undergraduate Engineering Programs and their adviser.

Accreditation is important in certain areas of the engineering profession; students wishing more information about accreditation should consult their department office or the office of the Senior Associate Dean for Student Affairs in 135 Huang Engineering Center.

### Policy on Satisfactory/No Credit Grading and Minimum Grade Point Average

All courses taken to satisfy major requirements (including the requirements for mathematics, science, engineering fundamentals, Technology in Society, and engineering depth) for all engineering students (including both department and School of Engineering majors) must be taken for a letter grade if the instructor offers that option.

For departmental majors, the minimum combined GPA (grade point average) for all courses taken in fulfillment of the Engineering Fundamentals requirement and the Engineering Depth requirement is 2.0. For School of Engineering majors, the minimum GPA on all engineering courses taken in fulfillment of the major requirements is 2.0.

## Admission

Any students admitted to the University may declare an engineering major if they elect to do so; no additional courses or examinations are required for admission to the School of Engineering.

## Recommended Preparation

### Freshman

Students who plan to enter Stanford as freshmen and intend to major in engineering should take the highest level of mathematics offered in high school. (See the "Mathematics (<http://www.stanford.edu/dept/registrar/bulletin/6023.htm>)" section of this bulletin for information on advanced placement in mathematics.) High school courses in physics and chemistry are strongly recommended, but not required. Additional elective course work in the humanities and social sciences is also recommended.

### Transfer Students

Students who do the early part of their college work elsewhere and then transfer to Stanford to complete their engineering programs should follow an engineering or pre-engineering program at the first school, selecting insofar as possible courses applicable to the requirements of the School of Engineering, that is, courses comparable to those described under "Undergraduate Programs (<http://www.stanford.edu/dept/registrar/bulletin/5144.htm>)." In addition, students should work toward completing the equivalent of Stanford's foreign language requirement and as many of the University's General Education Requirements (GERs) as possible before transferring. Some transfer students may require more than four years (in total) to obtain the B.S. degree. However, Stanford affords great flexibility in planning and scheduling individual programs, which makes it possible for transfer students, who have wide variations in preparation, to plan full programs for each quarter and to progress toward graduation without undue delay.

Transfer credit is given for courses taken elsewhere whenever the courses are equivalent or substantially similar to Stanford courses in scope and rigor. The policy of the School of Engineering is to study each transfer student's preparation and make a reasonable evaluation of the courses taken prior to transfer by means of a petition process. Inquiries may be addressed to the Office of Student Affairs in 135 Huang Engineering Center. For more information, see the transfer credit section of the Handbook for Undergraduate Engineering Programs at <http://ughb.stanford.edu>.

## Degree Program Options

The School of Engineering offers two types of B.S. degrees:

- Bachelor of Science in Engineering
- Bachelor of Science for Individually Designed Majors in Engineering (IDMENs)

There are eight Engineering B.S. subplans that have been proposed by cognizant faculty groups and pre-approved by the Undergraduate Council:

- Aeronautics and Astronautics
- Architectural Design
- Atmosphere/Energy
- Bioengineering
- Biomechanical Engineering
- Biomedical Computation
- Engineering Physics
- Product Design.

The B.S. for an Individually Designed Major in Engineering has also been approved by the council.

Curricula for majors are offered by the departments of:

- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science
- Electrical Engineering
- Management Science and Engineering
- Materials Science and Engineering
- Mechanical Engineering

Curricula for majors in these departments have the following components:

- 36-45 units of mathematics and science (see Basic Requirements 1 and 2 at the end of this section)
- engineering fundamentals (three course minimum, at least one of which must be unspecified by the department, see Basic Requirement 3)
- Technology in Society (TIS) (one course minimum, see Basic Requirement 4)
- engineering depth (courses such that the total number of units for Engineering Fundamentals and Engineering Depth is between 60 and 72)
- ABET accredited majors must meet a minimum number of Engineering Science and Engineering Design units; (see Basic Requirement 5)

Consult the 2012-13 Handbook for Undergraduate Engineering Programs (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>) for additional information.

## Dual and Coterminal Programs

A Stanford undergraduate may work simultaneously toward two bachelor's degrees or toward a bachelor's and a master's degree, that is, B.A. and M.S., B.A. and M.A., B.S. and M.S., or B.S. and M.A. The degrees may be granted simultaneously or at the conclusion of different quarters. Five years are usually required for a dual or coterminal program or for a combination of these two multiple degree programs. For further information, inquire with the School of Engineering's student affairs office, 135 Huang Engineering Center, or with department contacts listed in the Handbook for Undergraduate Engineering Programs, available at <http://ughb.stanford.edu>.

Dual B.A. and B.S. Degree Program—To qualify for both degrees, a student must:

1. complete the stated University and department requirements for each degree
2. complete 15 full-time quarters, or 3 full-time quarters after completing 180 units
3. complete a total of 225 units (180 units for the first bachelor's degree plus 45 units for the second bachelor's degree)

Coterminal Bachelor's and Master's Degree Program—A Stanford undergraduate may be admitted to graduate study for the purpose of working simultaneously toward a bachelor's degree and a master's degree, in the same or different disciplines. To qualify for both degrees, a student must:

1. complete, in addition to the 180 units required for the bachelor's degree, the number of units required by the graduate department for the master's degree which in no event is fewer than the University minimum of 45 units
2. complete the requirements for the bachelor's degree (department, school, and University) and apply for conferral of the degree at the appropriate time
3. complete the department and University requirements for the master's degree and apply for conferral of the degree at the appropriate time

A student may complete the bachelor's degree before completing the master's degree, or both degrees may be completed in the same quarter.



Admission to the coterminal program requires admission to graduate status by the pertinent department. Admission criteria vary from department to department.

## Procedure for Applying for Admission to Coterminal Degree Programs

A Stanford undergraduate may apply to the pertinent graduate department using the University coterminal application form after completing 120 bachelor's degree units. Application deadlines vary by department, but in all cases the student must apply early enough to allow a departmental decision at least one quarter in advance of the anticipated date of conferral of the bachelor's degree.

Students should refer to the University Registrar's Office or its web site for details about when courses begin to count toward the master's degree requirements and when graduate tuition is assessed; this may affect the decision about when to apply for admission to graduate status.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4874.htm>)" section of this bulletin. For University coterminal degree program rules and University application forms, also see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

## Graduate Programs in the School of Engineering

### Admission

Application for admission with graduate standing in the school should be made to the graduate admissions committee in the appropriate department or program. While most graduate students have undergraduate preparation in an engineering curriculum, it is feasible to enter from other programs, including chemistry, geology, mathematics, or physics.

For further information and application instructions, see the department sections in this bulletin or <http://gradadmissions.stanford.edu>. Stanford undergraduates may also apply as coterminal students; details can be found under "Degree Program Options" in the "Undergraduate Programs in the School of Engineering (<http://www.stanford.edu/dept/registrar/bulletin/5144.htm>)" section of this bulletin.

### Fellowships and Assistantships

Departments and divisions of the School of Engineering award graduate fellowships, research assistantships, and teaching assistantships each year.

### Curricula in the School of Engineering

For further details about the following programs, see the department sections in this bulletin.

Related aspects of particular areas of graduate study are commonly covered in the offerings of several departments and divisions. Graduate students are encouraged, with the approval of their department advisers, to choose courses in departments other than their own to achieve a broader appreciation of their field of study. For example, most departments in the school offer courses concerned with nanoscience, and a student interested in an aspect of nanotechnology can often gain appreciable benefit from the related courses given by departments other than her or his own.

Departments and programs of the school offer graduate curricula as follows:

### Aeronautics and Astronautics

- Aeroelasticity

- Aircraft Design, Performance, and Control
- Applied Aerodynamics
- Computational Aero-Acoustics
- Computational Fluid Dynamics
- Control of Robots, including Space and Deep-Underwater Robots
- Conventional and Composite Structures/Materials
- Direct and Large Eddy Simulation of Turbulence
- High-Lift Aerodynamics
- Hybrid Propulsion
- Hypersonic and Supersonic Flow
- Multidisciplinary Design Optimization
- Navigation Systems (especially GPNetworked and Hybrid Control)
- Optimal Control, Estimation, System Identification
- Spacecraft Design and Satellite Engineering
- Turbulent Flow and Combustion

### Bioengineering

- Biomedical Computation
- Biomedical Devices
- Biomedical Imaging
- Cell and Molecular Engineering
- Regenerative Medicine

### Chemical Engineering

- Applied Statistical Mechanics
- Biocatalysis
- Biochemical Engineering
- Bioengineering
- Biophysics
- Computational Materials Science
- Colloid Science
- Dynamics of Complex Fluids
- Energy Conversion
- Functional Genomics
- Hydrodynamic Stability
- Kinetics and Catalysis
- Microrheology
- Molecular Assemblies
- Nanoscience and Technology
- Newtonian and Non-Newtonian Fluid Mechanics
- Polymer Physics
- Protein Biotechnology
- Renewable Fuels
- Semiconductor Processing
- Soft Materials Science
- Solar Utilization
- Surface and Interface Science
- Transport Mechanics

### Civil and Environmental Engineering

- Atmosphere/Energy

- Construction Engineering and Management
- Design/Construction Integration
- Environmental Engineering and Science
- Environmental Fluid Mechanics and Hydrology
- Environmental and Water Studies
- Geomechanics
- Structural Engineering
- Sustainable Design and Construction

## Computational and Mathematical Engineering

- Applied and Computational Mathematics
- Computational Fluid Dynamics
- Computational Geometry and Topology
- Discrete Mathematics and Algorithms
- Numerical Analysis
- Optimization
- Partial Differential Equations
- Stochastic Processes

## Computer Science

See <http://forum.stanford.edu/research/areas.php> for a comprehensive list.

- Algorithmic Game Theory
- Analysis of Algorithms
- Artificial Intelligence
- Autonomous Agents
- Biomedical Computation
- Compilers
- Complexity Theory
- Computational and Cognitive Neuroscience
- Computational Biology
- Computational Geometry
- Computational Logic
- Computational Photography
- Computational Physics
- Computer Architecture
- Computer Graphics
- Computer Security
- Computer Science Education
- Computer Vision
- Cryptography
- Database Systems
- Data Mining
- Digital Libraries
- Distributed and Parallel Computation
- Distributed Systems
- Electronic Commerce
- Formal Verification
- Haptic Display of Virtual Environments
- Human-Computer Interaction
- Image Processing

- Information and Communication Technologies for Development
- Information Management and Mining
- Machine Learning
- Mathematical Theory of Computation
- Mobile Computing
- Multi-Agent Systems
- Natural Language and Speech Processing
- Networking and Internet Architecture
- Operating Systems
- Parallel Computing
- Probabilistic Models and Methods
- Programming Systems/Languages
- Robotics
- Robust System Design
- Scientific Computing and Numerical Analysis
- Sensor Networks
- Social and Information Networks
- Social Computing
- Ubiquitous and Pervasive Computing
- Visualization
- Web Application Infrastructure

## Electrical Engineering

- Biomedical Devices and Bioimaging
- Communication Systems: Wireless, Optical, Wireline
- Control, Learning, and Optimization
- Electronic and Magnetic Devices
- Energy: Solar Cells, Smart Grid, Load Control
- Environmental and Remote Sensing: Sensor Nets, Radar Systems, Space
- Fields and Waves
- Graphics, HCI, Computer Vision, Photography
- Information Theory and Coding: Image and Data Compression, Denoising
- Integrated Circuit Design: MEMS, Sensors, Analog, RF
- Network Systems and Science: Next Gen Internet, Wireless Networks
- Nano and Quantum Science
- Photonic Devices
- Systems Software: OS, Compilers, Languages
- Systems Hardware: Architecture, VLSI, Embedded Systems
- VLSI Design

## Management Science and Engineering

- Decision and Risk Analysis
- Dynamic Systems
- Economics
- Entrepreneurship
- Finance
- Information
- Marketing
- Optimization
- Organization Behavior

- Organizational Science
- Policy
- Production
- Stochastic Systems
- Strategy

## Materials Science and Engineering

- Biomaterials
- Ceramics and Composites
- Computational Materials Science
- Electrical and Optical Behavior of Solids
- Electron Microscopy
- Fracture and Fatigue
- Imperfections in Crystals
- Kinetics
- Magnetic Behavior of Solids
- Magnetic Storage Materials
- Nanomaterials
- Photovoltaics
- Organic Materials
- Phase Transformations
- Physical Metallurgy
- Solid State Chemistry
- Structural Analysis
- Thermodynamics
- Thin Films
- X-Ray Diffraction

## Mechanical Engineering

- Biomechanics
- Combustion Science
- Computational Mechanics
- Controls
- Design of Mechanical Systems
- Dynamics
- Environmental Science
- Experimental Stress and Analysis
- Fatigue and Fracture Mechanics
- Finite Element Analysis
- Fluid Mechanics
- Heat Transfer
- High Temperature Gas Dynamics
- Kinematics
- Manufacturing
- Mechatronics
- Product Design
- Robotics
- Sensors
- Solids
- Thermodynamics

- Turbulence
- Turbulence

## Bachelor of Science in the School of Engineering

Departments within the School of Engineering offer programs leading to the B.S. degree in the following fields:

- Chemical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering
- Environmental Engineering
- Management Science and Engineering
- Materials Science and Engineering
- Mechanical Engineering

The School of Engineering itself offers interdisciplinary programs leading to the B.S. degree in Engineering with specializations in:

- Aeronautics and Astronautics
- Architectural Design
- Atmosphere/Energy
- Bioengineering
- Biomechanical Engineering
- Biomedical Computation
- Engineering Physics
- Product Design

In addition, students may elect a B.S. in an Individually Designed Major in Engineering.

## Bachelor of Arts and Science (B.A.S.) in the School of Engineering

This degree is available to students who complete both the requirements for a B.S. degree in engineering and the requirements for a major or program ordinarily leading to the B.A. degree. For more information, see the "Undergraduate Degrees (p. 23)" section of this bulletin.

## Independent Study, Research, and Honors

The departments of Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical Engineering, and Mechanical Engineering, as well as the faculty overseeing the Architectural Design, Atmosphere/Energy, Bioengineering, Biomechanical Engineering, Biomedical Computing, and Engineering Physics majors, offer qualified students opportunities to do independent study and research at an advanced level with a faculty mentor in order to receive a Bachelor of Science with honors. An honors option is also available to students pursuing an independently designed major, with the guidance and approval of their adviser.

# Petroleum Engineering

Petroleum Engineering is offered by the Department of Energy Resource Engineering in the School of Earth Sciences. Consult the "Energy Resources Engineering (p. 109)" section of this bulletin for requirements. School of Engineering majors who anticipate summer jobs or career positions associated with the oil industry should consider enrolling in ENGR 120.

## Programs in Manufacturing

Programs in manufacturing are available at the undergraduate, master's, and doctorate levels. The undergraduate programs of the departments of Civil and Environmental Engineering, Management Science and Engineering, and Mechanical Engineering provide general preparation for any student interested in manufacturing. More specific interests can be accommodated through Individually Designed Majors in Engineering (IDMENs).

## Basic Requirements

### Basic Requirement 1 (Mathematics)

Engineering students need a solid foundation in the calculus of continuous functions, linear algebra, an introduction to discrete mathematics, and an understanding of statistics and probability theory. Students are encouraged to select courses on these topics. To meet ABET accreditation criteria, a student's program must include the study of differential equations. Courses that satisfy the math requirement are listed at <http://ughb.stanford.edu> in the Handbook for Undergraduate Engineering Programs.

### Basic Requirement 2 (Science)

A strong background in the basic concepts and principles of natural science in such fields as biology, chemistry, geology, and physics is essential for engineering. Most students include the study of physics and chemistry in their programs. Courses that satisfy the science requirement are listed at <http://ughb.stanford.edu> in the Handbook for Undergraduate Engineering Programs.

### Basic Requirement 3 (Engineering Fundamentals)

The Engineering Fundamentals requirement is satisfied by a nucleus of technically rigorous introductory courses chosen from the various engineering disciplines. It is intended to serve several purposes. First, it provides students with a breadth of knowledge concerning the major fields of endeavor within engineering. Second, it allows the incoming engineering student an opportunity to explore a number of courses before embarking on a specific academic major. Third, the individual classes each offer a reasonably deep insight into a contemporary technological subject for the interested non-engineer.

The requirement is met by taking three courses from the following list, at least one of which is chosen by the student rather than by the department:

		Units
ENGR 10	Introduction to Engineering Analysis	4
ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	3
ENGR 20	Introduction to Chemical Engineering (same as CHEMENG 20)	3
ENGR 25B	Biotechnology <sup>1</sup>	3
ENGR 25E	Energy: Chemical Transformations for Production, Storage, and Use (same as CHEMENG 25E) <sup>1</sup>	3

ENGR 30	Engineering Thermodynamics	3
ENGR 40	Introductory Electronics <sup>1,2</sup>	5
ENGR 40N	Engineering Wireless Networks <sup>1</sup>	5
ENGR 40P	Physics of Electrical Engineering <sup>1</sup>	5
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis <sup>1,2</sup>	4
ENGR 50E	Introduction to Materials Science - Energy Emphasis <sup>1</sup>	4
ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis <sup>1</sup>	4
ENGR 60	Engineering Economy	3
ENGR 62	Introduction to Optimization (same as MS&E 111)	4
ENGR 70A/CS 106A	Programming Methodology <sup>1</sup>	5
ENGR 70B/CS 106B	Programming Abstractions <sup>1</sup>	5
ENGR 70X/CS 106X	Programming Abstractions (Accelerated) <sup>1</sup>	5
ENGR 80	Introduction to Bioengineering (same as BIO 80)	4
ENGR 90	Environmental Science and Technology (same as CEE 70)	3

- 1 Only one course from each numbered series can be used in the Engineering Fundamentals category within a major program.
- 2 ENGR 40 Introductory Electronics and ENGR 50 Introduction to Materials Science, Nanotechnology Emphasis may be taken on video at some of Stanford's Overseas Centers.

### Basic Requirement 4 (Technology in Society)

It is important for the student to obtain a broad understanding of engineering as a social activity. To foster this aspect of intellectual and professional development, all engineering majors must take one course devoted to exploring issues arising from the interplay of engineering, technology, and society. Courses that fulfill this requirement are listed online at <http://ughb.stanford.edu> in the Handbook for Undergraduate Engineering Programs.

### Basic Requirement 5 (Engineering Topics)

In order to satisfy ABET (Accreditation Board for Engineering and Technology) requirements, a student majoring in Chemical, Civil, Electrical, Environmental, or Mechanical Engineering must complete one and a half years of engineering topics, consisting of a minimum of 68 units of Engineering Fundamentals and Engineering Depth appropriate to the student's field of study. In most cases, students meet this requirement by completing the major program core and elective requirements. A student may need to take additional courses in Depth in order to fulfill the minimum requirement. Appropriate courses assigned to fulfill each major's program are listed online at <http://ughb.stanford.edu> in the Handbook for Undergraduate Engineering Programs.

### Experimentation

Chemical Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, Materials Science and Engineering, and Mechanical Engineering must include experimental experience appropriate to the discipline. Lab courses taken in the sciences, as well as experimental work taken in courses within the School of Engineering, will fulfill this requirement.

# Overseas Studies Courses in Engineering

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses web site (<http://explorecourses.stanford.edu>) or the Bing Overseas Studies web site (<http://bosp.stanford.edu>). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

## Aeronautics and Astronautics (AA)

Completion of the undergraduate program in Aeronautics and Astronautics leads to the conferral of the Bachelor of Science in Engineering. The subplan "Aeronautics and Astronautics" appears on the transcript and on the diploma.

### Requirements

	Units
<b>Mathematics (5)</b>	
Select one of the following:	5
MATH 53 Ordinary Differential Equations with Linear Algebra	
CME 102/ ENGR 155A Ordinary Differential Equations for Engineers	
Math electives <sup>1</sup>	
<b>Science (20)</b>	
PHYSICS 41 Mechanics	4
PHYSICS 43 Electricity and Magnetism	4
One additional Physics course	4
Science electives <sup>1</sup>	8
<b>Technology in Society (one course required) (3-5) <sup>1</sup></b>	3-5
<b>Engineering Fundamentals (8)</b>	
Three courses minimum, including:	
ENGR 30 Engineering Thermodynamics	3
ENGR 70A Programming Methodology	5
<b>Engineering Depth (38-42)</b>	
AA 100 Introduction to Aeronautics and Astronautics	3
AA 190 Directed Research and Writing in Aero/Astro	3-5
ENGR 15 Dynamics	3
CEE 101A Mechanics of Materials	4
or ME 80 Mechanics of Materials	
ME 161 Dynamic Systems, Vibrations and Control	3-4
or PHYSICS 110 Advanced Mechanics	
ME 70 Introductory Fluids Engineering	4
ME 131A Heat Transfer	3-4
Depth Area I <sup>2</sup>	6
Depth Area II <sup>2</sup>	6
Engineering elective(s) <sup>3</sup>	3
<b>Total Units</b>	<b>74-80</b>

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

- 1 Courses that satisfy the Math electives, Science electives, the Technology in Society requirement, and the Engineering Fundamentals requirement are listed in Figures 3-1, 3-2, 3-3, and 3-4 in the Handbook for Undergraduate Engineering Programs at <http://ughb.stanford.edu>.
- 2 Two of the following areas: Fluids (AA 200 Applied Aerodynamics, AA 210A Fundamentals of Compressible Flow, AA 214A Introduction to Numerical Methods for Engineering, AA 283 Aircraft and Rocket Propulsion; ME 131B Fluid Mechanics: Compressible Flow and Turbomachinery) Structures (AA 240A Analysis of Structures, AA 240B Analysis of Structures, AA 256 Mechanics of Composites) Dynamics and Controls (AA 242A Classical Dynamics, AA 271A Dynamics and Control of Spacecraft and Aircraft, AA 279 Space Mechanics; ENGR 105 Feedback Control Design, ENGR 205 Introduction to Control Design Techniques) Systems Design (AA 241A Introduction to Aircraft Design, Synthesis, and Analysis, AA 241B Introduction to Aircraft Design, Synthesis, and Analysis, AA 236A Spacecraft Design, AA 236B Spacecraft Design Laboratory)
- 3 Electives are to be approved by the adviser, and might be from the depth area lists or other upper-division Engineering courses.

## Architectural Design (AD)

Completion of the undergraduate program in Architectural Design leads to the conferral of the Bachelor of Science in Engineering. The subplan "Architectural Design" appears on the transcript and on the diploma.

### Mission of the Undergraduate Program in Architectural Design

The mission of the undergraduate program in Architectural Design is to develop students' ability to integrate engineering and architecture in ways that blend innovative architectural design with cutting-edge engineering technologies. Courses in the program combine hands-on architectural design studios with a wide variety of other courses. Students can choose from a broad mix of elective courses concerning energy conservation, sustainability, building systems, and structures, as well as design foundation and fine arts courses. In addition to preparing students for advanced studies in architecture and construction management, the program's math and science requirements prepare students well for graduate work in other fields such as civil and environmental engineering, law, and business.

### Requirements

	Units
<b>Mathematics and Science (36 units minimum) (0) <sup>1</sup></b>	
<b>Mathematics (18-20)</b>	
MATH 19 Calculus	3
MATH 20 Calculus	3
MATH 21 Calculus	4
Or the following sequence:	
MATH 41 Calculus	
MATH 42 Calculus	
CME 100 Vector Calculus for Engineers (Recommended)	5
One course in Statistics (required)	3-5
<b>Science (4)</b>	
PHYSICS 41 Mechanics	4
Recommended:	
EARTHSYS 101 Energy and the Environment	
EARTHSYS 102 Renewable Energy Sources and Greener Energy Processes	

GES 1A	Introduction to Geology: The Physical Science of the Earth (or GES 1B or 1C)
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions
CEE 70	Environmental Science and Technology
CEE 101D	Computations in Civil and Environmental Engineering
PHYSICS 23 or PHYSICS 43	Electricity and Optics Electricity and Magnetism

Or from School of Engineering approved list

**Technology in Society (3-5)**

One course required, see Basic Requirement 4 3-5

**Engineering Fundamentals (16-22)**

Three courses minimum, see Basic Requirement 3 9-15

ENGR 14	Intro to Solid Mechanics	4
ENGR 60	Engineering Economy <sup>2</sup>	3

**Engineering Depth (36-38) <sup>3</sup>**

Engineering Depth Electives (with at least 3 units from SoE courses): the number of units of Depth Electives must be such that courses in Engineering Fundamentals and Engineering Depth total at least 60 units

CEE 31 or CEE 31Q	Accessing Architecture Through Drawing	4
CEE 100	Managing Sustainable Building Projects	4
CEE 101A	Mechanics of Materials	4
CEE 110	Building Information Modeling	2-4
CEE 130	Architectural Design: 3-D Modeling, Methodology, and Process	4
CEE 136	Green Architecture	4
CEE 137B	Advanced Architecture Studio	5
CEE 156	Building Systems	4
ARTHIST 3	Introduction to the History of Architecture	5

Total Units 77-89

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

- <sup>1</sup> School of Engineering approved list of math and science courses available in the Handbook for Undergraduate Engineering Programs at <http://ughb.stanford.edu>.
- <sup>2</sup> CEE 146A, offered Autumn quarter, may be used in place of ENGR 60 for the second ENGR Fundamental.
- <sup>3</sup> Engineering depth electives:  
At least one of the following courses: CEE 111, CEE 115, CEE 131, CEE 134  
Others from
  - CEE 32A, CEE 32B, CEE 32Q, CEE 80N, CEE 101B, CEE 101C, CEE 122A, CEE 122B, CEE 124, CEE 131A, CEE 132, CEE 134B, CEE 135A, CEE 139, CEE 154, CEE 172A, CEE 176A, CEE 180, CEE 181, CEE 182, CEE 183
  - ENGR 50, ENGR 103, ENGR 131
  - ME 10AX, ME 101, ME 110, ME 115A/B/C, ME 120, ME 203
  - ARTSTUDI 4, ARTSTUDI 11A, ARTSTUDI 13, ARTSTUDI 14, ARTSTUDI 140, ARTSTUDI 145, ARTSTUDI 147S, ARTSTUDI 151, ARTSTUDI 160, ARTSTUDI 170, ARTSTUDI 180, ARTSTUDI 262
  - ARTHIST 107A, ARTHIST 108A/B, ARTHIST 142, ARTHIST 143A, ARTHIST 188A
  - FILMPROD 114
  - TAPS 137/DRAMA 137
  - URBANST 110, URBANST 113, URBANST 163, URBANST 171

# Atmosphere/Energy (A/E)

Completion of the undergraduate program in Atmosphere/Energy leads to the conferral of the Bachelor of Science in Engineering. The subplan "Atmosphere/Energy" appears on the transcript and on the diploma.

## Mission of the Undergraduate Program in Atmosphere/Energy

Atmosphere and energy are strongly linked: fossil-fuel energy use contributes to air pollution, global warming, and weather modification; and changes in the atmosphere feed back to renewable energy resources, including wind, solar, hydroelectric, and wave resources. The mission of the undergraduate program in Atmosphere/Energy (A/E) is to provide students with the fundamental background necessary to solve large- and local-scale climate, air pollution, and energy problems through renewable and efficient energy systems. To accomplish this goal, students learn in detail the causes and proposed solutions to the problems, and learn to evaluate whether the proposed solutions are truly beneficial. A/E students take courses in renewable energy resources, indoor and outdoor air pollution, energy efficient buildings, climate change, renewable energy and clean-vehicle technologies, weather and storm systems, energy technologies in developing countries, electric grids, and air quality management. The curriculum is flexible. Depending upon their area of interest, students may take in-depth courses in energy or atmosphere and focus either on science, technology, or policy. The major is designed to provide students with excellent preparation for careers in industry, government, and research; and for study in graduate school.

## Requirements

	Units
<b>Mathematics and Science (45 units minimum): (0)</b>	
<b>Mathematics (23)</b>	23
23 units minimum, including at least one course from each group:	
Group A	
MATH 53	Ordinary Differential Equations with Linear Algebra
CME 102	Ordinary Differential Equations for Engineers
Group B	
CME 106	Introduction to Probability and Statistics for Engineers
STATS 60	Introduction to Statistical Methods: Precalculus
STATS 110	Statistical Methods in Engineering and the Physical Sciences
<b>Science (24)</b>	20
20 units minimum, including all of the following:	
PHYSICS 41	Mechanics
PHYSICS 43 or PHYSICS 45	Electricity and Magnetism Light and Heat
Select one of the following:	
CHEM 31B or CHEM 31X or ENGR 31	Chemical Principles II Chemical Principles Chemical Principles with Application to Nanoscale Science and Technology
CEE 70	Environmental Science and Technology <sup>1</sup>
<b>Technology in Society (1 course) (5)</b>	
STS 110	Ethics and Public Policy (or other course from approved list; see Basic Requirement 4)

Engineering Fundamentals (9-12)		
Three courses minimum, including the following:		
ENGR 25E	Energy: Chemical Transformations for Production, Storage, and Use	3
Plus one of the following courses, plus one elective (see Basic Requirement 3):		6-9
ENGR 10	Introduction to Engineering Analysis	
ENGR 30	Engineering Thermodynamics	
ENGR 60	Engineering Economy	
ENGR 70A	Programming Methodology	
Engineering Depth (41-42)		
Required: <sup>2</sup>		
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions (cannot also fulfill science requirement)	3
CEE 173A	Energy Resources	4-5
At least 34 units from the following with at least four courses from each group:		34
Group A: Atmosphere		
AA 100	Introduction to Aeronautics and Astronautics	
CEE 63	Weather and Storms	
CEE 101B or ME 70	Mechanics of Fluids Introductory Fluids Engineering	
CEE 164 or EESS 146B	Introduction to Physical Oceanography Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	
CEE 172	Air Quality Management	
CEE 172A	Indoor Air Quality ((given alt years))	
CEE 172S	Green House Gas Mitigation	
CEE 178	Introduction to Human Exposure Analysis	
EARTHSYS 111	Biology and Global Change	
EARTHSYS 57Q	Climate Change from the Past to the Future	
EARTHSYS 142 or EARTHSYS 144	Remote Sensing of Land Fundamentals of Geographic Information Science (GIS)	
EARTHSYS 146A	Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation (alt years)	
EARTHSYS 147	Controlling Climate Change in the 21st Century	
EARTHSYS 184	Climate and Agriculture	
ME 131B	Fluid Mechanics: Compressible Flow and Turbomachinery	
MS&E 92Q	International Environmental Policy	
Group B: Energy		
CEE 109	Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision (alternate years)	
or CEE 136	Green Architecture	
CEE 142A or CEE 156	Negotiating Sustainable Development Building Systems	
CEE 176A	Energy Efficient Buildings	
CEE 176B	Electric Power: Renewables and Efficiency	
CEE 176F	Energy Systems Field Trips: China Energy Systems ((given alt years))	

CEE 177S	Design for a Sustainable World	
CHEMENG 35N	Renewable Energy for a Sustainable World	
EARTHSYS 101	Energy and the Environment	
EARTHSYS 102	Renewable Energy Sources and Greener Energy Processes	
ECON 17N	Energy, the Environment, and the Economy	
AA 116N or EE 152	Electric Automobiles and Aircraft Green Electronics	
ENERGY 104	Transition to sustainable energy systems	
MATSCI 156	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	
ME 185	Electric Vehicle Design	
Total Units		102-106

- 1 Can count as a science requirement or Engineering Fundamental, but not both.
- 2 To fulfill the Writing in the Major (WIM) requirement take Technology in Society course STS 110 or MS&E 193W. Alternative WIM Courses: CEE 100, EARTHSYS 200, HUMBIO 4B, or the combination of 2 units of CEE 199 with 1 unit of E199W.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Bioengineering (BioE)

Completion of the undergraduate program in Bioengineering leads to the conferral of the Bachelor of Science in Engineering. The subplan "Bioengineering" appears on the transcript and on the diploma.

## Mission of the Undergraduate Program in Bioengineering

The Stanford Bioengineering (BioE) major enables students to combine engineering and the life sciences in ways that advance scientific discovery, healthcare and medicine, manufacturing, environmental quality, culture, education, and policy. Students who major in BioE earn a fundamental engineering degree for which the raw materials, underlying basic sciences, fundamental toolkit, and future frontiers are all defined by the unique properties of living systems. Students will complete engineering fundamentals courses, including an introduction to BioE and computer programming. A series of core BioE classes beginning in the second year leads to a student-selected depth area and a capstone senior BioDesign project. The department also organizes a summer Research Experience for Undergraduates (REU) program. BioE graduates are well prepared to pursue careers and lead projects in research, medicine, business, law, and policy.

## Requirements

### Mathematics (28-29) <sup>1</sup>

		Units
28 units minimum required, see Basic Requirement 1)		
MATH 41 & MATH 42	Calculus and Calculus (or AP Calculus)	10
CME 100	Vector Calculus for Engineers	5
CME 102	Ordinary Differential Equations for Engineers	5
CME 104	Linear Algebra and Partial Differential Equations for Engineers	5
CME 106	Introduction to Probability and Statistics for Engineers	3-4

<b>Science (26)</b> <sup>2</sup>		
26 units minimum:		
CHEM 31X	Chemical Principles (or CHEM 31A and 31B)	4
CHEM 33	Structure and Reactivity	4
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
<b>Technology in Society (3)</b>		
One course required; see Basic Requirement 4		
BIOE 131	Ethics in Bioengineering	3
<b>Engineering Fundamentals (12-14)</b>		
ENGR 70A	Programming Methodology (same as CS 106A)	5
ENGR 80	Introduction to Bioengineering	4
Fundamentals Elective; see UGHB Fig. 3-4 for approved course list; may not use ENGR 70B or ENGR 70X		3-5
<b>Bioengineering Core (36)</b>		
BIOE 41	Physical Biology of Macromolecules	4
BIOE 42	Physical Biology of Cells	4
BIOE 44	Fundamentals for Engineering Biology Lab	4
BIOE 51	Anatomy for Bioengineers	4
BIOE 101	Systems Biology	4
BIOE 103	Systems Physiology and Design	4
BIOE 123	Optics and Devices Lab	4
BIOE 141A	Biodesign Project I	4
BIOE 141B	Biodesign Project II	4
<b>Bioengineering Depth Electives (12)</b>		
Four courses, minimum 12 units:		12
BIOE 212	Introduction to Biomedical Informatics Research Methodology	
BIOE 214	Representations and Algorithms for Computational Molecular Biology	
BIOE 220	Introduction to Imaging and Image-based Human Anatomy	
BIOE 222A	Multimodality Molecular Imaging in Living Subjects I	
BIOE 222B	Multimodality Molecular Imaging in Living Subjects II	
BIOE 244	Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems	
BIOE 261	Principles and Practice of Stem Cell Engineering	
BIOE 281	Biomechanics of Movement	
BIOE 311	Biophysics of Multi-cellular Systems and Amorphous Computers	
BIOE 332	Large-Scale Neural Modeling	
Total Units		117-120

- 1 It is strongly recommended that CME 100 Vector Calculus for Engineers, CME 102 Ordinary Differential Equations for Engineers, and CME 104 Linear Algebra and Partial Differential Equations for Engineers be taken rather than MATH 51 Linear Algebra and Differential Calculus of Several Variables, MATH 52 Integral Calculus of Several Variables, and MATH 53 Ordinary Differential Equations with Linear Algebra. CME 106 Introduction to Probability and Statistics for Engineers should be taken rather than STATS 110 Statistical Methods in Engineering and the Physical Sciences or STATS 141 Biostatistics
- 2 Science must include both Chemistry (CHEM 31A Chemical Principles I and CHEM 31B Chemical Principles II; or CHEM 31X Chemical Principles or ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology) and calculus-based Physics, with two quarters of course work in each, in addition to two courses of BIO core. CHEM 31A Chemical Principles I and CHEM 31B Chemical Principles II are considered one course even though given over two quarters. Premeds should take Chemistry, not ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>). Students pursuing a premed program need to take additional courses; see the UGHB, BioE Premed 4-Year Plan.

## Biomechanical Engineering (BME)

Completion of the undergraduate program in Biomechanical Engineering leads to the conferral of the Bachelor of Science in Engineering. The subplan "Biomechanical Engineering" appears on the transcript and on the diploma.

### Mission of the Undergraduate Program in Biomechanical Engineering

The mission of the undergraduate program in Biomechanical Engineering is to help students address health science challenges by applying engineering mechanics and design to the fields of biology and medicine. The program is interdisciplinary in nature, integrating engineering course work with biology and clinical medicine. Research and teaching in this discipline focus primarily on neuromuscular, musculoskeletal, cardiovascular, and cell and tissue biomechanics. This major prepares students for graduate studies in bioengineering, medicine or related areas.

### Requirements

	Units
<b>Mathematics (21)</b>	21
21 units minimum; see Basic Requirement 1	
<b>Science (22 units Minimum) (27)</b> <sup>1</sup>	
CHEM 31X	4
CHEM 33	4
PHYSICS 41	4
BIO 44X	5
Biology or Human Biology A/B core courses	10
<b>Technology in Society (3-5)</b>	
One course required, see Basic Requirement 4	
<b>Engineering Topics (Engineering Science and Design) (10-12)</b>	



Engineering Fundamentals (minimum three courses; see Basic Requirement 3):		
ENGR 14	Intro to Solid Mechanics	4
ENGR 25B	Biotechnology	3
or ENGR 80	Introduction to Bioengineering	
Fundamentals Elective		3-5
<b>Engineering Depth (33)</b>		
ENGR 15	Dynamics	3
ENGR 30	Engineering Thermodynamics	3
ME 70	Introductory Fluids Engineering	4
ME 80	Mechanics of Materials	4
ME 389	Biomechanical Research Symposium	1
Options to complete the ME depth sequence (3 courses, minimum 9 units):		9
ENGR 105	Feedback Control Design	
ME 101	Visual Thinking	
ME 112	Mechanical Systems Design	
ME 113	Mechanical Engineering Design	
ME 131A	Heat Transfer	
ME 131B	Fluid Mechanics: Compressible Flow and Turbomachinery	
ME 140	Advanced Thermal Systems	
ME 161	Dynamic Systems, Vibrations and Control	
ME 203	Design and Manufacturing (for WIM take ENGR 102M concurrently) <sup>2</sup>	
ME 210	Introduction to Mechatronics	
ME 220	Introduction to Sensors	
Options to complete the BME depth sequence (3 courses, minimum 9 units): <sup>3</sup>		9
BIOE 260	Tissue Engineering	
ME 280	Skeletal Development and Evolution	
ME 281	Biomechanics of Movement	
ME 283	Introduction to Biomechanics	
ME 287	Mechanics of Biological Tissues	
ME 294	Medical Device Design	
Total Units		94-98

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Biomedical Computation (BMC)

Completion of the undergraduate program in Biomedical Computation leads to the conferral of the Bachelor of Science in Engineering. The subplan "Biomedical Computation" appears on the transcript and on the diploma.

### Mission of the Undergraduate Program in Biomedical Computation

As biology and medical science enter the 21st century, the importance of computational methods continues to increase dramatically. These methods span the analysis of biomedical data, the construction of computational models for biological systems, and the design of computer systems that help biologists and physicians create and administer treatments to patients. The Biomedical Computation major prepares students to work at the cutting edge of this interface between computer science, biology, and medicine.

Students begin their journey by gaining a solid fundamental understanding of the underlying biological and computational disciplines. They learn techniques in informatics and simulation and their countless applications in understanding and analyzing biology at all levels, from individual molecules in cells to entire organs, organisms, and populations. Students then focus their efforts on a depth area of their choice, and participate in a substantial research project with a Stanford faculty member. Upon graduation, students are prepared to enter a wide range of cutting-edge fields in both academia and industry.

## Requirements

		Units
<b>Mathematics (16-20)</b>		
21 unit minimum, see Basic Requirement 1		
MATH 41	Calculus	5
MATH 42	Calculus	5
STATS 116	Theory of Probability <sup>1</sup>	3-5
CS 103	Mathematical Foundations of Computing	3-5
<b>Science (27)</b>		
17 units minimum, see Basic Requirement 2		
PHYSICS 41	Mechanics	4
CHEM 31X	Chemical Principles (or CHEM 31A and CHEM 31B, or ENGR 31)	4
CHEM 33	Structure and Reactivity	4
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
or HUMBIO 2A	Genetics, Evolution, and Ecology	
BIO 42	Cell Biology and Animal Physiology	5
or HUMBIO 3A	Cell and Developmental Biology	
BIO 43	Plant Biology, Evolution, and Ecology	5
or HUMBIO 4A	The Human Organism	
<b>Engineering Fundamentals (3-5)</b>		
CS 106B	Programming Abstractions	3-5
or CS 106X	Programming Abstractions (Accelerated)	
For the second required course, see concentrations		
<b>Technology in Society (3-5)</b>		
One course required, see Basic Requirement 4		3-5
<b>Engineering (15-19)</b>		
CS 107	Computer Organization and Systems	3-5
CS 161	Design and Analysis of Algorithms	3-5
Select one of the following:		3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	
CS 273A	A Computational Tour of the Human Genome	
CS 274	Representations and Algorithms for Computational Molecular Biology	
CS 275	Translational Bioinformatics	
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	
Research: 6 units of biomedical computation research in any department <sup>2,3</sup>		6
Engineering Depth Concentration (select one of the following concentrations): <sup>7</sup>		
<b>Cellular/Molecular Concentration (0)</b>		
Mathematics: Select one of the following:		
CME 100	Vector Calculus for Engineers	
STATS 141	Biostatistics	
MATH 51	Linear Algebra and Differential Calculus of Several Variables	

One additional Engineering Fundamental <sup>4</sup>		
Biology (four courses):		
BIO 129A	Cellular Dynamics I: Cell Motility and Adhesion	
BIO 129B	Cellular Dynamics II: Building a Cell	
BIO 188	Biochemistry I (or CHEM 135 or CHEM 171)	
Informatics Electives (two courses) <sup>5,6</sup>		
Simulation Electives (two courses) <sup>5,6</sup>		
Simulation, Informatics, or Cell/Mol Elective (one course) <sup>5,6</sup>		
<b>Informatics Concentration (6-10)</b>		
Mathematics: Select one of the following:		
STATS 141	Biostatistics	
STATS 203	Introduction to Regression Models and Analysis of Variance	
STATS 205	Introduction to Nonparametric Statistics	
STATS 215	Statistical Models in Biology	
One additional Engineering Fundamental <sup>4</sup>		
Informatics Core (three courses):		
CS 145	Introduction to Databases	
or CS 147	Introduction to Human-Computer Interaction Design	
One additional course from the previous two lines		
Informatics Electives (three courses) <sup>5,6</sup>		
Cellular Electives (two courses) <sup>5,6</sup>		
Organs Electives (two courses) <sup>5,6</sup>	6-10	
<b>Organs/Organisms Concentration (0)</b>		
Mathematics (select one of the following):		
CME 100	Vector Calculus for Engineers	
STATS 141	Biostatistics	
MATH 51	Linear Algebra and Differential Calculus of Several Variables	
One additional Engineering Fundamental <sup>4</sup>		
Biology (two courses):		
BIO 112	Human Physiology	
BIO 188	Biochemistry I	
or BIOE 220	Introduction to Imaging and Image-based Human Anatomy	
Two additional Organs Electives <sup>5,6</sup>		
Simulation Electives (two courses) <sup>5,6</sup>		
Informatics Electives (two courses) <sup>5,6</sup>		
Simulation, Informatics, or Organs Elective (one course) <sup>5,6</sup>		
<b>Simulation Concentration (17)</b>		
Mathematics:		
CME 100	Vector Calculus for Engineers	
or MATH 51	Linear Algebra and Differential Calculus of Several Variables	
Engineering Fundamentals:		
ENGR 30	Engineering Thermodynamics	
Simulation Core:		
CME 102	Ordinary Differential Equations for Engineers	5
or MATH 53	Ordinary Differential Equations with Linear Algebra	
ENGR 80	Introduction to Bioengineering	4
BIOE 101	Systems Biology	4
BIOE 103	Systems Physiology and Design	4
Simulation Electives (two courses) <sup>5,6</sup>		
Cellular Elective (one course) <sup>5,6</sup>		

Organs Elective (one course) <sup>5,6</sup>	
Simulation, Cellular, or Organs Elective (two courses) <sup>5,6</sup>	
Total Units	87-103
<ol style="list-style-type: none"> <li>CS 109 Introduction to Probability for Computer Scientists, MS&amp;E 120 Probabilistic Analysis, MS&amp;E 220 Probabilistic Analysis, EE 178 Probabilistic Systems Analysis, and CME 106 Introduction to Probability and Statistics for Engineers are acceptable substitutes for STATS 116 Theory of Probability.</li> <li>Research projects require pre-approval of BMC Coordinators</li> <li>Research units taken as CS 191W Writing Intensive Senior Project or in conjunction with ENGR 199W Writing of Original Research for Engineers fulfill the Writing in the Major (WIM) requirement. CS 272 Introduction to Biomedical Informatics Research Methodology, which does not have to be taken in conjunction with research, also fulfills the WIM requirement.</li> <li>One 3-5 unit course required; CS 106A Programming Methodology may not be used. See Fundamentals list in Handbook for Undergraduate Engineering Programs.</li> <li>The list of electives is continually updated to include all applicable courses. For the current list of electives, see <a href="http://bmc.stanford.edu">http://bmc.stanford.edu</a>.</li> <li>A course may only be counted towards one elective or core requirement; it may not be double-counted.</li> <li>A total of 40 Engineering units must be taken. The core classes only provide 27 Engineering units, so the remaining units must be taken from within the electives.</li> </ol>	

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>). Also see <http://bmc.stanford.edu>.

## Chemical Engineering (CHE)

Completion of the undergraduate program in Chemical Engineering leads to the conferral of the Bachelor of Science in Chemical Engineering.

### Mission of the Undergraduate Program in Chemical Engineering

Chemical engineers are responsible for the conception and design of processes for the purpose of production, transformation, and transportation of materials. This activity begins with experimentation in the laboratory and is followed by implementation of the technology in full-scale production. The mission of the undergraduate program in Chemical Engineering is to develop students' understanding of the core scientific, mathematical, and engineering principles that serve as the foundation underlying these technological processes. The program's core mission is reflected in its curriculum which is built on a foundation in the sciences of chemistry, physics, and biology. Course work includes the study of applied mathematics, material and energy balances, thermodynamics, fluid mechanics, energy and mass transfer, separations technologies, chemical reaction kinetics and reactor design, and process design. The program provides students with excellent preparation for careers in the corporate sector and government, or for graduate study.

### Requirements

	Units	
<b>Mathematics (25) <sup>1</sup></b>		
MATH 41	Calculus	5
MATH 42	Calculus	5
Select one of the following:		5

CME 100	Vector Calculus for Engineers	
MATH 51 & MATH 52	Linear Algebra and Differential Calculus of Several Variables and Integral Calculus of Several Variables	
CME 102 or MATH 53	Ordinary Differential Equations for Engineers	5
CME 104	Ordinary Differential Equations with Linear Algebra	
CME 104	Linear Algebra and Partial Differential Equations for Engineers	5
or CME 106	Introduction to Probability and Statistics for Engineers	
<b>Science (23) <sup>1</sup></b>		
CHEM 31X	Chemical Principles (or CHEM 31A and CHEM 31B)	4
CHEM 33	Structure and Reactivity	4
CHEM 35	Organic Monofunctional Compounds	4
CHEM 36	Organic Chemistry Laboratory I	3
PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
<b>Technology in Society (3-5)</b>		
One course required, see Basic Requirement 4		3-5
<b>Engineering Fundamentals (9-11)</b>		
Three courses minimum; see Basic Requirement 3		
ENGR/ CHEMENG 20	Introduction to Chemical Engineering	3
Select one of the following:		3
ENGR/ CHEMENG 25B	Biotechnology	
ENGR/ CHEMENG 25E	Energy: Chemical Transformations for Production, Storage, and Use	
Fundamentals Elective		3-5
<b>Chemical Engineering Depth (60)</b>		
Minimum 68 Engineering Science and Design units; see Basic Requirement 5		
CHEMENG 10	The Chemical Engineering Profession	1
CHEMENG 100	Chemical Process Modeling, Dynamics, and Control	3
CHEMENG 110	Equilibrium Thermodynamics	3
CHEMENG 120A	Fluid Mechanics	4
CHEMENG 120B	Energy and Mass Transport	4
CHEMENG 130	Separation Processes	3
CHEMENG 150	Biochemical Engineering	3
CHEMENG 170	Kinetics and Reactor Design	3
CHEMENG 180	Chemical Engineering Plant Design	3
CHEMENG 185A	Chemical Engineering Laboratory A (WIM)	4
CHEMENG 185B	Chemical Engineering Laboratory B	4
CHEMENG 181	Biochemistry I	3
CHEM 130	Organic Chemistry Laboratory II	4
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 175	Physical Chemistry	3
Select two of the following: <sup>2</sup>		6

CHEMENG 140	Micro and Nanoscale Fabrication Engineering	
CHEMENG 142	Basic Principles of Heterogeneous Catalysis with Applications in Energy Transformations	
CHEMENG 160	Polymer Science and Engineering	
CHEMENG 174	Environmental Microbiology I	
CHEMENG 183	Biochemistry II	
<b>Note 3</b>		
Total Units		120-124

<sup>1</sup> Unit count is higher if program includes one of more of the following: MATH 51 and MATH 52 in lieu of CME 100; or CHEM 31A and CHEM 31B in lieu of CHEM 31X.

<sup>2</sup> Any two acceptable except combining 174 and 183.

<sup>3</sup> For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>)

## Civil Engineering (CE)

Completion of the undergraduate program in Civil Engineering leads to the conferral of the Bachelor of Science in Civil Engineering.

## Mission of the Undergraduate Program in Civil Engineering

The mission of the undergraduate program in Civil Engineering is to provide students with the principles of engineering and the methodology needed for civil engineering practice. This pre-professional program balances the fundamentals common to many specialties in civil engineering and allows for concentration in structures and construction or environmental and water studies. Students in the major learn to apply knowledge of mathematics, science, and civil engineering to conduct experiments, design structures and systems to creatively solve engineering problems, and communicate their ideas effectively. The curriculum includes course work in structural, construction, and environmental engineering. The major prepares students for careers in consulting, industry and government, as well as for graduate school in Engineering.

## Requirements

	Units
<b>Mathematics and Science (45)</b>	45
45 units minimum; see Basic Requirements 1 and 2 <sup>1</sup>	
<b>Technology in Society (3-5)</b>	
One course; see Basic Requirement 4 <sup>2</sup>	3-5
<b>Engineering Fundamentals (10-12)</b>	
Three courses minimum, see Basic Requirement 3	
ENGR 14	Intro to Solid Mechanics 4
ENGR 90	Environmental Science and Technology 3
Fundamentals Elective	3-5
<b>Engineering Depth (57-61)</b>	
Minimum of 68 Engineering Fundamentals plus Engineering Depth; see Basic Requirement 5	
CEE 100	Managing Sustainable Building Projects <sup>3</sup> 4

CEE 101A	Mechanics of Materials	4
CEE 101B	Mechanics of Fluids	4
CEE 101C	Geotechnical Engineering	4
CEE 146A	Engineering Economy	3
Specialty courses in either:		35-42
Environmental and Water Studies (see below)		
Structures and Construction (see below)		
Other School of Engineering Electives		3-0
<b>Total Units</b>		<b>115-123</b>

- Mathematics must include CME 100 Vector Calculus for Engineers/ CME 102 Ordinary Differential Equations for Engineers (or Math 51 Linear Algebra and Differential Calculus of Several Variables/ MATH 53 Ordinary Differential Equations with Linear Algebra) and a Statistics course. Science must include Physics 41 Mechanics; either ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology, CHEM31A Chemical Principles I or CHEM 31X Chemical Principles; two additional quarters in either chemistry or physics and GES 1A Introduction to Geology: The Physical Science of the Earth (or GES 1B or 1C); for students in the Environmental and Water Studies track, the additional chemistry or physics must include CHEM 33; for students in the Structures and Construction track, it must include PHYSICS 43 or 45.
- Chosen TiS class must specifically include an ethics component, such as STS 101 Science Technology and Contemporary Society, STS 110 Ethics and Public Policy, STS 115 Ethical Issues in Engineering.
- CEE 100 meets the Writing in the Major (WIM) requirement

## Environmental and Water Studies

		Units
ENGR 30	Engineering Thermodynamics <sup>1</sup>	3
CEE 101D	Computations in Civil and Environmental Engineering <sup>2</sup>	3
CEE 160	Mechanics of Fluids Laboratory	2
CEE 161A	Rivers, Streams, and Canals	3-4
CEE 166A	Watersheds and Wetlands	3
CEE 166B	Floods and Droughts, Dams and Aqueducts	3
CEE 171	Environmental Planning Methods	3
CEE 172	Air Quality Management	3
CEE 177	Aquatic Chemistry and Biology	4
CEE 179A	Water Chemistry Laboratory	3
Remaining specialty units from:		
CEE 63	Weather and Storms <sup>2</sup>	3
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions <sup>2</sup>	3
CEE 109	Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision	2
CEE 129	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future	3
CEE 164	Introduction to Physical Oceanography	4
CEE 166D	Water Resources and Water Hazards Field Trips	2
CEE 172A	Indoor Air Quality	2-3
CEE 173A	Energy Resources	3-5
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 178	Introduction to Human Exposure Analysis	3
CEE 199	Undergraduate Research in Civil and Environmental Engineering	1-4

## Structures and Construction

		Units
Select one of the following:		4
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	
ENGR 50E	Introduction to Materials Science - Energy Emphasis	
ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis	
CEE 102	Legal Aspects of Engineering and Construction	3
CEE 156	Building Systems	4
CEE 180	Structural Analysis	4
CEE 181	Design of Steel Structures	4
CEE 182	Design of Reinforced Concrete Structures	4
CEE 183	Integrated Civil Engineering Design Project	4
Remaining specialty units from:		
ENGR 15	Dynamics	4
CME 104	Linear Algebra and Partial Differential Equations for Engineers	5
CEE 101D	Computations in Civil and Environmental Engineering	3
CEE 122A	Computer Integrated Architecture/Engineering/ Construction	2
CEE 122B	Computer Integrated A/E/C	2
CEE 129	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future	3
CEE 141A/141B	Infrastructure Project Development	3
CEE 142A	Negotiating Sustainable Development	3
CEE 151	Negotiation	3
CEE 155	Introduction to Sensing Networks for CEE	4
CEE 160	Mechanics of Fluids Laboratory	2
CEE 161A	Rivers, Streams, and Canals	3-4
CEE 171	Environmental Planning Methods	3
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 195	Fundamentals of Structural Geology	3
CEE 196	Engineering Geology and Global Change	3
CEE 199	Undergraduate Research in Civil and Environmental Engineering	1-4
CEE 203	Probabilistic Models in Civil Engineering	3-4
One of the following can also count as remaining specialty units.		3-4
CEE 110	Building Information Modeling	
CEE 130	Architectural Design: 3-D Modeling, Methodology, and Process	
CEE 131A	Professional Practice: Mixed-Use Design in an Urban Setting	
CEE 134B	Intermediate Arch Studio	

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Computer Science (CS)

Completion of the undergraduate program in Computer Science leads to the conferral of the Bachelor of Science in Computer Science.

# Mission of the Undergraduate Program in Computer Science

The mission of the undergraduate program in Computer Science is to develop students' breadth of knowledge across the subject areas of computer sciences, including their ability to apply the defining processes of computer science theory, abstraction, design, and implementation to solve problems in the discipline. Students take a set of core courses. After learning the essential programming techniques and the mathematical foundations of computer science, students take courses in areas such as programming techniques, automata and complexity theory, systems programming, computer architecture, analysis of algorithms, artificial intelligence, and applications. The program prepares students for careers in government, law, and the corporate sector, and for graduate study.

## Requirements

### Mathematics (26 units minimum)

CS 103	Mathematical Foundations of Computing <sup>1</sup>	5
CS 109	Introduction to Probability for Computer Scientists <sup>2</sup>	5
MATH 41 & MATH 42	Calculus and Calculus <sup>3</sup>	10
Plus two electives <sup>4</sup>		

### Science (11 units minimum)—

PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
Science elective <sup>5</sup>		3

### Technology in Society (3-5 units)

One course; see Basic Requirement 4

### Engineering Fundamentals (13 units minimum; see Basic Requirement 3)—

CS 106B	Programming Abstractions	5
or CS 106X	Programming Abstractions (Accelerated)	
ENGR 40	Introductory Electronics	5
or ENGR 40N	Engineering Wireless Networks	
Fundamentals Elective (may not be 70A, B, or X)		3-5

### Writing in the Major—

Select one of the following:

CS 181W	Computers, Ethics and Public Policy
CS 191W	Writing Intensive Senior Project
CS 194W	Software Project
CS 210B	Software Project Experience with Corporate Partners

## Computer Science Core (15 units)

CS 107	Computer Organization and Systems	5
CS 110	Principles of Computer Systems <sup>6</sup>	5
CS 161	Design and Analysis of Algorithms <sup>7</sup>	5

## Computer Science Depth

Choose one of the following ten CS degree tracks (a track must consist of at least 25 units and 7 classes):

### Artificial Intelligence Track—

		Units
CS 221	Artificial Intelligence: Principles and Techniques	4
Select two of the following:		6-8
CS 223A	Introduction to Robotics	
CS 224M	Multi-Agent Systems	
CS 224N	Natural Language Processing	
CS 226	Statistical Techniques in Robotics	
CS 227	Knowledge Representation and Reasoning	
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 229	Machine Learning	
One additional course from the list above or the following:		3-4
CS 124	From Languages to Information	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	
CS 222	Rational Agency and Intelligent Interaction	
CS 224S	Speech Recognition and Synthesis	
CS 224U	Natural Language Understanding	
CS 224W	Social and Information Network Analysis	
CS 225A	Experimental Robotics	
CS 227B	General Game Playing	
CS 231B	The Cutting Edge of Computer Vision	
CS 262	Computational Genomics	
CS 276	Information Retrieval and Web Search	
CS 277	Experimental Haptics	
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	
CS 321	Information Processing for Sensor Networks	
CS 326A	Motion Planning	
CS 327A	Advanced Robotic Manipulation	
CS 329	Topics in Artificial Intelligence (with adviser consent)	
CS 331	Advanced Reading in Computer Vision	
CS 379	Interdisciplinary Topics (with adviser consent)	
EE 263	Introduction to Linear Dynamical Systems	
EE 376A	Information Theory	
ENGR 205	Introduction to Control Design Techniques	
ENGR 209A	Analysis and Control of Nonlinear Systems	
MS&E 251	Stochastic Decision Models	
MS&E 351	Dynamic Programming and Stochastic Control	
STATS 315A	Modern Applied Statistics: Learning	
STATS 315B	Modern Applied Statistics: Data Mining	
Note: CS225B and MS&E 339 no longer offered		

Note: CS 374 not given this year

Track Electives (at least three additional courses from the above lists, 9-13 the general CS electives list, or the following):<sup>9</sup>

CS 275	Translational Bioinformatics
CS 334A or EE 364A	Convex Optimization I
EE 364B	Convex Optimization II
MS&E 252	Decision Analysis I: Foundations of Decision Analysis
MS&E 352	Decision Analysis II: Professional Decision Analysis
MS&E 355	Influence Diagrams and Probabilistic Networks
PHIL 152	Computability and Logic
PSYCH 202	Cognitive Neuroscience
PSYCH 204A	Human Neuroimaging Methods
PSYCH 204B	Computational Neuroimaging: Analysis Methods
STATS 200	Introduction to Statistical Inference
STATS 202	Data Mining and Analysis
STATS 205	Introduction to Nonparametric Statistics

Note: CS 278 no longer offered

Note: ECON 286 not given this year

## Biocomputation Track—

Units

The Mathematics, Science, and Engineering Fundamentals requirements are non-standard for this track. See Handbook for Undergraduate Engineering Programs for details.

Select one of the following: 3-4

CS 221	Artificial Intelligence: Principles and Techniques
CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 229	Machine Learning
CS 231A	Introduction to Computer Vision

Select one of the following:

CS 173 or CS 273A	A Computational Tour of the Human Genome
CS 262	Computational Genomics
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving
CS 274	Representations and Algorithms for Computational Molecular Biology
CS 275	Translational Bioinformatics
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks

Note: CS 278 no longer offered

One additional course from the lists above or the following: 3-4

CS 124	From Languages to Information
CS 145	Introduction to Databases
CS 147	Introduction to Human-Computer Interaction Design
CS 148	Introduction to Computer Graphics and Imaging
CS 248	Interactive Computer Graphics

One course from either the general CS electives list, BIOE 101, or the list of Biomedical Computation (BMC) Informatics electives (see <http://bmc.stanford.edu> and select Informatics from the elective options)<sup>9</sup> 3-4

One course from the BMC Informatics elective list 3-4

One course from either the BMC Informatics, Cellular/Molecular, or Organs/Organisms electives lists 3-5

One course from either the BMC Cellular/Molecular or Organs/Organisms electives lists 3-5

## Computer Engineering Track—

Units

EE 108A & EE 108B	Digital Systems I and Digital Systems II	6-8
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Select two of the following: 8

EE 101A	Circuits I
EE 101B	Circuits II
EE 102A	Signal Processing and Linear Systems I
EE 102B	Signal Processing and Linear Systems II

Satisfy the requirements of one of the following concentrations:

1) Digital Systems Concentration

CS 140 or CS 143	Operating Systems and Systems Programming Compilers
EE 109	Digital Systems Design Lab
EE 271	Introduction to VLSI Systems

Select two of the following (6-8 units):

CS 140 or CS 143	Operating Systems and Systems Programming <sup>8</sup> Compilers
CS 144	Introduction to Computer Networking
CS 149	Parallel Computing
CS 244	Advanced Topics in Networking
EE 273	Digital Systems Engineering
EE 282	Computer Systems Architecture

Note: CS 240E no longer offered

2) Robotics and Mechatronics Concentration

CS 205A	Mathematical Methods for Robotics, Vision, and Graphics
CS 223A	Introduction to Robotics
ME 210	Introduction to Mechatronics
ENGR 105	Feedback Control Design

Select one of the following (3-4 units):

CS 225A	Experimental Robotics
CS 231A	Introduction to Computer Vision
CS 235	Applied Robot Design for Non-Robot-Designers: How to Fix, Modify, Design, and Build
CS 277	Experimental Haptics
ENGR 205	Introduction to Control Design Techniques
ENGR 207A	Linear Control Systems I

Note: AA 278 no longer offered

Note: CS 225B, ENGR 206, and ENGR 207B not given this year

3) Networking Concentration

CS 140 & CS 144	Operating Systems and Systems Programming and Introduction to Computer Networking
Select three of the following (9-11 units):	
CS 240	Advanced Topics in Operating Systems
CS 244	Advanced Topics in Networking
CS 244B	Distributed Systems
CS 244E	Networked Wireless Systems
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective
CS 249B	Large-scale Software Development
EE 179	Analog and Digital Communication Systems

EE 276 Introduction to Wireless Personal Communications  
 Note: CS 240E no longer offered

## Graphics Track—

	<b>Units</b>
CS 148 Introduction to Computer Graphics and Imaging & CS 248 and Interactive Computer Graphics	8
Select one of the following: <sup>10</sup>	3-5
CS 205A Mathematical Methods for Robotics, Vision, and Graphics	
CME 104 Linear Algebra and Partial Differential Equations for Engineers	
CME 108 Introduction to Scientific Computing	
MATH 52 Integral Calculus of Several Variables	
MATH 113 Linear Algebra and Matrix Theory	
Select two of the following:	6-8
CS 164 Computing with Physical Objects: Algorithms for Shape and Motion	
CS 178 Digital Photography	
CS 205B Mathematical Methods for Fluids, Solids, and Interfaces	
CS 231A Introduction to Computer Vision	
CS 268 Geometric Algorithms	
CS 348A Computer Graphics: Geometric Modeling	
CS 348B Computer Graphics: Image Synthesis Techniques	
CS 448 Topics in Computer Graphics	
Track Electives: at least two additional courses from the lists above, the general CS electives list, or the following: <sup>9</sup>	6-8
ARTSTUDI Design I : Fundamental Visual Language 160	
ARTSTUDI Introduction to Photography 170	
ARTSTUDI Digital Art I 179	
CME 302 Numerical Linear Algebra	
CME 306 Numerical Solution of Partial Differential Equations	
EE 262 Two-Dimensional Imaging	
EE 264 Digital Signal Processing	
EE 368 Digital Image Processing	
ME 101 Visual Thinking	
PSYCH 30 Introduction to Perception	
PSYCH 221 Applied Vision and Image Systems	
Note: CME 324 no longer offered	
Note: CS 48N, EE 278, and STS 144 not given this year	

## Human-Computer Interaction Track—

	<b>Units</b>
CS 147 Introduction to Human-Computer Interaction Design	4
Select one of the following:	4
CS 247 Human-Computer Interaction Design Studio	
CS 377 Topics in Human-Computer Interaction	
CS 448B Data Visualization	
or CS 210A Software Project Experience with Corporate Partners	
Select one of the following:	3-6

PSYCH 55 Introduction to Cognition and the Brain  
 PSYCH 70 Introduction to Social Psychology  
 PSYCH 252 Statistical Methods for Behavioral and Social Sciences

ME 101 Visual Thinking	
Or any MS&E 18*	
Select one of the following:	3-4
CS 108 Object-Oriented Systems Design	
CS 124 From Languages to Information	
CS 140 Operating Systems and Systems Programming	
CS 142 Web Applications	
CS 221 Artificial Intelligence: Principles and Techniques	
CS 229 Machine Learning	
CS 229A Applied Machine Learning	
CS 249A Object-Oriented Programming from a Modeling and Simulation Perspective	
Select one of the following:	3-4
CS 148 Introduction to Computer Graphics and Imaging	
CS 376 Research Topics in Human-Computer Interaction	
CS 378 Phenomenological Foundations of Cognition, Language, and Computation	
CS 447 Software Design Experiences	
Track Electives: at least two additional courses from the lists above, the general CS electives list, or the following: <sup>9</sup>	6-9
ARTSTUDI Design I : Fundamental Visual Language 160	
COMM 169 Computers and Interfaces	
ME 115A Introduction to Human Values in Design	
ME 115B Product Design Methods	
Note: CS 476A not given this year	

## Information Track—

	<b>Units</b>
CS 124 From Languages to Information	4
CS 145 Introduction to Databases	4
Two courses, from different areas:	6-9
1) Information-based AI applications	
CS 224N Natural Language Processing	
CS 224S Speech Recognition and Synthesis	
CS 229 Machine Learning	
CS 229A Applied Machine Learning	
2) Database and Information Systems	
CS 140 Operating Systems and Systems Programming	
CS 142 Web Applications	
CS 245 Database Systems Principles	
CS 246 Mining Massive Data Sets	
CS 341 Project in Mining Massive Data Sets	
CS 345 Advanced Topics in Database Systems	
CS 347 Parallel and Distributed Data Management	
Note: CS 346 no longer offered	
3) Information Systems in Biology	
CS 262 Computational Genomics	
CS 270 Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	
CS 274 Representations and Algorithms for Computational Molecular Biology	
4) Information Systems on the Web	

CS 224W	Social and Information Network Analysis
CS 276	Information Retrieval and Web Search
CS 364B	Topics in Algorithmic Game Theory
At least three additional courses from the above areas or the general CS electives list. <sup>9</sup>	

## Systems Track—

	Units	
CS 140	Operating Systems and Systems Programming	4
Select one of the following:		3-4
CS 143	Compilers	
EE 108B	Digital Systems II	
Two additional courses from the list above or the following:		6-8
CS 144	Introduction to Computer Networking	
CS 145	Introduction to Databases	
CS 149	Parallel Computing	
CS 155	Computer and Network Security	
CS 240	Advanced Topics in Operating Systems	
CS 242	Programming Languages	
CS 243	Program Analysis and Optimizations	
CS 244	Advanced Topics in Networking	
CS 245	Database Systems Principles	
EE 271	Introduction to VLSI Systems	
EE 282	Computer Systems Architecture	
Track Electives: at least three additional courses selected from the list above, the general CS electives list, or the following: <sup>9</sup>		9-12
CS 244C	Readings and Projects in Distributed Systems	
CS 244E	Networked Wireless Systems	
CS 315A	Parallel Computer Architecture and Programming	
or CS 316	Advanced Multi-Core Systems	
CS 315B	Parallel Computing Research Project	
CS 341	Project in Mining Massive Data Sets	
CS 343	Advanced Topics in Compilers	
CS 344	Topics in Computer Networks	
CS 344E	Advanced Wireless Networks	
CS 345	Advanced Topics in Database Systems	
CS 347	Parallel and Distributed Data Management	
CS 349	Topics in Programming Systems (with adviser consent)	
CS 448	Topics in Computer Graphics	
EE 382C	Interconnection Networks	
EE 384A	Internet Routing Protocols and Standards	
EE 384C	Wireless Local and Wide Area Networks	
EE 384M	Network Science	
EE 384S	Performance Engineering of Computer Systems & Networks	
EE 384X	Packet Switch Architectures	
Note: CS 240E, CS 346, EE 382A, and EE 384Y no longer offered		
Note: EE 384B not given this year		

## Theory Track—

	Units	
CS 154	Introduction to Automata and Complexity Theory	4
Select one of the following:		3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	

CS 255	Introduction to Cryptography	
CS 261	Optimization and Algorithmic Paradigms	
CS 268	Geometric Algorithms	
CS 361A	Advanced Algorithms	
CS 365	Randomized Algorithms	
Two additional courses from the list above or the following:		6-8
CS 143	Compilers	
CS 155	Computer and Network Security	
CS 157	Logic and Automated Reasoning	
or PHIL 151	First-Order Logic	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 242	Programming Languages	
CS 254	Computational Complexity	
CS 259	Security Analysis of Network Protocols	
CS 262	Computational Genomics	
CS 354	Topics in Circuit Complexity	
CS 355	Advanced Topics in Cryptography	
CS 357	Advanced Topics in Formal Methods	
CS 358	Topics in Programming Language Theory	
CS 359	Topics in the Theory of Computation (with adviser consent)	
CS 364A	Algorithmic Game Theory	
CS 364B	Topics in Algorithmic Game Theory	
CS 366	Graph Partitioning and Expanders	
CS 369	Topics in Analysis of Algorithms (with adviser consent)	
MS&E 310	Linear Programming	
Note: CS 374 not given this year		
Track Electives: at least three additional courses from the list above, the general CS electives list, or the following: <sup>9</sup>		9-12
CME 302	Numerical Linear Algebra	
CME 305	Discrete Mathematics and Algorithms	
PHIL 152	Computability and Logic	

## Unspecialized Track—

	Units	
CS 154	Introduction to Automata and Complexity Theory	4
Select one of the following:		4
CS 140	Operating Systems and Systems Programming	
CS 143	Compilers	
One additional course from the list above or the following:		3-4
CS 144	Introduction to Computer Networking	
CS 155	Computer and Network Security	
CS 242	Programming Languages	
CS 244	Advanced Topics in Networking	
EE 108B	Digital Systems II	
Select one of the following:		3-4
CS 221	Artificial Intelligence: Principles and Techniques	
CS 223A	Introduction to Robotics	
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 229	Machine Learning	
CS 231A	Introduction to Computer Vision	



Select one of the following: 3-4

CS 145	Introduction to Databases
CS 147	Introduction to Human-Computer Interaction Design
CS 148	Introduction to Computer Graphics and Imaging
CS 248	Interactive Computer Graphics
CS 262	Computational Genomics

At least two courses from the general CS electives list <sup>9</sup>

## Individually Designed Track—

Students may propose an individually designed track. Proposals should include a minimum of seven courses, at least four of which must be CS courses numbered 100 or above. See Handbook for Undergraduate Engineering Programs for further information.

## Senior Capstone Project (3 units minimum)

CS 191	Senior Project <sup>11</sup>
CS 191W	Writing Intensive Senior Project <sup>11</sup>
CS 194	Software Project
CS 194W	Software Project
CS 210B	Software Project Experience with Corporate Partners
CS 294	Research Project in Computer Science

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>)

## Electrical Engineering (EE)

Completion of the undergraduate program in Electrical Engineering leads to the conferral of the Bachelor of Science in Electrical Engineering.

### Mission of the Undergraduate Program in Electrical Engineering

The mission of the undergraduate program of the Department of Electrical Engineering is to augment the liberal education expected of all Stanford undergraduates, to impart a basic understanding of electrical engineering built on a foundation of physical science, mathematics, computing, and technology, and to provide majors in the department with knowledge of electrical engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering fundamentals. The program develops students' skills in performing and designing experimental projects and communicating their findings to the scientific community effectively. Students in the major are required to select one sub-discipline for specialization. Choices include bioelectronics and bioimaging; circuits and devices; computer hardware; computer software; music; signal processing, communication and controls; and solid state, photonics, and electromagnetics. The program prepares students for careers in government agencies, the corporate sector, or for future study in graduate or professional schools.

### Requirements

	Units
<b>Mathematics (28-30)</b>	
MATH 41	Calculus 5
MATH 42	Calculus 5
Select one of the following sequences:	10

MATH 51 & MATH 52	Linear Algebra and Differential Calculus of Several Variables and Integral Calculus of Several Variables
CME 100 & CME 104	Vector Calculus for Engineers and Linear Algebra and Partial Differential Equations for Engineers (Same as ENGR 154 & ENGR 155B)

Select one of the following: 5

MATH 53	Ordinary Differential Equations with Linear Algebra
CME 102/ENGR 155A	Ordinary Differential Equations for Engineers

Select one of the following: 3-5

EE 178	Probabilistic Systems Analysis (Preferred)
STATS 116	Theory of Probability
MATH 151	Introduction to Probability Theory
CME 106/ENGR 155C	Introduction to Probability and Statistics for Engineers

#### Science (15-17)

Select one of the following sequences: 8

PHYSICS 41 & PHYSICS 43	Mechanics and Electricity and Magnetism
PHYSICS 61 & PHYSICS 63	Mechanics and Special Relativity and Electricity, Magnetism, and Waves

Math or Science electives <sup>1</sup> 7-9

#### Technology in Society (3-5)

One course, see Basic Requirement 4 in the School of Engineering section 3-5

#### Writing in the Major (WIM) (3-4)

Select one of the following: 3-4

EE 109	Digital Systems Design Lab (WIM)
EE 133	Analog Communications Design Laboratory (WIM)
EE 134	Introduction to Photonics (WIM)
EE 168	Introduction to Digital Image Processing (WIM)
EE 191W	Special Studies and Reports in Electrical Engineering (WIM) <sup>2</sup>
CS 194W	Software Project (WIM)

#### Engineering Fundamentals (11-15)

Three courses minimum, see Basic Requirement 3 in the School of Engineering section

CS 106B/ENGR 70B	Programming Abstractions 5
or CS 106X/ENGR 70X	Programming Abstractions (Accelerated)

At least two additional courses, at least one of which is not in EE or CS (CS 106A is not allowed). Choose from table in Undergraduate Handbook. One from ENGR 40, ENGR 40N or ENGR 40P recommended. 6-10

#### Core Courses Engineering Depth (46-62)

Minimum 68 Engineering Topics units; see Basic Requirement 5 in the School of Engineering section

EE 100	The Electrical Engineering Profession	1
EE 101A	Circuits I	4
EE 101B	Circuits II	4
EE 102A	Signal Processing and Linear Systems I	4
EE 102B	Signal Processing and Linear Systems II	4
EE 108A	Digital Systems I	4

EE 108B	Digital Systems II	4
Physics in Electrical Engineering:		
EE 41/ENGR 40P	Physics of Electrical Engineering <sup>3</sup>	3-5
or EE 141	Engineering Electromagnetics	
Specialty courses <sup>4</sup>		9-12
One course in Design <sup>5</sup>		
Electrical Engineering electives <sup>6</sup>		9-20
Total Units		106-133

- <sup>1</sup> A minimum of 12 science units must be taken. A minimum of 45 math and science units combined must be taken.
- <sup>2</sup> EE 191W may satisfy WIM if used for Honors Thesis, REU (following a summer REU project), or a research project. A written report that has gone through revision with an advisor is required. An advisor from the Writing Center is recommended.
- <sup>3</sup> EE 41/ENGR 40P can meet this requirement only if it is not used to fulfill the Engineering Fundamentals requirement.
- <sup>4</sup> Three courses from one of the specialty areas shown below (consultation with an adviser in the selection of these courses is especially important):
- <sup>5</sup> The design course may be part of the specialty sequence. The following courses satisfy this requirement: EE 109, EE 133, EE 134, EE 168, EE 262, EE 265, CS 194W.
- <sup>6</sup> May include up to two additional Engineering Fundamentals. May include up to 10 units of EE 191 and EE 191W. May include any CS 193 course.

## Specialty Areas

		Units
<b>Bioelectronics and Bioimaging (23)</b>		
EE 122B	Introduction to Biomedical Electronics	3
EE 124	Introduction to Neuroelectrical Engineering	3
EE 134	Introduction to Photonics (WIM)	4
EE 168	Introduction to Digital Image Processing (WIM)	4
EE 169	Introduction to Bioimaging	3
EE 202	Electrical Engineering in Biology and Medicine	3
EE 225	Bio-chips, Imaging and Nanomedicine	3
<b>Circuits and Devices (26)</b>		
EE 114	Fundamentals of Analog Integrated Circuit Design	4
EE 116	Semiconductor Device Physics	3
EE 122A	Analog Circuits Laboratory	3
EE 133	Analog Communications Design Laboratory (WIM)	4
EE 212	Integrated Circuit Fabrication Processes	3
EE 214B	Advanced Analog Integrated Circuit Design	3
EE 216	Principles and Models of Semiconductor Devices	3
EE 271	Introduction to VLSI Systems	3
<b>Computer Hardware (16-18)</b>		
EE 109	Digital Systems Design Lab (WIM)	4
EE 271	Introduction to VLSI Systems	3
EE 273	Digital Systems Engineering	3
EE 282	Computer Systems Architecture	3
CS 107	Computer Organization and Systems	3-5
<b>Computer Software (27-37)</b>		
CS 107	Computer Organization and Systems	3-5
CS 108	Object-Oriented Systems Design	3-4
CS 110	Principles of Computer Systems	3-5
CS 140	Operating Systems and Systems Programming	3-4

CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 194W	Software Project (WIM)	3

### Music (23-51)

EE 109	Digital Systems Design Lab (WIM)	4
EE 264	Digital Signal Processing	3-4
or EE 265	Digital Signal Processing Laboratory	
MUSIC 256A	Music, Computing, and Design I: Software Paradigms for Computer Music	1-4
MUSIC 256B	Music, Computing, Design II: Mobile Music	1-4
MUSIC 420A	Signal Processing Models in Musical Acoustics	3-4
MUSIC 420B	Software for Sound Synthesis and Audio Effects	1-10
MUSIC 421A	Audio Applications of the Fast Fourier Transform	3-4
MUSIC 421B	Projects in Spectral Audio Signal Processing	1-10
MUSIC 422	Perceptual Audio Coding	3
MUSIC 424	Signal Processing Techniques for Digital Audio Effects	3-4

### Signal Processing, Communications and Controls (44-45)

EE 124	Introduction to Neuroelectrical Engineering	3
EE 133	Analog Communications Design Laboratory (WIM)	4
EE 168	Introduction to Digital Image Processing (WIM)	4
EE 169	Introduction to Bioimaging	3
EE 179	Analog and Digital Communication Systems	3
EE 261	The Fourier Transform and Its Applications	3
EE 262	Two-Dimensional Imaging	3
EE 263	Introduction to Linear Dynamical Systems	3
EE 264	Digital Signal Processing	3-4
or EE 265	Digital Signal Processing Laboratory	
EE 276	Introduction to Wireless Personal Communications	3
EE 278B	Introduction to Statistical Signal Processing	3
EE 279	Introduction to Digital Communication	3
ENGR 105	Feedback Control Design	3
ENGR 205	Introduction to Control Design Techniques	3

### Solid State, Photonics and Electromagnetics (37)

EE 116	Semiconductor Device Physics	3
EE 134	Introduction to Photonics (WIM)	4
EE 136	Introduction to Nanophotonics and Nanostructures	3
EE 141	Engineering Electromagnetics	3
EE 216	Principles and Models of Semiconductor Devices	3
EE 222	Applied Quantum Mechanics I	3
EE 223	Applied Quantum Mechanics II	3
EE 228	Basic Physics for Solid State Electronics	3
EE 235	Guided Wave Optical Devices	3
EE 242	Electromagnetic Waves	3
EE 247	Introduction to Optical Fiber Communications	3
EE 268	Introduction to Modern Optics	3

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

# Engineering Physics (EPHYS)

Completion of the undergraduate program in Engineering Physics leads to the conferral of the Bachelor of Science in Engineering. The subplan "Engineering Physics" appears on the transcript and on the diploma.

## Mission of the Undergraduate Program in Engineering Physics

The mission of the undergraduate program in Engineering Physics is to provide students with a strong foundation in physics and mathematics, together with engineering and problem solving skills. All majors take high-level math and physics courses as well as engineering courses. This background prepares them to tackle complex problems in multidisciplinary areas that are at the forefront of 21st-century technology such as solid state devices, quantum optics and photonics, materials science, nanotechnology, electromechanical systems, energy systems, biophysics, computational science, and any other engineering field that requires a solid background in physics. Because the program emphasizes science, mathematics, and engineering, students are well prepared to pursue graduate work in engineering, physics, or applied physics..

## Requirements

	Units
<b>Mathematics (18)</b>	
Select one of the following sequences:	10
MATH 51 Linear Algebra and Differential Calculus of Several Variables & MATH 52 Integral Calculus of Several Variables	
CME 100 Vector Calculus for Engineers & CME 104 and Linear Algebra and Partial Differential Equations for Engineers	
MATH 53 Ordinary Differential Equations with Linear Algebra	5
or CME 102 Ordinary Differential Equations for Engineers	
MATH 131P Partial Differential Equations I	3
<b>Science (20)</b>	
PHYSICS 41 Mechanics (or PHYSICS 61)	4
PHYSICS 42 Classical Mechanics Laboratory (or PHYSICS 62) <sup>1</sup>	1
PHYSICS 43 Electricity and Magnetism (or PHYSICS 63)	4
PHYSICS 67 Introduction to Laboratory Physics <sup>2</sup>	2
PHYSICS 45 Light and Heat (or PHYSICS 65)	4
PHYSICS 46 Light and Heat Laboratory (or PHYSICS 67)	1
PHYSICS 70 Foundations of Modern Physics (if taking the 40 series)	4
<b>Technology in Society (3-5)</b>	
One course required, see Basic Requirement 4	3-5
<b>Engineering Fundamentals (9-14)</b>	
Three courses minimum (CS 106A or X recommended) <sup>3</sup>	9-14
<b>Engineering Physics Depth (core) (12-16)</b>	
Advanced Mathematics:	
One advanced math elective such as:	3-5
EE 261 The Fourier Transform and Its Applications	
PHYSICS 112 Mathematical Methods of Physics	
CS 109 Introduction to Probability for Computer Scientists	
CME 106 Introduction to Probability and Statistics for Engineers	

Also qualified are EE 263, any Math or Statistics course numbered 100 or above, and any CME course numbered 200 or above, except CME 206.

Advanced Mechanics: <sup>4</sup>	3-4
AA 242A Classical Dynamics (or ME 333 or PHYSICS 110)	3
Intermediate Electricity and Magnetism:	
EE 141 Engineering Electromagnetics & EE 242 and Electromagnetic Waves	
PHYSICS 120 Intermediate Electricity and Magnetism I & PHYSICS 121 and Intermediate Electricity and Magnetism II	
Numerical Methods:	
Select one of the following:	3-4
APPPHYS 215 Numerical Methods for Physicists and Engineers	
CME 108 Introduction to Scientific Computing	
CME 206/ME 300C Introduction to Numerical Methods for Engineering	
PHYSICS 113 Computational Physics	
<b>Electronics Lab (3-5)</b>	
Select one of the following:	3-5
ENGR 40 Introductory Electronics	
EE 101B Circuits II	
EE 122A Analog Circuits Laboratory	
PHYSICS 105 Intermediate Physics Laboratory I: Analog Electronics	
APPPHYS 207 Laboratory Electronics	
<b>Writing Lab (WIM) (4-5)</b>	
Select one of the following:	4-5
EE 134 Introduction to Photonics	
ME 203 Design and Manufacturing & ENGR 102M and Technical/Professional Writing for Mechanical Engineers	
MATSCI 161 Nanocharacterization Laboratory	
MATSCI 164 Electronic and Photonic Materials and Devices Laboratory	
PHYSICS 107 Intermediate Physics Laboratory II: Experimental Techniques and Data Analysis	
<b>Quantum Mechanics (6-8)</b>	
Select one of the following sequences:	6-8
EE 222 Applied Quantum Mechanics I & EE 223 and Applied Quantum Mechanics II	
PHYSICS 130 Quantum Mechanics & PHYSICS 131 and Quantum Mechanics II	
<b>Thermodynamics and Statistical Mechanics (8)</b>	
PHYSICS 170 Thermodynamics, Kinetic Theory, and Statistical Mechanics I & PHYSICS 171 and Thermodynamics, Kinetic Theory, and Statistical Mechanics II (or ME 346A (offered every other year))	8
<b>Design Course (12-16)</b>	
Select one of the following:	3-4
CS 108 Object-Oriented Systems Design	
EE 133 Analog Communications Design Laboratory	
ME 203 Design and Manufacturing	
ME 210 Introduction to Mechatronics	
PHYSICS 108 Advanced Physics Laboratory: Project	

Select three courses from one specialty area: 9-12

**Solid State Physics:**

APPPHYS 273	Solid State Physics II
EE 116	Semiconductor Device Physics
EE 216	Principles and Models of Semiconductor Devices
MATSCI 199	Electronic and Optical Properties of Solids
PHYSICS 172	Solid State Physics

**Photonics:**

EE 216	Principles and Models of Semiconductor Devices
EE 231	Introduction to Lasers
EE 232	Laser Dynamics
EE 234	Photonics Laboratory
EE 243	Semiconductor Optoelectronic Devices
EE 268	Introduction to Modern Optics
MATSCI 199	Electronic and Optical Properties of Solids

**Materials Science:**

Any MATSCI courses numbered 151 to 199 (except 159Q) or PHYSICS 172

**Electromechanical System Design:**

ME 80	Mechanics of Materials
ME 112	Mechanical Systems Design
ME 210	Introduction to Mechatronics

**Energy Systems:**

ME 131A	Heat Transfer
ME 131B	Fluid Mechanics: Compressible Flow and Turbomachinery
ME 140	Advanced Thermal Systems

**Renewable Energy:**

EE 293A	Fundamentals of Energy Processes
EE 293B	Fundamentals of Energy Processes
MATSCI 156	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution
MATSCI 302	Solar Cells
MATSCI 316	Nanoscale Science, Engineering, and Technology
ME 260	Fuel Cell Science and Technology

**Biophysics:**

BIO 132	Advanced Imaging Lab in Biophysics
BIOE 41	Physical Biology of Macromolecules
BIOE 42	Physical Biology of Cells
BIOE 44	Fundamentals for Engineering Biology Lab
BIOE 101	Systems Biology
BIOE 103	Systems Physiology and Design
BIOE 123	Optics and Devices Lab
CS 262	Computational Genomics
EE 169	Introduction to Bioimaging

**Computational Science:**

CME 212	Advanced Programming for Scientists and Engineers
CME 215A	Advanced Computational Fluid Dynamics
CME 215B	Advanced Computational Fluid Dynamics
Any CME course with course number greater than 300 and less than 390	
CS 103	Mathematical Foundations of Computing
CS 154	Introduction to Automata and Complexity Theory
CS 161	Design and Analysis of Algorithms

CS 164	Computing with Physical Objects: Algorithms for Shape and Motion
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics
CS 205B	Mathematical Methods for Fluids, Solids, and Interfaces
CS 221	Artificial Intelligence: Principles and Techniques
CS 228	Probabilistic Graphical Models: Principles and Techniques
or CS 229A	Applied Machine Learning
STATS 202	Data Mining and Analysis
STATS 213	Introduction to Graphical Models

Total Units 95-115

- 1 PHYSICS 42 Classical Mechanics Laboratory or PHYSICS 62 Classical Mechanics Laboratory, Mechanics Lab (1 unit), required in 2011-12 and beyond
- 2 PHYSICS 67 Introduction to Laboratory Physics (2 units), recommended in place of PHYSICS 44 Electricity and Magnetism Lab
- 3 The Engineering Fundamental courses are to be selected from the Basic Requirements 3 list. Fundamentals courses acceptable for the core program may also be used to satisfy the fundamentals requirement as long as 45 unduplicated units of Engineering are taken.
- 4 ENGR 15 Dynamics, allowed for students who matriculated in 2011/2012 or earlier; however, AA 242A Classical Dynamics, ME 333 Mechanics or PHYSICS 110 Advanced Mechanics recommended instead of, or in addition to, ENGR 15 Dynamics.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Environmental Engineering (ENV)

Completion of the undergraduate program in Environmental Engineering leads to the conferral of the Bachelor of Science in Environmental Engineering.

## Mission of the Undergraduate Program in Environmental Engineering

The mission of the undergraduate program in Environmental Engineering is to equip students with the problem solving skills and knowledge necessary to assess and develop solutions to environmental problems impacting the biosphere, land, water, and air quality. The Environmental Engineering major offers a more focused program in Environmental and Water Studies than the Environmental and Water Studies concentration in the Civil Engineering degree program. Courses in the program are multidisciplinary in nature, combining fundamental principles drawn from physics, chemistry, geology, engineering, and biology. Students learn to apply analytical methods necessary to evaluate environmental changes and to design strategies to remediate problems that inevitably may have resulted from human activities. The program prepares students for careers in consulting, industry, and government, and for graduate school in engineering.

## Requirements

**Mathematics and Science (45) Units**

See Basic Requirement 1 and 2 <sup>1</sup>	45
<b>Technology in Society (TiS) (3-5)</b>	
One 3-5 unit course required, see Basic Requirement 4 <sup>2</sup>	3-5
<b>Engineering Fundamentals (9-11)</b>	
Three courses minimum, including the two listed below; see Basic Requirement 3	
ENGR 30      Engineering Thermodynamics	3
ENGR 90/CEE 70      Environmental Science and Technology	3
Fundamentals Elective	3-5
<b>Environmental Engineering Depth (57)</b>	
Minimum of 68 units of Engineering Fundamentals plus Engineering Depth; see Basic Requirement 5	
CEE 64      Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 100      Managing Sustainable Building Projects	4
CEE 101B      Mechanics of Fluids	4
CEE 101D      Computations in Civil and Environmental Engineering	3
CEE 146A      Engineering Economy	3
CEE 160      Mechanics of Fluids Laboratory	2
CEE 161A      Rivers, Streams, and Canals	4
CEE 166A      Watersheds and Wetlands	3
CEE 166B      Floods and Droughts, Dams and Aqueducts	3
CEE 171      Environmental Planning Methods	3
CEE 172      Air Quality Management	3
CEE 177      Aquatic Chemistry and Biology	4
CEE 179A      Water Chemistry Laboratory	3
CEE 179C      Environmental Engineering Design (or CEE 169 (offered alt years))	5
CEE Breadth Electives <sup>3</sup>	10
Other School of Engineering Electives (0-2 units)	
<b>Total Units</b>	<b>114-118</b>

- Math must include CME 100 Vector Calculus for Engineers/CME 102 Ordinary Differential Equations for Engineers (or MATH 51 Linear Algebra and Differential Calculus of Several Variables/MATH 53 Ordinary Differential Equations with Linear Algebra) and a Statistics course. Science must include PHYSICS 41 Mechanics; either ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology, CHEM 31A Chemical Principles I or CHEM 31X Chemical Principles; CHEM 33 Structure and Reactivity; GES 1A Introduction to Geology: The Physical Science of the Earth (or GES 1B or 1C); and one other physics or chemistry class for at least 3 units.
- Chosen TiS class must specifically include an ethics component, such as STS 1 The Public Life of Science and Technology; COMM 169 Computers and Interfaces; CS 181 Computers, Ethics, and Public Policy; or MS&E 181 Issues in Technology and Work for a Postindustrial Economy
- Breadth electives currently include CEE 63 Weather and Storms, CEE 101C Geotechnical Engineering, CEE 109 Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision, CEE 129 Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future, CEE 164 Introduction to Physical Oceanography, CEE 166D Water Resources and Water Hazards Field Trips, CEE 172A Indoor Air Quality, CEE 173A Energy Resources, CEE 176A Energy Efficient Buildings, CEE 176B Electric Power: Renewables and Efficiency, CEE 178 Introduction to Human Exposure Analysis, and CEE 199 Undergraduate Research in Civil and Environmental Engineering.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Individually Designed Majors in Engineering (IDMENS)

Completion of the undergraduate program in Individually Designed Majors in Engineering (IDMEN) leads to the conferral of the Bachelor of Science in an Individually Designed Major: (approved title). The approved title of the IDMEN also appears on the transcript.

### Mission of the Undergraduate Program in Individually Designed Majors in Engineering

The mission of the undergraduate program in Individually Designed Majors in Engineering (IDMEN) is to provide students with an understanding of engineering principles and the analytical and problem solving, design, and communication skills necessary to be successful in the field. The B.S. for IDMENS is intended for undergraduates interested in pursuing engineering programs that, by virtue of their focus and intellectual content, cannot be accommodated by existing departmental majors or the pre-approved School of Engineering majors. Core courses in the curriculum include engineering fundamentals, mathematics, technology in society, and the sciences. Students then take additional courses pertinent to their IDMEN major. The program prepares students for careers in government and the corporate sector, and for graduate study.

### B.S. in Individually Designed Majors in Engineering

The B.S. degree for IDMENS is intended for undergraduates interested in pursuing engineering programs that, by virtue of their focus and intellectual content, cannot be accommodated by existing departmental majors or the pre-approved School of Engineering majors. IDMEN curricula are designed by students with the assistance of two faculty advisers of their choice and are submitted to the Undergraduate Council's Subcommittee on Individually Designed Majors. The degree conferred is "Bachelor of Science in Individually Designed Major in Engineering: (approved title)."

Students must submit written proposals to the IDMEN subcommittee detailing their course of study. Programs must meet the following requirements: mathematics (21 unit minimum, see Basic Requirement 1 below), science (17 units minimum, see Basic Requirement 2 below), Technology in Society (one approved course, see Basic Requirement 4 below), engineering (40 units minimum), and sufficient relevant additional course work to bring the total number of units to at least 90 and at most 107. Students may take additional courses pertinent to their IDMEN major, but the IDMEN proposal itself may not exceed 107 units. The student's curriculum must include at least three Engineering Fundamentals courses, see Basic Requirement 4 for a list of courses.

		<b>Units</b>
ENGR 10	Introduction to Engineering Analysis	4
ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	3
ENGR 20	Introduction to Chemical Engineering	3
ENGR 25B	Biotechnology	3
ENGR 25E	Energy: Chemical Transformations for Production, Storage, and Use	3
ENGR 30	Engineering Thermodynamics	3
ENGR 40	Introductory Electronics	5

ENGR 40N	Engineering Wireless Networks	5
ENGR 40P	Physics of Electrical Engineering	5
ENGR 50/50E/50M	Introduction to Materials Science, Nanotechnology Emphasis	4
ENGR 60	Engineering Economy	3
ENGR 62	Introduction to Optimization	4
ENGR 70A	Programming Methodology	3-5
ENGR 70B	Programming Abstractions	3-5
ENGR 70X	Programming Abstractions (Accelerated)	3-5
ENGR 80	Introduction to Bioengineering	4
ENGR 90	Environmental Science and Technology	3

Students are responsible for completing the prerequisites for all courses included in their majors.

Each proposal should begin with a statement describing the proposed major. In the statement, the student should make clear the motivation for and goal of the major, and indicate how it relates to her or his projected career plans. The statement should specify how the courses to be taken relate to and move the student toward realizing the major's goal. A proposed title for the major should be included. The title approved by the IDMEN Subcommittee is listed on the student's official University transcript and on the diploma in this form: "Individually Designed Major in Subplan", where "Subplan" is the title approved by the IDMEN Subcommittee.

The proposal statement should be followed by a completed Program Sheet listing all the courses comprising the student's IDMEN curriculum, organized by the five categories printed on the sheet (mathematics, science, technology in society, engineering fundamentals, and engineering depth). Normally, the courses selected should comprise a well-coordinated sequence or sequences that provide mastery of important principles and techniques in a well-defined field. In some circumstances, especially if the proposal indicates that the goal of the major is to prepare the student for graduate work outside of engineering, a more general engineering program may be appropriate. A four-year study plan, showing courses to be taken each quarter, should also be included in the student's IDMEN proposal.

The proposal must be signed by two faculty members who certify that they endorse the major as described in the proposal and that they agree to serve as the student's permanent advisers. One of the faculty members, who must be from the School of Engineering, acts as the student's primary adviser. The proposal must be accompanied by a statement from that person giving an appraisal of the academic value and viability of the proposed major.

Students proposing IDMENs must have at least four quarters of undergraduate work remaining at Stanford after the quarter in which their proposals are first submitted. Any changes in a previously approved major must be endorsed by the advisers and re-approved by the IDMEN subcommittee. A request by a student to make changes in her or his approved curriculum must be made sufficiently far in advance so that, should the request be denied, adequate time remains to complete the original, approved curriculum. Proposals are reviewed and acted upon once a quarter. Forms may be obtained from the Handbook for Undergraduate Engineering Programs at <http://ughb.stanford.edu>. Completed proposals should be submitted to Darlene Lazar in the Office of Student Affairs, Huang Engineering Center, Suite 135. An IDMEN cannot be a student's secondary major.

## Management Science and Engineering (MS&E)

Completion of the undergraduate program in Management Science and Engineering leads to the conferral of the Bachelor of Science in Management Science and Engineering.

## Requirements

### Mathematics (32-34)

Seven courses and 32 units minimum; see Basic Requirement 1<sup>1</sup>

MATH 41	Calculus	5
MATH 42	Calculus	5
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 53	Ordinary Differential Equations with Linear Algebra	5
MS&E 120	Probabilistic Analysis	5
MS&E 121	Introduction to Stochastic Modeling	4
STATS 110	Statistical Methods in Engineering and the Physical Sciences	3-5
or STATS 200	Introduction to Statistical Inference	

### Science (11-13)

Three courses and 11 units minimum; see Basic Requirement 2<sup>1</sup>

Select one of the following sequences: 8

CHEM 31B & CHEM 33	Chemical Principles II and Structure and Reactivity	
CHEM 31X & CHEM 33	Chemical Principles and Structure and Reactivity	
PHYSICS 21 & PHYSICS 22 & PHYSICS 23 & PHYSICS 24	Mechanics and Heat and Mechanics and Heat Laboratory and Electricity and Optics and Electricity and Optics Laboratory	
PHYSICS 41 & PHYSICS 43	Mechanics and Electricity and Magnetism	
Science Elective		3-5

### Technology in Society (3-5)

Select one of the following; see Basic Requirement 4 3-5

COMM 120W	Digital Media in Society	
COMM 169	Computers and Interfaces	
CS 181	Computers, Ethics, and Public Policy	
MS&E 181	Issues in Technology and Work for a Postindustrial Economy	
MS&E 193	Technology and National Security (WIM)	
STS 110	Ethics and Public Policy (WIM)	
STS 115	Ethical Issues in Engineering	

### Engineering Fundamentals (11-15)

Three courses; see Basic Requirement 3

CS 106A	Programming Methodology <sup>2</sup>	5
Select one of the following:		3-5
ENGR 25B	Biotechnology	
or ENGR 25E	Energy: Chemical Transformations for Production, Storage, and Use	
ENGR 40	Introductory Electronics	
or ENGR 40N	Engineering Wireless Networks	
or ENGR 40P	Physics of Electrical Engineering	
ENGR 80	Introduction to Bioengineering	
Select one of the following (or E25, E40, or E80 if not used above):		3-5
ENGR 10	Introduction to Engineering Analysis	
ENGR 14	Intro to Solid Mechanics	
ENGR 15	Dynamics	

ENGR 20	Introduction to Chemical Engineering	
ENGR 30	Engineering Thermodynamics	
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	
or ENGR 50E	Introduction to Materials Science - Energy Emphasis	
or ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis	
ENGR 60	Engineering Economy	
ENGR 90	Environmental Science and Technology	
<b>Engineering Depth (core; six courses) (22-26)</b>		
MS&E 108	Senior Project	5
MS&E 111	Introduction to Optimization	4
MS&E 180	Organizations: Theory and Management	4
Select one of the following:		3-5
CS 103	Mathematical Foundations of Computing	
CS 106B	Programming Abstractions	
CS 106X	Programming Abstractions (Accelerated)	
Select one of the following:		3-4
MS&E 130	Information Networks and Services	
MS&E 134	Organization Change and Information Systems <sup>3</sup>	
MS&E 233	Networked Markets	
Select one of the following:		3-4
MS&E 142	Introductory Financial Analysis <sup>4</sup>	
MS&E 260	Introduction to Operations Management <sup>4</sup>	
<b>Engineering Depth (concentration; seven or eight courses) (22-30)</b>		
Concentration: choose one of the following 5 concentrations: <sup>5</sup>		22-30
<b>Financial and Decision Engineering Concentration (25-30) <sup>4</sup></b>		
ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
MS&E 140	Accounting for Managers and Entrepreneurs	3-4
MS&E 152	Introduction to Decision Analysis (WIM)	3-4
Select one of the following:		3-4
MS&E 245G	Finance for Non-MBAs	
MS&E 247S	International Investments	
Select two of the following:		6-8
ENGR 145	Technology Entrepreneurship	
MS&E 107	Interactive Management Science	
MS&E 146	Corporate Financial Management	
MS&E 223	Simulation	
MS&E 247G	International Financial Management	
MS&E 250A	Engineering Risk Analysis	
MS&E 260	Introduction to Operations Management <sup>4</sup>	
<b>Operations Research Concentration (24-27) <sup>4</sup></b>		
MATH 113	Linear Algebra and Matrix Theory <sup>6</sup>	3
MATH 115	Functions of a Real Variable <sup>6</sup>	3
MS&E 112	Mathematical Programming and Combinatorial Optimization	3
MS&E 152	Introduction to Decision Analysis (WIM)	3-4
MS&E 241	Economic Analysis	3-4
MS&E 251	Stochastic Decision Models	3
STATS 202	Data Mining and Analysis <sup>6</sup>	3
Select one of the following:		3-4
MS&E 142	Introductory Financial Analysis <sup>4</sup>	
MS&E 260	Introduction to Operations Management <sup>4</sup>	

### Organization, Technology, and Entrepreneurship Concentration (22-30)

Select one of the following: 4-5

ECON 50	Economic Analysis I
PSYCH 70	Introduction to Social Psychology
SOC 114	Economic Sociology

Select two of the following: 6-8

ENGR 145	Technology Entrepreneurship
MS&E 175	Innovation, Creativity, and Change
MS&E 181	Issues in Technology and Work for a Postindustrial Economy <sup>6</sup>

Select at least four of the following courses (may also include E145, MS&E 175, or MS&E 181, if not used above): 12-17

CS 147	Introduction to Human-Computer Interaction Design
ENGR 130	Science, Technology, and Contemporary Society <sup>6</sup>
MS&E 134	Organization Change and Information Systems <sup>3</sup>
MS&E 140	Accounting for Managers and Entrepreneurs
MS&E 178	The Spirit of Entrepreneurship
MS&E 185	Global Work
MS&E 189	Social Networks - Theory, Methods, and Applications
MS&E 266	Management of New Product Development

### Policy and Strategy Concentration (25-30)

ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
MS&E 190	Methods and Models for Policy and Strategy Analysis	3

At least four of the following courses, including at least one course in policy and at least one course in strategy: 12-17

Policy:	
MS&E 193	Technology and National Security (WIM) <sup>6</sup>
MS&E 197	Ethics and Public Policy (WIM) <sup>6</sup>
MS&E 243	Energy and Environmental Policy Analysis
MS&E 248	Economics of Natural Resources
MS&E 292	Health Policy Modeling
Strategy:	
ENGR 145	Technology Entrepreneurship
MS&E 175	Innovation, Creativity, and Change
MS&E 266	Management of New Product Development

### Production and Operations Management Concentration (25-29) <sup>4</sup>

ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
MS&E 140	Accounting for Managers and Entrepreneurs	3-4
MS&E 152	Introduction to Decision Analysis (WIM)	3-4
Select three of the following:		9-11
MS&E 142	Introductory Financial Analysis <sup>4</sup>	
MS&E 245G	Finance for Non-MBAs	
MS&E 262	Supply Chain Management	
MS&E 264	Sustainable Product Development and Manufacturing	
MS&E 266	Management of New Product Development	
MS&E 268	Operations Strategy	

- <sup>1</sup> Math and Science must total a minimum of 45 units. Electives must come from the School of Engineering approved list, or, PHYSICS 25 Modern Physics, PHYSICS 26 Modern Physics Laboratory; PSYCH 55 Introduction to Cognition and the Brain, PSYCH 70 Introduction to Social Psychology. AP credit for Chemistry, Mathematics, and Physics may be used.
- <sup>2</sup> Students may petition to place out of CS 106A Programming Methodology.
- <sup>3</sup> Students may not count 134 for both core and the Organization, Technology, and Entrepreneurship concentration.
- <sup>4</sup> Students may not count 142 or 260 for both core and concentration. Students doing the Financial and Decision Engineering concentration must take 142 for core, and may also take 260 as a concentration elective. Students doing the Operations Research concentration must take both 142 and 260 (one for core, and one for concentration). Students doing the Production and Operations Management concentration must take 260 for core, and may also take 142 as a concentration elective.
- <sup>5</sup> Engineering fundamentals, engineering depth (core), and engineering depth (concentration) must total a minimum of 60 units.
- <sup>6</sup> Courses used to satisfy the Math, Science, Technology in Society, or Engineering Fundamental requirement may not also be used to satisfy an engineering depth requirement.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

# Materials Science and Engineering (MATSCI)

Completion of the undergraduate program in Materials Science and Engineering leads to the conferral of the Bachelor of Science in Materials Science and Engineering.

## Requirements

Course List

	Units
<b>Mathematics (10)</b>	
20 units minimum; see Basic Requirement 1	
Select one of the following:	5
MATH 51 Linear Algebra and Differential Calculus of Several Variables	
CME 100/ ENGR 154 Vector Calculus for Engineers	
Select one of the following:	
MATH 52 Integral Calculus of Several Variables	
CME 104/ ENGR 155B Linear Algebra and Partial Differential Equations for Engineers	
Select one of the following:	5
MATH 53 Ordinary Differential Equations with Linear Algebra	
CME 102/ ENGR 155A Ordinary Differential Equations for Engineers	
<b>Science (20)</b>	
20 units minimum; see Basic Requirement 2	20
Must include a full year of physics or chemistry, with one quarter of study in the other subject	
<b>Technology in Society (3-5)</b>	
One course; see Basic Requirement 4	3-5
<b>Engineering Fundamentals (10-13)</b>	

Three courses minimum; see Basic Requirement 3	
Select one of the following:	4
ENGR 50 Introduction to Materials Science, Nanotechnology Emphasis <sup>1</sup>	
ENGR 50E Introduction to Materials Science - Energy Emphasis <sup>1</sup>	
ENGR 50M Introduction to Materials Science, Biomaterials Emphasis <sup>1</sup>	
At least two additional courses	6-9
<b>Materials Science and Engineering Depth (50)</b>	
Materials Science Fundamentals:	
MATSCI 153 Nanostructure and Characterization	4
MATSCI 154 Thermodynamics of Energy Conversions at the Nanoscale <sup>3</sup>	4
MATSCI 155 Nanomaterials Synthesis	4
MATSCI 157 Quantum Mechanics of Nanoscale Materials	4
Two of the following courses:	8
MATSCI 151 Microstructure and Mechanical Properties	
MATSCI 152 Electronic Materials Engineering	
MATSCI 156 Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	
MATSCI 190 Organic and Biological Materials	
MATSCI 192 Materials Chemistry	
MATSCI 193 Atomic Arrangements in Solids	
MATSCI 194 Thermodynamics and Phase Equilibria	
MATSCI 195 Waves and Diffraction in Solids	
MATSCI 196 Imperfections in Solids	
MATSCI 197 Rate Processes in Materials	
MATSCI 198 Mechanical Properties of Materials	
MATSCI 199 Electronic and Optical Properties of Solids	
Engineering Depth	16
One of the following courses:	
MATSCI 161 Nanocharacterization Laboratory	
MATSCI 164 Electronic and Photonic Materials and Devices Laboratory (WIM)	
Three of the following courses:	
MATSCI 160 Nanomaterials Laboratory	
MATSCI 162 X-Ray Diffraction Laboratory	
MATSCI 163 Mechanical Behavior Laboratory	
MATSCI 165 Nanoscale Materials Physics Computation Laboratory	
Focus Area Options <sup>2</sup>	10

Footnotes

- <sup>1</sup> If both ENGR 50 Introduction to Materials Science, Nanotechnology Emphasis, ENGR 50E Introduction to Materials Science - Energy Emphasis, and/or ENGR 50M Introduction to Materials Science, Biomaterials Emphasis are taken, one may be used for the Materials Science Fundamentals requirement.
- <sup>2</sup> Focus Area Options; 10 units from one of the following areas below
- <sup>3</sup> ENGR 30 Engineering Thermodynamics may be substituted for MATSCI 154 Thermodynamics of Energy Conversions at the Nanoscale as long as the total MATSCI program units total 50 or more.

## Focus Area Options

Course List



		Units
<b>Bioengineering (28)</b>		
BIOE 220	Introduction to Imaging and Image-based Human Anatomy	3
BIOE 281	Biomechanics of Movement	3
BIOE 284B	Cardiovascular Bioengineering	3
BIOE 333	Interfacial Phenomena and Bionanotechnology	3
BIOE 381	Orthopaedic Bioengineering	3
MATSCI 190	Organic and Biological Materials	4
MATSCI 380	Nano-Biotechnology	3
MATSCI 381	Biomaterials in Regenerative Medicine	3
MATSCI 382	Bio-chips, Imaging and Nanomedicine	3
<b>Chemical Engineering (15)</b>		
CHEM 171	Physical Chemistry	3
CHEMENG 130	Separation Processes	3
CHEMENG 140	Micro and Nanoscale Fabrication Engineering	3
CHEMENG 150	Biochemical Engineering	3
CHEMENG 160	Polymer Science and Engineering	3
<b>Chemistry (24)</b>		
CHEM 151	Inorganic Chemistry I	3
CHEM 153	Inorganic Chemistry II	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 175	Physical Chemistry	3
CHEM 181	Biochemistry I	3
CHEM 183	Biochemistry II	3
CHEM 185	Biochemistry III	3
<b>Electronics &amp; Photonics (32)</b>		
EE 101A	Circuits I	4
EE 101B	Circuits II	4
EE 102A	Signal Processing and Linear Systems I	4
EE 102B	Signal Processing and Linear Systems II	4
EE 116	Semiconductor Device Physics	3
EE 134	Introduction to Photonics	4
EE 136	Introduction to Nanophotonics and Nanostructures	3
EE 141	Engineering Electromagnetics	3
MATSCI 343	Organic Semiconductors for Electronics and Photonics	3
<b>Energy Technology (15-16)</b>		
EE 293A	Fundamentals of Energy Processes	3-4
EE 293B	Fundamentals of Energy Processes	3
MATSCI 302	Solar Cells	3
MATSCI 303	Principles, Materials and Devices of Batteries	3
ME 260	Fuel Cell Science and Technology	3
<b>Materials Characterization Techniques (9)</b>		
MATSCI 321	Transmission Electron Microscopy	3
MATSCI 323	Thin Film and Interface Microanalysis	3
MATSCI 325	X-Ray Diffraction	3
MATSCI 320 and 326 (not offered in 2012-2013) may also be counted towards this focus area.		
<b>Mechanical Behavior &amp; Design (25)</b>		
AA 240A	Analysis of Structures	3
AA 240B	Analysis of Structures	3
AA 256	Mechanics of Composites	3
MATSCI 198	Mechanical Properties of Materials	4
MATSCI 358	Fracture and Fatigue of Materials and Thin Film Structures	3
ME 80	Mechanics of Materials	4
or CEE 101A	Mechanics of Materials	
ME 203	Design and Manufacturing	4
ME 294	Medical Device Design	1
<b>Nanoscience (21)</b>		
BIOE 333	Interfacial Phenomena and Bionanotechnology	3
EE 136	Introduction to Nanophotonics and Nanostructures	3
ENGR 240	Introduction to Micro and Nano Electromechanical Systems	3
MATSCI 316	Nanoscale Science, Engineering, and Technology	3
MATSCI 346	Nanophotonics	3
MATSCI 347	Introduction to Magnetism and Magnetic Nanostructures	3
MATSCI 380	Nano-Biotechnology	3
MATSCI 320 (not offered in 2012-2013) may also be counted towards this focus area.		
<b>Physics (39)</b>		
PHYSICS 70	Foundations of Modern Physics	4
PHYSICS 110	Advanced Mechanics	4
PHYSICS 120	Intermediate Electricity and Magnetism I	4
PHYSICS 121	Intermediate Electricity and Magnetism II	4
PHYSICS 130	Quantum Mechanics	4
PHYSICS 131	Quantum Mechanics II	4
PHYSICS 134	Advanced Topics in Quantum Mechanics	4
PHYSICS 170	Thermodynamics, Kinetic Theory, and Statistical Mechanics I	4
PHYSICS 171	Thermodynamics, Kinetic Theory, and Statistical Mechanics II	4
PHYSICS 172	Solid State Physics	3
<b>Self-Defined Option (10)</b>		
Petition for a self-defined cohesive program, minimum of 10 units.		10
These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.		
<h2>Mechanical Engineering (ME)</h2>		
Completion of the undergraduate program in Mechanical Engineering leads to the conferral of the Bachelor of Science in Mechanical Engineering.		
<h2>Requirements</h2>		
		<b>Units</b>
<b>Mathematics (8-10)</b>		
24 units minimum; see Basic Requirement 1 <sup>1</sup>		
CME 102/ENGR 155A	Ordinary Differential Equations for Engineers	5
or MATH 53	Ordinary Differential Equations with Linear Algebra	
Select one of the following:		3-5
CME 106/ENGR 155C	Introduction to Probability and Statistics for Engineers	
STATS 110	Statistical Methods in Engineering and the Physical Sciences	
STATS 116	Theory of Probability	
<b>Science (4)</b>		

20 units minimum; see Basic Requirement 2 <sup>1</sup>

CHEM 31X	Chemical Principles	4
or ENGR 31	Chemical Principles with Application to Nanoscale Science and Technology	

**Technology in Society (0)**

one course from approved ME list; see Basic Requirement 4 <sup>2</sup>

**Engineering Fundamentals (11-15)**

Three courses minimum; see Basic Requirement 3

ENGR 40	Introductory Electronics	5
ENGR 70A	Programming Methodology (same as CS 106A)	3-5
Fundamentals Elective <sup>3</sup>		3-5

**Engineering Depth (51-53)**

Minimum of 68 Engineering Science and Design ABET units; see Basic Requirement 5

ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	3
ENGR 30	Engineering Thermodynamics	3
ENGR 102M	Technical/Professional Writing for Mechanical Engineers <sup>4</sup>	1
ME 70	Introductory Fluids Engineering	4
ME 80	Mechanics of Materials	4
ME 101	Visual Thinking	4
ME 103D	Engineering Drawing and Design <sup>4</sup>	1
ME 112	Mechanical Systems Design	4
ME 113	Mechanical Engineering Design	4
ME 131A	Heat Transfer	3-4
ME 131B	Fluid Mechanics: Compressible Flow and Turbomachinery	4
ME 140	Advanced Thermal Systems	5
ME 161	Dynamic Systems, Vibrations and Control	3-4
ME 203	Design and Manufacturing <sup>4</sup>	4

<sup>1</sup> Math and science must total 45 units. Math: 24 units required and must include a course in differential equations (CME 102 Ordinary Differential Equations for Engineers or MATH 53 Ordinary Differential Equations with Linear Algebra; one of these required) and Statistics (CME 106 Introduction to Probability and Statistics for Engineers or STATS 110 Statistical Methods in Engineering and the Physical Sciences or 116 is required (neither STATS 60 Introduction to Statistical Methods: Precalculus nor STATS 160 fulfill statistics requirement). Science: 20 units minimum and requires courses in calculus-based Physics and Chemistry, with at least a full year (3 courses) in one or the other. CHEM 31A Chemical Principles I/CHEM 31B Chemical Principles II are considered one course because they cover the same material as CHEM 31X Chemical Principles but at a slower pace. CHEM 31X Chemical Principles or ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology are recommended.

<sup>2</sup> ME majors must choose their TIS course from the following list: ME 190 (recommended; offered every other year), STS 101 Science, Technology, and Contemporary Society, STS 110 Ethics and Public Policy, or STS 115 Ethical Issues in Engineering, or CS 181(prerequisite of CS 106B or X).

<sup>3</sup> ME Fundamental elective may not be a course counted for other requirements. Students may opt to use ENGR 14 Intro to Solid Mechanics, ENGR 15 Dynamics, or ENGR 30 Engineering Thermodynamics from the required depth courses as the third fundamental class. However, total units for Engineering Topics (Fundamentals + Depth) must be a minimum of 68 units; additional options courses may be required to meet unit requirements.

<sup>4</sup> All three courses (ENGR 102M Technical/Professional Writing for Mechanical Engineers, ME 103D Engineering Drawing and Design, ME 203 Design and Manufacturing) must be taken concurrently in order to fulfill the Writing in the Major (WIM) requirement.

Options to complete the ME depth sequence: see the list of options in the ME major section of the Handbook for Undergraduate Engineering Programs (<http://ughb.stanford.edu>).

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Product Design (PD)

Completion of the undergraduate program in Product Design leads to the conferral of the Bachelor of Science in Engineering. The subplan "Product Design" appears on the transcript and on the diploma.

### Mission of the Undergraduate Program in Product Design

The mission of the undergraduate program in Product Design is to graduate designers who can synthesize technology, human factors, and business factors in the service of human need. The program teaches a design process that encourages creativity, craftsmanship, and personal expression, and emphasizes brainstorming and need finding. Students studying product design follow the basic mechanical engineering curriculum and are expected to meet the University requirements for a Bachelor of Science degree. The program emphasis is placed on conceptual thinking, creativity, risk taking, and aesthetics. Students are taught to use design processes to resolve constraints arising from technical, human, aesthetic, and business concerns. The course work provides students with the skills necessary to carry projects from initial concept to completion of working prototypes. The program prepares students for careers in industry and for graduate study.

### Requirements

	Units
<b>Mathematics and Science (43-45)</b>	43-45
<b>Mathematics (20)</b>	20
20 units minimum	
Recommended: one course in Statistics	
<b>Science (20-22)</b>	
23 units minimum: 8 units of social science (inc PSYCH 1) and 15 units must be from School of Engineering approved list <sup>1</sup>	
PHYSICS 41	Mechanics 4
PHYSICS 43	Electricity and Magnetism 4
PHYSICS 45	Light and Heat 4
PSYCH 1	Introduction to Psychology 5
PSYCH elective from courses numbered 20-95	3-5
<b>Technology in Society (3)</b>	
ME 120	History and Philosophy of Design 3
<b>Engineering Fundamentals (13-15)</b>	
ENGR 40	Introductory Electronics 5
ENGR 70A	Programming Methodology 5
Fundamentals Elective <sup>2</sup>	3-5
<b>Product Design Engineering Depth (49-55)</b>	
Three Art Studio courses numbered 100 or higher 9-15	
ENGR 14	Intro to Solid Mechanics 4
ENGR 102M	Technical/Professional Writing for Mechanical Engineers <sup>3</sup> 1
ME 80	Mechanics of Materials 4

ME 101	Visual Thinking	4
ME 103D	Engineering Drawing and Design <sup>3</sup>	1
ME 110	Design Sketching (May be repeated for credit)	1
ME 112	Mechanical Systems Design	4
ME 115A	Introduction to Human Values in Design	3
ME 115B	Product Design Methods	3
ME 115C	Design and Business Factors <sup>4</sup>	3
ME 203	Design and Manufacturing <sup>3</sup>	4
ME 216A	Advanced Product Design: Needfinding	4
ME 216B	Advanced Product Design: Implementation I	4

- 1 School of Engineering approved science list available at <http://ughb.stanford.edu>.
- 2 Select one of the following: ENGR 10, ENGR 15, ENGR 20, ENGR 25B or ENGR 25E, ENGR 30, ENGR 50 or ENGR 50E or ENGR 50M, ENGR 60, ENGR 62, ENGR 80, ENGR 90
- 3 These three courses (ENGR 102M Technical/Professional Writing for Mechanical Engineers, ME 103D Engineering Drawing and Design, ME 203 Design and Manufacturing) should be taken concurrently in order to fulfill the Writing in the Major (WIM) requirement.
- 4 One quarter abroad may substitute for ME 115C.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/http://ughb.stanford.edu>).

## Minor in the School of Engineering

An undergraduate minor in some Engineering programs may be pursued by interested students; see the Handbook for Undergraduate Engineering Programs, or consult with a department's undergraduate program representative or the Office of Student Affairs, Huang Engineering Center, Suite 135.

General requirements and policies for a minor in the School of Engineering are:

1. A set of courses totaling not less than 20 and not more than 36 units, with a minimum of six courses of at least 3 units each.
2. The set of courses should be sufficiently coherent as to present a body of knowledge within a discipline or subdiscipline.
3. Prerequisite mathematics, statistics, or science courses, such as those normally used to satisfy the school's requirements for a department major, may not be used to satisfy the requirements of the minor; conversely, engineering courses that serve as prerequisites for subsequent courses must be included in the unit total of the minor program.
4. Courses used for the major and/or minor core must not be duplicated within any other of the student's degree programs; that is, students may not overlap (double-count) courses for completing major and minor requirements except in the case of prerequisite courses as noted in #3.

Departmentally based minor programs are structured at the discretion of the sponsoring department, subject only to requirements 1, 2, 3, and 4 above. Interdisciplinary minor programs may be submitted to the Undergraduate Council for approval and sponsorship. A general Engineering minor is not offered.

## Aeronautics and Astronautics (AA) Minor

The Aero/Astro minor introduces undergraduates to the key elements of modern aerospace systems. Within the minor, students may focus on

aircraft, spacecraft, or disciplines relevant to both. The course requirements for the minor are described in detail below. Courses cannot be double-counted within a major and a minor, or within multiple minors; if necessary, the Aero/Astro adviser can help select substitute courses to fulfill the AA minor core.

The following core courses fulfill the minor requirements:

		Units
AA 100	Introduction to Aeronautics and Astronautics	3
ENGR 14	Intro to Solid Mechanics*	4
ENGR 15	Dynamics*	3
ENGR 30	Engineering Thermodynamics*	3
ME 70	Introductory Fluids Engineering	4
ME 131A	Heat Transfer	3-4

Two courses from one of the upper-division elective areas below (min. 6 units)

Plus one course from a second area below (min. 3 units) 9-11

### Aerospace Systems Synthesis/Design (0)

AA 236A & AA 236B	Spacecraft Design and Spacecraft Design Laboratory
AA 241A & AA 241B	Introduction to Aircraft Design, Synthesis, and Analysis and Introduction to Aircraft Design, Synthesis, and Analysis

### Dynamics and Controls (0)

AA 242A	Classical Dynamics
AA 271A	Dynamics and Control of Spacecraft and Aircraft
AA 279	Space Mechanics
ENGR 105	Feedback Control Design
ENGR 205	Introduction to Control Design Techniques

### Fluids (0)

AA 200	Applied Aerodynamics
AA 210A	Fundamentals of Compressible Flow
AA 214A or AA 283	Introduction to Numerical Methods for Engineering Aircraft and Rocket Propulsion

### Structures (0)

AA 240A	Analysis of Structures
AA 240B	Analysis of Structures
AA 256	Mechanics of Composites

\* ENGR 14 Intro to Solid Mechanics, ENGR 15 Dynamics, or ENGR 30 Engineering Thermodynamics are waived as minor requirements if already taken as part of the major.

## Chemical Engineering (CHE) Minor

The following core courses fulfill the minor requirements:

		Units
ENGR/	Introduction to Chemical Engineering	3
CHEMENG 20		
CHEMENG 100	Chemical Process Modeling, Dynamics, and Control	3
CHEMENG 110	Equilibrium Thermodynamics	3
CHEMENG 120A	Fluid Mechanics	4
CHEMENG 120B	Energy and Mass Transport	4
Select one of the following:		3

CHEMENG 140	Micro and Nanoscale Fabrication Engineering	
CHEMENG 142	Basic Principles of Heterogeneous Catalysis with Applications in Energy Transformations	
CHEMENG 160	Polymer Science and Engineering	
CHEMENG 174	Environmental Microbiology I	
CHEMENG 181	Biochemistry I	
CHEMENG 170	Kinetics and Reactor Design	3
CHEMENG 185A	Chemical Engineering Laboratory A	4
CHEM 171	Physical Chemistry	3
Total Units		30

## Civil Engineering (CE) Minor

The civil engineering minor is intended to give students a focused introduction to one or more areas of civil engineering. Departmental expertise and undergraduate course offerings are available in the areas of Architectural Design, Construction Engineering and Management, and Structural and Geotechnical Engineering. Students interested in Environmental and Water Studies should refer to the environmental engineering minor.

The minimum prerequisite for a civil engineering minor is MATH 42 Calculus (or MATH 21 Calculus); however, many courses of interest require PHYSICS 41 Mechanics and/or MATH 51 Linear Algebra and Differential Calculus of Several Variables as prerequisites. The minimum prerequisite for a Civil Engineering minor focusing on architectural design is MATH 41 Calculus (or MATH 19 Calculus) and a course in Statistics. Students should recognize that a minor in civil engineering is not an ABET-accredited degree program.

Since undergraduates having widely varying backgrounds may be interested in obtaining a civil engineering minor, and the field itself is so broad, no single set of course requirements will be appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below. Additional information, including example minor programs, are provided on the CEE web site ([http://cee.stanford.edu/prospective/undergrad/minor\\_overview.html](http://cee.stanford.edu/prospective/undergrad/minor_overview.html)) and in Chapter 6 of the Handbook for Undergraduate Engineering Programs (<http://ughb.stanford.edu>).

General guidelines are:

1. A civil engineering minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes of at least 3 units each of letter-graded work, except where letter grades are not offered.
2. The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another. Example programs are given on the CEE webpage.

Professor Anne Kiremidjian ([kiremidjian@stanford.edu](mailto:kiremidjian@stanford.edu)) is the CEE undergraduate minor adviser in Structural Engineering and Construction Engineering and Management. John Barton ([jhbarton@stanford.edu](mailto:jhbarton@stanford.edu)), Program Director for Architectural Design, is the undergraduate minor adviser in Architectural Design. Students must consult the appropriate adviser when developing their minor program, and obtain approval of the finalized study list from them.

## Computer Science (CS) Minor

The following core courses fulfill the minor requirements. Prerequisites include the standard mathematics sequence through MATH 51.

		Units
Introductory Programming (AP Credit may be used to fulfill this requirement):		
CS 106B	Programming Abstractions	5
or CS 106X	Programming Abstractions (Accelerated)	
Core:		
CS 103	Mathematical Foundations of Computing	5
CS 107	Computer Organization and Systems	5
CS 109	Introduction to Probability for Computer Scientists <sup>1</sup>	5
Electives (choose two courses from different areas):		
Artificial Intelligence—		
CS 124	From Languages to Information	4
CS 221	Artificial Intelligence: Principles and Techniques	4
Human-Computer Interaction—		
CS 147	Introduction to Human-Computer Interaction Design	4
Software—		
CS 108	Object-Oriented Systems Design	4
CS 110	Principles of Computer Systems	5
Systems—		
CS 140	Operating Systems and Systems Programming	4
CS 143	Compilers	4
CS 144	Introduction to Computer Networking	4
CS 145	Introduction to Databases	4
CS 148	Introduction to Computer Graphics and Imaging	4
Theory—		
CS 154	Introduction to Automata and Complexity Theory	4
CS 157	Logic and Automated Reasoning	3
CS 161	Design and Analysis of Algorithms	5

<sup>1</sup> Students who completed STATS 116, MS&E 120, or CME 106 in Winter 2008-09 or earlier may count that course as satisfying the CS 109 requirement. These same courses taken in Spring 2008-09 or later cannot be used to satisfy the CS 109 requirement.

*Note:* for students with no programming background and who begin with CS 106A, the minor consists of seven or eight courses.

## Electrical Engineering (EE) Minor

The options for completing a minor in EE are outlined below. Students must complete a minimum of 25 units, as follows:

		Units
Select one of the following courses:		5
ENGR 40	Introductory Electronics	
ENGR 40N	Engineering Wireless Networks	
ENGR 40P	Physics of Electrical Engineering	
Select one of the following options:		8
Option I:		
EE 101A	Circuits I	
EE 101B	Circuits II	
Option II:		
EE 102A	Signal Processing and Linear Systems I	
EE 102B	Signal Processing and Linear Systems II	

Option III:	
EE 108A	Digital Systems I
EE 108B	Digital Systems II

In addition, four letter-graded EE or cognate courses at the 100-level or higher must be taken (12 units minimum)

## Environmental Engineering (ENV) Minor

The Environmental Engineering minor is intended to give students a focused introduction to one or more areas of Environmental Engineering. Departmental expertise and undergraduate course offerings are available in the areas of environmental engineering and science, environmental fluid mechanics and hydrology, and atmosphere/energy. The minimum prerequisite for an Environmental Engineering minor is MATH 42 Calculus (or MATH 21 Calculus); however, many courses of interest require PHYSICS 41 Mechanics and/or MATH 51 Linear Algebra and Differential Calculus of Several Variables as prerequisites. Students should recognize that a minor in Environmental Engineering is not an ABET-accredited degree program.

Since undergraduates having widely varying backgrounds may be interested in obtaining an environmental engineering minor, no single set of course requirements is appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below. Additional information on preparing a minor program is available in Chapter 6 of the Handbook for Undergraduate Engineering Programs (<http://ughb.stanford.edu>).

General guidelines are—

- An Environmental Engineering minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes of at least 3 units each of letter-graded work, except where letter grades are not offered.
- The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another. Example programs are available on the CEE web site ([http://cee.stanford.edu/prospective/undergrad/minor\\_overview.html](http://cee.stanford.edu/prospective/undergrad/minor_overview.html)).

Professor Lynn Hildemann ([hildemann@stanford.edu](mailto:hildemann@stanford.edu)) is the CEE undergraduate minor adviser in Environmental Engineering. Students must consult with Professor Hildemann in developing their minor program, and obtain approval of the finalized study list from her.

## Management Science and Engineering (MS&E) Minor

The following courses are required to fulfill the minor requirements:

	Units
<b>Background requirements (10)</b>	
CS 106A	5
MATH 51	5
<b>Minor requirements (26-29)</b>	
MS&E 111	4
MS&E 120	5
MS&E 121	4
MS&E 180	4
Select one of the following:	3-4
MS&E 130	4
MS&E 134	4
MS&E 233	4
Select one of the following:	3-4

MS&E 142	Introductory Financial Analysis	
MS&E 260	Introduction to Operations Management	
Elective (select any 100- or 200-level MS&E course)		3-4

## Materials Science and Engineering (MATSCI) Minor

A minor in Materials Science and Engineering allows interested students to explore the role of materials in modern technology and to gain an understanding of the fundamental processes that govern materials behavior.

The following courses fulfill the minor requirements:

	Units
<b>Engineering Fundamentals (4)</b>	
Select one of the following:	4
ENGR 50	4
ENGR 50E	4
ENGR 50M	4
<b>Materials Science Fundamentals and Engineering Depth (24)</b>	
Select six of the following:	24
MATSCI 151	3
MATSCI 152	3
MATSCI 153	3
MATSCI 154	3
MATSCI 155	3
MATSCI 156	3
MATSCI 157	3
MATSCI 160	3
MATSCI 161	3
MATSCI 162	3
MATSCI 163	3
MATSCI 164	3
MATSCI 165	3
MATSCI 190	3
MATSCI 192	3
MATSCI 193	3
MATSCI 194	3
MATSCI 195	3
MATSCI 196	3
MATSCI 197	3
MATSCI 198	3
MATSCI 199	3

Total Units 28

Insert Mechanical Engineering Minor Here

## Master of Science in the School of Engineering

The M.S. degree is conferred on graduate students in engineering according to the University regulations stated in the "Graduate Degrees (<http://exploreddegrees.stanford.edu/graduatedegrees>)" section of this bulletin, and

is described in the various department listings. A minimum of 45 units is usually required in M.S. programs in the School of Engineering. The presentation of a thesis is not a school requirement. Further information is found in departmental listings.

## Master of Science in Engineering

The M.S. in Engineering is available to students who wish to follow an interdisciplinary program of study that does not conform to a normal graduate program in a department. There are three school requirements for the M.S. degree in Engineering:

1. The student's program must be a coherent one with a well-defined objective and must be approved by a department within the school which has experience with graduate-level teaching and advising in the program area.
2. The student's program must include at least 21 units of courses within the School of Engineering with catalog numbers of 200 or above in which the student receives letter grades.
3. The program must include a total of at least 45 units.

Each student's program is administered by the particular department in which it is lodged and must meet the standard of quality of that department. Transfer into this program is possible from any graduate program by application through the appropriate department; the department will then recommend approval to the Office of Student Affairs in the School of Engineering. The application should be submitted before completing 18 units of the proposed program; it should include a statement describing the objectives of the program, the coherence of the proposed coursework, and why this course of study cannot conform to existing graduate programs. Normally, it will include the approval of at least one faculty member willing to serve as adviser. (A co-advising team may be appropriate for interdisciplinary programs.) The actual transfer will be accomplished through the Graduate Authorization Petition process.

## Engineer in the School of Engineering

The degree of Engineer is intended for students who want additional graduate training beyond that offered in an M.S. program. The program of study must satisfy the student's department and must include at least 90 units beyond the B.S. degree. The presentation of a thesis is required. The University regulations for the Engineer degree are stated in the "Graduate Degrees (<http://exploreddegrees.stanford.edu/graduatedegrees>)" section of this bulletin, and further information is available in the individual departmental sections of this bulletin.

## Doctor of Philosophy in the School of Engineering

Programs leading to the Ph.D. degree are offered in each of the departments of the school. University regulations for the Ph.D. are given in the "Graduate Degrees (p. 38)" section of this bulletin. Further information is found in departmental listings.

## Honors Cooperative Program

Industrial firms, government laboratories, and other organizations may participate in the Honors Cooperative Program (HCP), a program that

permits qualified engineers, scientists, and technology professionals admitted to Stanford graduate degree programs to register for Stanford courses and obtain the degree on a part-time basis. In many areas of concentration, the master's degree can be obtained entirely online.

Through this program, many graduate courses offered by the School of Engineering on campus are made available through the Stanford Center for Professional Development (SCPD). SCPD delivers more than 250 courses a year online. For HCP employees who are not part of a graduate degree program at Stanford, courses and certificates are also available through a non-degree option (NDO) and a non-credit professional education program. Non-credit short courses may be customized to meet a company's needs. For a full description of educational services provided by SCPD, see <http://scpd.stanford.edu>; call (650) 725-3000; fax (650) 725-2868; or email [scpd-registration@stanford.edu](mailto:scpd-registration@stanford.edu).

*Dean:* James D. Plummer

*Senior Associate Deans:* Laura L. Breyfogle (External Relations), (Stanford Center for Professional Development), Curtis W. Frank (Faculty and Academic Affairs), Clare Hansen-Shinnerl (Administration), Brad Osgood (Student Affairs)

*Associate Dean:* Noé P. Lozano (Diversity Programs)

*Assistant Dean:* Sally Gressens (Graduate Student Affairs)

## Faculty Teaching General Engineering Courses

*Professors:* Stacey F. Bent, Mark Cappelli, Roger Howe, Chaitan Khosla, Reginald Mitchell, Stephen Monismith, Drew Nelson, Brad Osgood, Channing R. Robertson (Emeritus), Stephen M. Rock, Michael Shanks, Sheri Sheppard, Robert Sinclair, Simon Wong, Paul McIntyre, Olav Solgaard, Benjamin Van Roy

*Associate Professors:* Sarah Billington, Eric Darve, Ashish Goel, Allison Okamura, Beth Pruitt, Adrian Lew, Nicolas A. Melosh, Christina Smolke, Margot Gerritsen

*Assistant Professors:* Scott Doorley, Charles E. Eesley, Sarah Heilshorn, Sachin Katti, Ali Mani, Manu Prakash, Leif Thomas, Clifford L. Wang, Xiaolin Zheng

*Professors (Teaching):* Thomas H. Byers, Eric Roberts

*Associate Professor (Teaching):* Mehran Sahami

*Senior Lecturers:* Vadim Khayms, Claude Reichard

*Lecturers:* Royal Kopperud, R. Ann Miura-Ko, Keith Schwarz

*Academic Research and Program Officer:* Tina Seelig

*Other Teaching:* David Baggeroer, Noé P. Lozano

## Overseas Studies Courses in Engineering

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofengineering/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofengineering/http://explorecourses.stanford.edu>) or Bing Overseas

Studies (<http://exploreddegrees.stanford.edu/schoolofengineering/http://bosp.stanford.edu>).

		Units
OSPBER 40B	Introductory Electronics	5
OSPBER 50M	Introductory Science of Materials	4
OSPFLO 50M	Introductory Science of Materials	4
OSPKYOTO 40K	Introductory Electronics	5
OSPPARIS 40P	Introductory Electronics	5
OSPPARIS 50M	Introductory Science of Materials	4
OSPPARIS 74	Climate Change Challenges in France and Europe: from Project to Policy	4

# Aeronautics and Astronautics

Courses offered by the Department of Aeronautics and Astronautics are listed under the subject code AA on the (<https://explorecourses.stanford.edu/search?filter-term=Autumn=on&filter-catalognumber-AA=on&filter-term=Summer=on&page=0&q=AA&filter-coursestatus-Active=on&view=catalog&filter-term-Spring=on&collapse=&filter-term-Winter=on&catalog=71>) *Stanford Bulletin's* ExploreCourses web site.

The Department of Aeronautics and Astronautics prepares students for professional positions in industry, government, and academia by offering a comprehensive program of graduate teaching and research. In this broad program, students have the opportunity to learn and integrate multiple engineering disciplines. The program emphasizes structural, aerodynamic, guidance and control, and propulsion problems of aircraft and spacecraft. Courses in the teaching program lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Undergraduates and doctoral students in other departments may also elect a minor in Aeronautics and Astronautics.

Requirements for all degrees include courses on basic topics in Aeronautics and Astronautics, as well as in mathematics, and related fields in engineering and the sciences.

The current research and teaching activities cover a number of advanced fields, with emphasis on:

- Aeroelasticity and Flow Simulation
- Aircraft Design, Performance, and Control
- Applied Aerodynamics
- Computational Aero-Acoustics
- Computational Fluid Dynamics
- Computational Mechanics and Dynamical Systems
- Control of Robots, including Space and Deep-Underwater Robots
- Conventional and Composite Materials and Structures
- Direct and Large-Eddy Simulation of Turbulence
- High-Lift Aerodynamics
- Hybrid Propulsion
- Hypersonic and Supersonic Flow
- Multidisciplinary Design Optimization
- Navigation Systems (especially GPS)
- Optimal Control, Estimation, System Identification
- Plasma

- Spacecraft Design and Satellite Engineering
- Turbulent Flow and Combustion

## Mission of the Undergraduate Program in Aeronautics and Astronautics

The mission of the undergraduate program in Aeronautics and Astronautics Engineering is to provide students with the fundamental principles and techniques necessary for success and leadership in the conception, design, implementation, and operation of aerospace and related engineering systems. Courses in the major introduce students to engineering principles. Students learn to apply this fundamental knowledge to conduct laboratory experiments and aerospace system design problems. Courses in the major include engineering fundamentals, mathematics, and the sciences, as well as in-depth courses in aeronautics and astronautics, dynamics, mechanics of materials, fluids engineering, and heat transfer. The major prepares students for careers in aircraft and spacecraft engineering, space exploration, air and space-based telecommunication industries, teaching, research, military service, and many related technology-intensive fields.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course work which provides a solid grounding in the basic disciplines, including fluid mechanics, dynamics and control, propulsion, structural mechanics, and applied or computational mathematics, and course work or supervised research which provides depth and breadth in the student's area of specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Aeronautics and Astronautics and related fields.

## Graduate Programs in Aeronautics and Astronautics

### Admission

To be eligible to apply for admission to the department, a student must have a bachelor's degree in engineering, physical science, mathematics, or an acceptable equivalent. Students who have not yet received a master's degree in a closely allied discipline will be admitted to the master's program; eligibility for the Ph.D. program is considered after the master's year (see "Doctor of Philosophy"). Applications for admission with financial aid (fellowships or assistantships) or without financial aid must be received and completed by December 4 for the next Autumn Quarter.

Information about admission to the Honors Cooperative Program is included in the "School of Engineering" section of this bulletin. The department may consider HCP applications for Winter or Spring quarters as well as for Autumn Quarter; prospective applicants should contact the department's student services office.

Further information and application forms for all graduate degree programs may be obtained from Graduate Admissions, the Registrar's Office, <http://gradadmissions.stanford.edu>.

## Waivers and Transfer Credits

Waivers of the Basic Courses required for the M.S. degree in Aeronautics and Astronautics can only be granted by the instructor of that course. Students who believe that they have had a substantially equivalent course at another institution should consult with the course instructor to determine if they are eligible for a waiver, and with their adviser to judge the effect on their overall program plans. To request a waiver, students should fill out a Petition for Waiver form (reverse side of the department's program proposal) and have it approved by the instructor and their adviser. One additional technical elective must be added for each Basic Course that is waived.

A similar procedure should be followed for transfer credits. The number of transfer credits allowed for each degree (Engineer and Ph.D.) is delineated in the "Graduate Degrees" section of this bulletin; transfer credit is not accepted for the M.S. degree. Transfer credit is allowed only for courses taken as a graduate student, after receiving a bachelor's degree, in which equivalence to Stanford courses is established and for which a grade of 'B' or better has been awarded. Transfer credits, if approved, reduce the total number of Stanford units required for a degree.

## Fellowships and Assistantships

Fellowships and course or research assistantships are available to qualified graduate students. Fellowships sponsored by Gift Funds, Stanford University, and Industrial Affiliates of Stanford University in Aeronautics and Astronautics provide grants to several first-year students for the nine-month academic year to cover tuition and living expenses. Stanford Graduate Fellowships, sponsored by the University, provide grants for three full years of study and research; each year, the department is invited to nominate several outstanding doctoral or predoctoral students for these prestigious awards. Students who have excelled in their master's-level course work at Stanford are eligible for course assistantships in the department; those who have demonstrated research capability are eligible for research assistantships from individual faculty members. Students may also hold assistantships in other departments if the work is related to their academic progress; the criteria for selecting course or research assistants are determined by each hiring department. A standard, 20 hours/week course or research assistantship provides a semi-monthly salary and an 8-10 unit tuition grant per quarter. Research assistants may be given the opportunity of additional summer employment. They may use their work as the basis for a dissertation or Engineer's thesis.

## Aeronautics and Astronautics Facilities

The work of the department is centered in the William F. Durand Building for Space Engineering and Science. This 120,000 square foot building houses advanced research and teaching facilities and concentrates in one complex the Department of Aeronautics and Astronautics. The Durand Building also houses faculty and staff offices and several conference rooms.

Through the department's close relations with nearby NASA-Ames Research Center, students and faculty have access to one of the best and most extensive collections of experimental aeronautical research facilities in the world, as well as the latest generation of supercomputers.

## General Information

Further information about the facilities and programs of the department is available at <http://aa.stanford.edu>, or from the department's student services office.

The department has a student branch of the American Institute of Aeronautics and Astronautics, which sponsors programs and speakers

covering aerospace topics and social events. It also conducts visits to nearby research, government, and industrial facilities, and sponsors a Young Astronauts Program in the local schools.

## Bachelor of Science in Engineering (Aeronautics and Astronautics)

Although primarily a graduate-level department, the program offers an undergraduate major in Aeronautics and Astronautics (AA) leading to the B.S. degree in Engineering and an undergraduate minor in Aeronautics and Astronautics. For further information, see the *Handbook for Undergraduate Engineering Programs* at <http://ughb.stanford.edu>.

Undergraduates interested in aerospace are encouraged to combine either a minor or a coterminal M.S. in Aeronautics and Astronautics with a major in a related discipline (such as Mechanical or Electrical Engineering). Students considering these options are encouraged to contact the department's student services office.

## Aeronautics and Astronautics (AA)

Completion of the undergraduate program in Aeronautics and Astronautics leads to the conferral of the Bachelor of Science in Engineering. The subplan "Aeronautics and Astronautics" appears on the transcript and on the diploma.

## Requirements

	Units
<b>Mathematics (5)</b>	
Select one of the following:	5
MATH 53     Ordinary Differential Equations with Linear Algebra	
CME 102/ ENGR 155A     Ordinary Differential Equations for Engineers	
Math electives <sup>1</sup>	
<b>Science (20)</b>	
PHYSICS 41     Mechanics	4
PHYSICS 43     Electricity and Magnetism	4
One additional Physics course	4
Science electives <sup>1</sup>	8
<b>Technology in Society (one course required) (3-5) <sup>1</sup></b>	3-5
<b>Engineering Fundamentals (8)</b>	
Three courses minimum, including:	
ENGR 30     Engineering Thermodynamics	3
ENGR 70A     Programming Methodology	5
<b>Engineering Depth (38-42)</b>	
AA 100     Introduction to Aeronautics and Astronautics	3
AA 190     Directed Research and Writing in Aero/Astro	3-5
ENGR 15     Dynamics	3
CEE 101A     Mechanics of Materials	4
or ME 80     Mechanics of Materials	
ME 161     Dynamic Systems, Vibrations and Control	3-4
or PHYSICS 110     Advanced Mechanics	
ME 70     Introductory Fluids Engineering	4
ME 131A     Heat Transfer	3-4



Depth Area I <sup>2</sup>	6
Depth Area II <sup>2</sup>	6
Engineering elective(s) <sup>3</sup>	3
<b>Total Units</b>	<b>74-80</b>

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (<http://exploreddegrees.stanford.edu/schoolofengineering/aeronauticsandastronautics/http://ughb.stanford.edu>).

- 1 Courses that satisfy the Math electives, Science electives, the Technology in Society requirement, and the Engineering Fundamentals requirement are listed in Figures 3-1, 3-2, 3-3, and 3-4 in the Handbook for Undergraduate Engineering Programs at <http://ughb.stanford.edu>.
- 2 Two of the following areas: Fluids (AA 200 Applied Aerodynamics, AA 210A Fundamentals of Compressible Flow, AA 214A Introduction to Numerical Methods for Engineering, AA 283 Aircraft and Rocket Propulsion; ME 131B Fluid Mechanics: Compressible Flow and Turbomachinery) Structures (AA 240A Analysis of Structures, AA 240B Analysis of Structures, AA 256 Mechanics of Composites) Dynamics and Controls (AA 242A Classical Dynamics, AA 271A Dynamics and Control of Spacecraft and Aircraft, AA 279 Space Mechanics; ENGR 105 Feedback Control Design, ENGR 205 Introduction to Control Design Techniques) Systems Design (AA 241A Introduction to Aircraft Design, Synthesis, and Analysis, AA 241B Introduction to Aircraft Design, Synthesis, and Analysis, AA 236A Spacecraft Design, AA 236B Spacecraft Design Laboratory)
- 3 Electives are to be approved by the adviser, and might be from the depth area lists or other upper-division Engineering courses.

## Aeronautics and Astronautics (AA) Minor

The Aero/Astro minor introduces undergraduates to the key elements of modern aerospace systems. Within the minor, students may focus on aircraft, spacecraft, or disciplines relevant to both. The course requirements for the minor are described in detail below. Courses cannot be double-counted within a major and a minor, or within multiple minors; if necessary, the Aero/Astro adviser can help select substitute courses to fulfill the AA minor core.

The following core courses fulfill the minor requirements:

		<b>Units</b>
AA 100	Introduction to Aeronautics and Astronautics	3
ENGR 14	Intro to Solid Mechanics *	4
ENGR 15	Dynamics *	3
ENGR 30	Engineering Thermodynamics *	3
ME 70	Introductory Fluids Engineering	4
ME 131A	Heat Transfer	3-4

Two courses from one of the upper-division elective areas below (min. 6 units)

Plus one course from a second area below (min. 3 units) 9-11

### Aerospace Systems Synthesis/Design (0)

AA 236A & AA 236B	Spacecraft Design and Spacecraft Design Laboratory
AA 241A & AA 241B	Introduction to Aircraft Design, Synthesis, and Analysis and Introduction to Aircraft Design, Synthesis, and Analysis

### Dynamics and Controls (0)

AA 242A	Classical Dynamics
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AA 271A	Dynamics and Control of Spacecraft and Aircraft
AA 279	Space Mechanics
ENGR 105	Feedback Control Design
ENGR 205	Introduction to Control Design Techniques
<b>Fluids (0)</b>	
AA 200	Applied Aerodynamics
AA 210A	Fundamentals of Compressible Flow
AA 214A or AA 283	Introduction to Numerical Methods for Engineering Aircraft and Rocket Propulsion
<b>Structures (0)</b>	
AA 240A	Analysis of Structures
AA 240B	Analysis of Structures
AA 256	Mechanics of Composites

\* ENGR 14 Intro to Solid Mechanics, ENGR 15 Dynamics, or ENGR 30 Engineering Thermodynamics are waived as minor requirements if already taken as part of the major.

## Coterminal Degrees Program in Aeronautics and Astronautics

This special program allows Stanford undergraduates an opportunity to work simultaneously toward a B.S. in another field and an M.S. in Aeronautics and Astronautics. General requirements for this program and admissions procedures are described in the "School of Engineering" section of this bulletin. Admission is granted or denied through the departmental faculty Admissions and Awards Committee. A coterminal student must meet the course and scholarship requirements detailed for the M.S. below.

For University coterminal degree program rules and University application forms, see <http://registrar.stanford.edu/shared/publications.htm#Coterm>.

## Master of Science in Aeronautics and Astronautics

The University's basic requirements for the master's degree are outlined in the "Graduate Degrees" section of this bulletin. Students with an aeronautical engineering background should be able to qualify for the master's degree in three quarters of work at Stanford. Students with a bachelor's degree in Physical Science, Mathematics, or other areas of Engineering may find it necessary to take certain prerequisite courses, which would lengthen the time required to obtain the master's degree. The following are departmental requirements.

## Grade Point Averages

A minimum grade point average (GPA) of 2.75 is required to fulfill the department's M.S. degree requirements; a minimum GPA of 3.5 is required for eligibility to attempt the Ph.D. qualifying examination. It is incumbent upon both M.S. and potential Ph.D. candidates to request letter grades in all courses except those that do not offer a letter grade option and those that fall into the categories of colloquia and seminars (for example, ENGR 298 Seminar in Fluid Mechanics). Insufficient grade points on which to base the GPA may delay expected degree conferral or result in refusal of permission to take the qualifying examinations.

## Course Requirements

The Master of Science (M.S.) program is a terminal degree program. It is based on the completion of lecture courses focused on a theme within the discipline of Aeronautics and Astronautics engineering. No thesis is required. No research is required.

The Master's degree program requires 45 quarter units of course work, which must be taken at Stanford. The course work is divided into four categories

- Basic Courses
- Mathematics Courses
- Technical Electives
- Other Electives

## Basic Courses

M.S. candidates must select eight courses as follows:

(I) Five courses in the basic areas of Aeronautics and Astronautics (one in each area):

Fluids		Units
AA 200	Applied Aerodynamics	3
AA 210A	Fundamentals of Compressible Flow	3
Structures		
AA 240A	Analysis of Structures	3
Guidance and Control		
ENGR 105	Feedback Control Design	3
ENGR 205	Introduction to Control Design Techniques	3
Propulsion		
AA 283	Aircraft and Rocket Propulsion	3
Experimentation/Design Requirements (see courses under Related Courses tab above)		

(II) Three courses (one each from three of the four areas below)

Fluids		Units
AA 200	Applied Aerodynamics	3
AA 210A	Fundamentals of Compressible Flow	3
Structures		
AA 240B	Analysis of Structures	3
AA 256	Mechanics of Composites	3
Guidance and Control		
AA 242A	Classical Dynamics	3
AA 271A	Dynamics and Control of Spacecraft and Aircraft	3
AA 272C	Global Positioning Systems	3
AA 279	Space Mechanics	3

One course selected from AA courses numbered 200 and above, excluding seminars and independent research

Candidates who believe they have satisfied a basic course requirement in previous study may request a waiver of one or more courses (see "Waivers and Transfer Credits" in the "Graduate Programs in Aeronautics and Astronautics" section of this bulletin).

## Mathematics Courses

M.S. candidates are expected to exhibit competence in applied mathematics. Students meet this requirement by taking a minimum of 6 units of either advanced mathematics offered by the Mathematics Department or technical electives that strongly emphasize applied mathematics. Common choices include:

AA 214A Introduction to Numerical Methods for Engineering

AA 214B Numerical Methods for Compressible Flows

AA 214C Numerical Computation of Viscous Flow

CME 200 Linear Algebra with Application to Engineering Computations

CME 204 Partial Differential Equations in Engineering

EE 263 Introduction to Linear Dynamical Systems

CME 108 Introduction to Scientific Computing

STATS 110 Statistical Methods in Engineering and the Physical Sciences

STATS 116 Theory of Probability

MATH 115 Functions of a Real Variable

MATH 120 Groups and Rings

See the list of mathematics courses under Related Courses tab above for additional suggestions. All courses in the Mathematics Department numbered 200 or above are also included as suggestions.

## Technical Electives

Students, in consultation with their advisers, select at least four courses (totaling at least 12 units) from among the graduate-level courses offered by departments of the School of Engineering and related science departments. Normally, one course (3 units) may be directed research.

## Other Electives

It is recommended that all candidates enroll in a humanities or social sciences course to complete the 45-unit requirement. Practicing courses in, for example, art, music, and physical education do not qualify in this category. Language courses may qualify.

## Master of Science in Engineering (AA)

Students whose career objectives require a more interdepartmental or narrowly focused program than is possible in the M.S. program in Aeronautics and Astronautics (AA) may pursue a program for an M.S. degree in Engineering (45 units). This program is described in the "Graduate Programs in the School of Engineering" section of this bulletin.

Sponsorship by the Department of Aeronautics and Astronautics in this more general program requires that the student file a proposal before completing 18 units of the proposed graduate program. The proposal must be accompanied by a statement explaining the objectives of the program and how the program is coherent, contains depth, and fulfills a well-defined career objective. The proposed program must include at least 12 units of graduate-level work in the department and meet rigorous standards of technical breadth and depth comparable to the regular AA Master of Science program. The grade and unit requirements are the same as for the M.S. degree in Aeronautics and Astronautics.

## Engineer in Aeronautics and Astronautics

The degree of Engineer represents an additional year (or more) of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master's degree alone. It is expected that full-time students will be able to complete the degree within two years of study after the master's degree.

The University's basic requirements for the degree of Engineer are outlined in the "Graduate Degrees" section of this bulletin. The following are department requirements.

The candidate's prior study program should have fulfilled the department's requirements for the master's degree or a substantial equivalent. Beyond the

master's degree, a total of 45 units of work is required, including a thesis and a minimum of 30 units of courses chosen as follows:

1. 24 units of approved technical electives, of which 9 are in mathematics or applied mathematics. See the list of mathematics courses under Related Courses tab above. All courses in the Mathematics Department numbered 200 or above are included. The remaining 15 units are chosen in consultation with the adviser, and represent a coherent field of study related to the thesis topic. Suggested fields include: (a) acoustics, (b) aerospace structures, (c) aerospace systems synthesis and design, (d) analytical and experimental methods in solid and fluid mechanics, (e) computational fluid dynamics, and (f) guidance and control.
2. 6 units of free electives.
3. The remaining 15 units may be thesis, research, technical courses, or free electives.

Candidates for the degree of Engineer are expected to have a minimum grade point average (GPA) of 3.0 for work in courses beyond those required for the master's degree. All courses except seminars and directed research should be taken for a letter grade.

## Doctor of Philosophy in Aeronautics and Astronautics

The University's basic requirements for the Ph.D. degree are outlined in the "Graduate Degrees (p. 38)" section of this bulletin. Department requirements are stated below.

Qualifications for candidacy for the doctoral degree are contingent on:

1. Having fulfilled department requirements for the master's degree or its substantial equivalent.
2. Maintaining a high scholastic record for graduate course work.
3. Completing 3 units of a directed research problem (AA 290 Problems in Aero/Astro).
4. In the first year of doctoral study, passing an oral Ph.D. qualifying examination given by the department during Autumn and Spring quarters.

Detailed information about the deadlines, nature, and scope of the Ph.D. qualifying examination can be obtained from the department. Research on the doctoral dissertation may not be formally started before passing this examination.

### Course Requirements

Each individual Ph.D. program in Aeronautics and Astronautics, designed by the student in consultation with the adviser, should represent a strong and cohesive program reflecting the student's major field of interest. A total of 90 units of work is required beyond the master's degree, including a minimum of 36 units of approved formal course work (excluding research, directed study, and seminars). The courses should consist primarily of graduate courses in engineering and related sciences. The remainder of the 90 units may be in the form of either Ph.D. dissertation units or free electives. For students who elect a minor in another department, a maximum of 12 units from the minor program may be included in the 36 units of formal course work; the remaining minor units may be considered free electives and are included in the 90 unit total required for the AA Ph.D. degree.

Ph.D. students in Aeronautics and Astronautics must take 12 units of mathematics courses, with at least 6 of these units from courses with numbers over 200. The AA department and other engineering departments offer many courses that have sufficient mathematical content that they may

be used to satisfy the mathematics requirement. See the list of mathematics courses under Related Courses tab above for suggestions. Others may be acceptable if approved by the adviser and the AA Student Services Office. University requirements for continuous registration apply to doctoral students for the duration of the degree.

### Candidacy

Ph.D. students must complete the candidacy process and be admitted to candidacy by their second year of doctoral study. There are two requirements for admission to Ph.D. candidacy in Aeronautics and Astronautics: students must first pass the departmental qualifying exam and must then submit an application for candidacy. Detailed deadlines for the qualifying exam may be obtained from the AA Student Services Office. The candidacy form lists the courses the student will take to fulfill the requirements for the degree. The form must include the 90 non-MS units required for the Ph.D.; it should be signed by the adviser and submitted to the AA Student Services Office for the candidacy chairman's signature. AA has a department-specific candidacy form, which may be obtained in the AA Student Services Office. Candidacy is valid for five years; this term is not affected by leaves of absence.

### Dissertation Reading Committee

Each Ph.D. candidate is required to establish a reading committee for the doctoral dissertation within six months after passing the department's Ph.D. qualifying exam. Thereafter, the student should consult frequently with all members of the committee about the direction and progress of the dissertation research.

A dissertation reading committee consists of the principal dissertation adviser and at least two other readers. If the principal adviser is emeritus, there should be a non-emeritus co-adviser. Reading committees in Aeronautics and Astronautics often include faculty from another department. It is expected that at least two members of the AA faculty be on each reading committee. If the principal research adviser is not within the AA department, then the student's AA academic adviser should be one of those members. The initial committee, and any subsequent changes, must be approved by the department Chair.

Although all readers are usually members of the Stanford Academic Council, the department Chair may approve one non-Academic Council reader if the person brings unusual and necessary expertise to the dissertation research. Generally, this non-Academic Council reader will be a fourth reader, in addition to three Academic Council members.

### University Oral and Dissertation

The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing), but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University oral committee (four faculty examiners, plus a chairman). The examiners usually include the three members on the student's Ph.D. reading committee. The chairman must not be in the same department as the student or the adviser. Once the oral has been passed, the student finalizes the dissertation for reading committee review and final approval. Forms for the University oral scheduling and a one-page dissertation abstract should be submitted to the AA Student Services Office at least three weeks prior to the date of the oral for departmental review and approval. Students must be enrolled during the quarter when they take their University oral. If the oral takes place during the vacation time between quarters, the student must be enrolled in the prior quarter.

# Ph.D. Minor in Aeronautics and Astronautics

A student who wishes to obtain a Ph.D. minor in Aeronautics and Astronautics should consult the department office for designation of a minor adviser. A minor in Aeronautics and Astronautics may be obtained by completing 20 units of graduate-level courses in the Department of Aeronautics and Astronautics, following a program (and performance) approved by the department's candidacy chair.

The student's Ph.D. reading committee and University oral committee must each include at least one faculty member from Aeronautics and Astronautics.

*Emeriti: (Professors)* Peter Bradshaw, Arthur E. Bryson, Robert H. Cannon, Richard Christensen,\* Daniel B. DeBra,\* Robert W. MacCormack,\* Bradford W. Parkinson,\* J. David Powell,\* George S. Springer, Charles R. Steele, Stephen W. Tsai,\* Walter G. Vincenti

*Chair:* Charbel Farhat

*Professors:* Brian J. Cantwell, Fu-Kuo Chang, Per Enge, Charbel Farhat, Antony Jameson, Sanjiva Lele, Stephen Rock

*Research Professors:* Ilan Kroo, Claire Tomlin

*Associate Professors:* Juan Alonso, Sanjay Lall

*Assistant Professors:* Sigrid Close, Marco Pavone, Debbie Senesky

*Courtesy Professors:* J. Christian Gerdes, Ronald K. Hanson, Lambertus Hesselink

*Consulting Professors:* G. Scott Hubbard, Andrew Kalman, Arif Karabeyoglu, James Spilker

*Consulting Assistant Professor:* Andrew Barrows, Steven Murray, Frank Van Diggelen

*Lecturer:* Gregory Zilliac

\* Recalled to active duty.

## Experimentation/Design Requirements Courses

The following courses satisfy the master's Experimentation/Design Requirements.

		Units
AA 236A	Spacecraft Design	3-5
AA 241X	Design, Construction, and Testing of Autonomous Aircraft	3
AA 284B	Propulsion System Design Laboratory	3
CS 225A	Experimental Robotics	3
CS 402L	Beyond Bits and Atoms - Lab	1-3
EE 133	Analog Communications Design Laboratory	3-4
EE 233	Analog Communications Design Laboratory	3-4
EE 234	Photonics Laboratory	3
EE 265	Digital Signal Processing Laboratory	3-4
EE 345	Optical Fiber Communication Laboratory	3
EE 410	Integrated Circuit Fabrication Laboratory	3-4
EE 412	Advanced Nanofabrication Laboratory	3
ENGR 206	Control System Design	3-4
ENGR 207A	Linear Control Systems I	3
ENGR 341	Micro/Nano Systems Design and Fabrication	3-5
MATSCI 160	Nanomaterials Laboratory	4

MATSCI 161	Nanocharacterization Laboratory	3-4
MATSCI 162	X-Ray Diffraction Laboratory	3-4
MATSCI 163	Mechanical Behavior Laboratory	3-4
MATSCI 164	Electronic and Photonic Materials and Devices Laboratory	4
MATSCI 171	Nanocharacterization Laboratory	3-4
MATSCI 172	X-Ray Diffraction Laboratory	3-4
MATSCI 173	Mechanical Behavior Laboratory	3-4
MATSCI 322	Transmission Electron Microscopy Laboratory	3
ME 210	Introduction to Mechatronics	4
ME 218A	Smart Product Design Fundamentals	4-5
ME 218B	Smart Product Design Applications	4-5
ME 218C	Smart Product Design Practice	4-5
ME 218D	Smart Product Design: Projects	3-4
ME 220	Introduction to Sensors	3-4
ME 310A	Project-Based Engineering Design, Innovation, and Development	4
ME 310B	Project-Based Engineering Design, Innovation, and Development	4
ME 310C	Project-Based Engineering Design, Innovation, and Development	4
ME 324	Precision Engineering	4
ME 348	Experimental Stress Analysis	3
ME 354	Experimental Methods in Fluid Mechanics	4
ME 367	Optical Diagnostics and Spectroscopy Laboratory	4
ME 382A	Biomedical Engineering in Research and Development	4
ME 382B	Medical Device Design	4
ME 385	Tissue Engineering Lab	1-2

## Mathematics Courses

Each Aero/Astro degree has a mathematics requirement, for which courses on the following list are pre-approved. (Other advanced courses may also be acceptable.) Students should consult with their advisers in selecting the most appropriate classes for their field. M.S. candidates select 2 courses; they may also use the mathematics courses listed as common choices in the master's degree course requirements. Engineers select 3 courses; Ph.D. candidates select 4 courses, with at least 6 units from courses numbered above 200.

		Units
AA 214A	Introduction to Numerical Methods for Engineering	3
AA 214B	Numerical Methods for Compressible Flows	3
AA 214C	Numerical Computation of Viscous Flow	3
AA 215A	Advanced Computational Fluid Dynamics	3
AA 215B	Advanced Computational Fluid Dynamics	3
AA 218	Introduction to Symmetry Analysis	3
AA 222	Introduction to Multidisciplinary Design Optimization	3
CEE 281	Mechanics and Finite Elements	3
CME 108	Introduction to Scientific Computing	3-4
CME 306	Numerical Solution of Partial Differential Equations	3
CME 326	Numerical Methods for Initial Boundary Value Problems	3
EE 261	The Fourier Transform and Its Applications	3
EE 263	Introduction to Linear Dynamical Systems	3
EE 264	Digital Signal Processing	3

EE 278B	Introduction to Statistical Signal Processing	3
EE 364A	Convex Optimization I	3
EE 364B	Convex Optimization II	3
ENGR 207B	Linear Control Systems II	3
ENGR 209A	Analysis and Control of Nonlinear Systems	3
MATH 113	Linear Algebra and Matrix Theory	3
MATH 115	Functions of a Real Variable	3
MATH 120	Groups and Rings	3
MATH 132	Partial Differential Equations II	3
ME 300A	Linear Algebra with Application to Engineering Computations	3
ME 300B	Partial Differential Equations in Engineering	3
ME 300C	Introduction to Numerical Methods for Engineering	3
ME 335A	Finite Element Analysis	3
ME 335B	Finite Element Analysis	3
ME 335C	Finite Element Analysis	3
ME 408	Spectral Methods in Computational Physics	3
ME 469	Computational Methods in Fluid Mechanics	3
ME 469B	Computational Methods in Fluid Mechanics	3
MS&E 201	Dynamic Systems	3-4
MS&E 211	Linear and Nonlinear Optimization	3-4
MS&E 311	Optimization	3
MS&E 312	Advanced Methods in Numerical Optimization	3
PHYSICS 211	Continuum Mechanics	3
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4-5
STATS 116	Theory of Probability	3-5
STATS 217	Introduction to Stochastic Processes	3

## Bioengineering

Mail Code: 94305-5444

Student Services Phone: Graduate students: (650) 736-2254;

Undergraduates: (650) 724-5314

Web Site: <http://bioengineering.stanford.edu>

Courses offered by the Department of Bioengineering are listed under the subject code BIOE on the *Stanford Bulletin's* ExploreCourses web site.

Bioengineering is jointly supported by the School of Engineering and the School of Medicine. The facilities and personnel of the Department of Bioengineering are housed in the James H. Clark Center, the William F. Durand Building for Space Engineering and Science, the William M. Keck Science Building, the Jerry Yang and Akiko Yamazaki Environment and Energy Building, and the Richard M. Lucas Center for Magnetic Resonance Spectroscopy and Imaging.

The departmental headquarters is in the James H. Clark Center for Biomedical Engineering and Sciences, along with approximately 600 faculty, staff, and students from more than 40 University departments. The Clark Center is also home to Stanford's Bio-X program, a collaboration of the Schools of Engineering, Medicine, Humanities and Sciences, and Earth Sciences.

Courses in the teaching program lead to the degrees of Master of Science and Doctor of Philosophy. The department collaborates in research and teaching programs with faculty members in Chemical Engineering, Mechanical Engineering, Electrical Engineering, and departments in the School of Medicine. Quantitative biology is the core science base of the department. The research and educational thrusts are in biomedical computation, biomedical imaging, biomedical devices, regenerative medicine, and cell/molecular engineering. The clinical dimension of the

department includes cardiovascular medicine, neuroscience, orthopedics, cancer care, neurology, and environment.

## Mission of the Undergraduate Program in Bioengineering

The mission of the Department of Bioengineering is to create a fusion of engineering and the life sciences that promotes scientific discovery and the development of new biomedical technologies and therapies through research and education. The Bioengineering (BioE) major enables students to embrace biology as a new engineering paradigm and apply engineering principles to medical problems and biological systems. Students who major in BioE obtain a solid background in the basic sciences (chemistry, physics, and biology) and mathematics. They take three engineering fundamentals courses including an introductory bioengineering course and computer programming. Starting in the sophomore year, BioE students take six core classes to gain essential knowledge to pursue a career in bioengineering and then have the opportunity to pursue elective courses suited to their own interests. The major prepares students to continue on to graduate or medical school; work in the biotechnology, medical device, medical imaging, or other medical and non-medical industries; or pursue advanced degrees in business or law.

The department offers an undergraduate major in Bioengineering (BIOE) leading to the B.S. degree in Engineering. An undergraduate major in Biomechanical Engineering and an undergraduate major in Biomedical Computation, both of which lead to the B.S. degree in Engineering, are available through the School of Engineering. For further information, see the *Handbook for Undergraduate Engineering Programs* at <http://ughb.stanford.edu>.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course work with specialization in an area of the field, including biomedical computation, regenerative medicine and tissue engineering, molecular and cell bioengineering, biomedical imaging, and biomedical devices.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Bioengineering and related fields.

## Graduate Programs in Bioengineering

The University's requirements for the M.S. and Ph.D. degrees are outlined in the "Graduate Degrees (p. 38)" section of this bulletin.

## Admission

Students are expected to enter with a series of core competencies in mathematics, biology, chemistry, physics, computing, and engineering. Students entering the program are assessed by the examination of their undergraduate transcripts and research experiences. Specifically, the department requires that students have completed mathematics through multivariable calculus and differential equations, completed a series of undergraduate biology courses (equivalent to the BIO 41 Genetics, Biochemistry, and Molecular Biology, BIO 42 Cell Biology and Animal

Physiology series) and completed physics, chemistry, and computer sciences courses required of all undergraduate majors in engineering.

Qualified applicants are encouraged to apply for predoctoral national competitive fellowships, especially those from the National Science Foundation. Applicants to the Ph.D. program should consult with their financial aid officers for information and applications.

The deadline for receiving applications is December 3, 2012.

Further information and application forms for all graduate degree programs may be obtained from Graduate Admissions, the Registrar's Office, <http://gradadmissions.stanford.edu>.

## Bachelor of Science in Engineering (Bioengineering)

The department offers an undergraduate major in Bioengineering (BioE) leading to the B.S. degree in Engineering. For additional information, see the *Handbook for Undergraduate Engineering Programs* at <http://ughb.stanford.edu>.

### Bioengineering (BioE)

Completion of the undergraduate program in Bioengineering leads to the conferral of the Bachelor of Science in Engineering. The subplan "Bioengineering" appears on the transcript and on the diploma.

### Mission of the Undergraduate Program in Bioengineering

The Stanford Bioengineering (BioE) major enables students to combine engineering and the life sciences in ways that advance scientific discovery, healthcare and medicine, manufacturing, environmental quality, culture, education, and policy. Students who major in BioE earn a fundamental engineering degree for which the raw materials, underlying basic sciences, fundamental toolkit, and future frontiers are all defined by the unique properties of living systems. Students will complete engineering fundamentals courses, including an introduction to BioE and computer programming. A series of core BioE classes beginning in the second year leads to a student-selected depth area and a capstone senior BioDesign project. The department also organizes a summer Research Experience for Undergraduates (REU) program. BioE graduates are well prepared to pursue careers and lead projects in research, medicine, business, law, and policy.

### Requirements

#### Mathematics (28-29) <sup>1</sup>

28 units minimum required, see Basic Requirement 1)		Units
MATH 41 & MATH 42	Calculus and Calculus (or AP Calculus)	10
CME 100	Vector Calculus for Engineers	5
CME 102	Ordinary Differential Equations for Engineers	5
CME 104	Linear Algebra and Partial Differential Equations for Engineers	5
CME 106	Introduction to Probability and Statistics for Engineers	3-4

#### Science (26) <sup>2</sup>

26 units minimum:		Units
CHEM 31X	Chemical Principles (or CHEM 31A and 31B)	4

CHEM 33	Structure and Reactivity	4
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4

#### Technology in Society (3)

One course required; see Basic Requirement 4

BIOE 131	Ethics in Bioengineering	3
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#### Engineering Fundamentals (12-14)

ENGR 70A	Programming Methodology (same as CS 106A)	5
ENGR 80	Introduction to Bioengineering	4

Fundamentals Elective; see UGHB Fig. 3-4 for approved course list; may not use ENGR 70B or ENGR 70X

#### Bioengineering Core (36)

BIOE 41	Physical Biology of Macromolecules	4
BIOE 42	Physical Biology of Cells	4
BIOE 44	Fundamentals for Engineering Biology Lab	4
BIOE 51	Anatomy for Bioengineers	4
BIOE 101	Systems Biology	4
BIOE 103	Systems Physiology and Design	4
BIOE 123	Optics and Devices Lab	4
BIOE 141A	Biodesign Project I	4
BIOE 141B	Biodesign Project II	4

#### Bioengineering Depth Electives (12)

Four courses, minimum 12 units:		Units
BIOE 212	Introduction to Biomedical Informatics Research Methodology	4
BIOE 214	Representations and Algorithms for Computational Molecular Biology	4
BIOE 220	Introduction to Imaging and Image-based Human Anatomy	4
BIOE 222A	Multimodality Molecular Imaging in Living Subjects I	4
BIOE 222B	Multimodality Molecular Imaging in Living Subjects II	4
BIOE 244	Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems	4
BIOE 261	Principles and Practice of Stem Cell Engineering	4
BIOE 281	Biomechanics of Movement	4
BIOE 311	Biophysics of Multi-cellular Systems and Amorphous Computers	4
BIOE 332	Large-Scale Neural Modeling	4

Total Units 117-120

- It is strongly recommended that CME 100 Vector Calculus for Engineers, CME 102 Ordinary Differential Equations for Engineers, and CME 104 Linear Algebra and Partial Differential Equations for Engineers be taken rather than MATH 51 Linear Algebra and Differential Calculus of Several Variables, MATH 52 Integral Calculus of Several Variables, and MATH 53 Ordinary Differential Equations with Linear Algebra. CME 106 Introduction to Probability and Statistics for Engineers should be taken rather than STATS 110 Statistical Methods in Engineering and the Physical Sciences or STATS 141 Biostatistics
- Science must include both Chemistry (CHEM 31A Chemical Principles I and CHEM 31B Chemical Principles II; or CHEM 31X Chemical Principles or ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology) and calculus-based Physics, with two quarters of course work in each, in addition to two courses of BIO core. CHEM 31A Chemical Principles I and CHEM 31B Chemical Principles II are considered one course even though given over two quarters. Premeds should take Chemistry, not ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/bioengineering/http://ughb.stanford.edu>). Students pursuing a premed program need to take additional courses; see the UGHB, BioE Premed 4-Year Plan.

## Coterminal B.S./M.S. Program in Bioengineering

This option is available to outstanding Stanford undergraduates who wish to work simultaneously toward a B.S. in another field and an M.S. in Bioengineering. The degrees may be granted simultaneously or at the conclusion of different quarters, though the bachelor's degree cannot be awarded after the master's degree has been granted. The University minimum requirements for the coterminal bachelor's/master's program are 180 units for the bachelor's degree plus 45 unduplicated units for the master's degree. Students may apply for the coterminal B.S. and M.S. program after 120 undergraduate units have been completed, and they must be accepted into our program one quarter before receiving the B.S. degree. Students should apply directly to the Bioengineering Student Service Office by December 3, 2012. Students interested in the coterminal degree must take the Graduate Record Examination (GRE); applications may be obtained at <http://www.gre.org>. Prospective applicants should see the application form, instructions, and supporting documents at <http://bioengineering.stanford.edu/education/coterminal.html>. University regulations and forms concerning coterminal degree programs are available at <http://registrar.stanford.edu/shared/publications.htm#Coterm>.

The application must provide evidence of potential for strong academic performance as a graduate student. The application is evaluated and acted upon by the graduate admissions committee of the department. Students are expected to enter with a series of core competencies in mathematics, biology, chemistry, physics, computing, and engineering. Typically, a GPA of at least 3.5 in engineering, science, and math is expected.

## Master of Science in Bioengineering

The Master of Science in Bioengineering requires 45 units of course work. The curriculum consists of core bioengineering courses, technical electives, seminars and unrestricted electives. Core courses focus on quantitative biology and biological systems analysis. Approved technical electives are chosen by the student in consultation with his/her graduate adviser, and

can be selected from graduate course offerings in mathematics, statistics, engineering, physical sciences, life sciences, and medicine. Seminars highlight emerging research in bioengineering and provide training in research ethics. Unrestricted electives can be freely chosen by the student in association with his/her adviser.

## Requirements

The department's requirements for the M.S. in Bioengineering are:

### 1. Core Bioengineering courses (9 units)

the following courses are required:

		Units
BIOE 300A	Molecular and Cellular Bioengineering	3
BIOE 300B	Physiology and Tissue Engineering	3
BIOE 301A	Molecular and Cellular Engineering Lab	2
BIOE 301B	Clinical Needs and Technology	1
Total Units		9

These courses, together with the approved technical electives, should form a cohesive course of study that provides depth and breadth.

### 2. Approved Technical Electives (26 units)

These units must be selected from graduate courses in mathematics, statistics, engineering, physical science, life science, and medicine. They should be chosen in concert with the bioengineering courses to provide a cohesive degree program in a bioengineering focus area. Students are required to take at least one course in some area of device or instrumentation. Up to 9 units of directed study and research may be used as approved electives.

### 3. Seminars (4 units)

The seminar units should be fulfilled through:

		Units
BIOE 390	Introduction to Bioengineering Research	2
BIOE 393	Bioengineering Departmental Research Colloquium	1
MED 255	The Responsible Conduct of Research	1
Total Units		4

Other relevant seminar units may also be used with the approval of the faculty adviser. One of the seminar units must be MED 255 The Responsible Conduct of Research.

### 4. Unrestricted Electives (6 units).

Students are assigned an initial faculty adviser to assist them in designing a plan of study that creates a cohesive degree program with a concentration in a particular bioengineering focus area. These focus areas include, but are not limited to: Biomedical Computation, Regenerative Medicine/Tissue Engineering, Molecular and Cell Bioengineering, Biomedical Imaging, and Biomedical Devices.

To ensure that an appropriate program is pursued by all M.S. candidates, students who first matriculate at Stanford at the graduate level must:

- submit an adviser-approved Program Proposal for a Master's Degree form to the student services office during the first month of the first quarter of enrollment
- obtain approval from the M.S. adviser and the Chair of Graduate Studies for any subsequent program change or changes.

It is expected that the requirements for the M.S. in Bioengineering can be completed within approximately one year. There is no thesis requirement for the M.S.

Due to the interdisciplinary nature of Bioengineering; a number of courses are offered directly through the Bioengineering Department, but many are available through other departments. See respective ExploreCourses for course descriptions.

## Doctor of Philosophy in Bioengineering

A student studying for the Ph.D. degree must complete a master's degree (45 units) comparable to that of the Stanford M.S. degree in Bioengineering. Up to 45 units of master's degree residency units may be counted towards the degree. The Ph.D. degree is awarded after the completion of a minimum of 135 units of graduate work as well as satisfactory completion of any additional University requirements. Students admitted to the Ph.D. program with an M.S. degree must complete at least 90 units of work at Stanford. The maximum number of transfer units is 45.

On the basis of the research interests expressed in their application, students are assigned an initial faculty adviser who assists them in choosing courses and identifying research opportunities. The department does not require formal lab rotations, but students are encouraged to explore research activities in two or three labs during their first academic year.

Prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of bioengineering fundamentals and a potential for research by passing a qualifying oral examination.

Typically, the exam is taken shortly after the student earns a master's degree. The student is expected to have a nominal graduate Stanford GPA of 3.25 to be eligible for the exam. Once the student's faculty sponsor has agreed that the exam is to take place, the student must submit an application folder containing items including a curriculum vitae, research project abstract, and preliminary dissertation proposal to the student services office. Information about the exam may be obtained from the student services office.

In addition to the course requirements of the M.S. degree, doctoral candidates must complete a minimum of 15 additional units of approved formal course work (excluding research, directed study, and seminars).

### Dissertation Reading Committee

Each Ph.D. candidate is required to establish a reading committee for the doctoral dissertation within six months after passing the department's Ph.D. qualifying exams. Thereafter, the student should consult frequently with all members of the committee about the direction and progress of the dissertation research.

A dissertation reading committee consists of the principal dissertation adviser and at least two other readers. Reading committees in Bioengineering may include faculty from another department. It is expected that at least one member of the Bioengineering faculty be on each reading committee. The initial committee, and any subsequent changes, must be officially approved by the department Chair.

### University Oral and Dissertation

The Ph.D. candidate is required to take the University oral examination after the dissertation is substantially completed (with the dissertation draft in writing), but before final approval. The examination consists of a public presentation of dissertation research, followed by substantive private questioning on the dissertation and related fields by the University oral committee (four selected faculty members, plus a chair from another department). Once the oral has been passed, the student finalizes the dissertation for reading committee review and final approval. Forms for the University oral scheduling and a one-page dissertation abstract should

be submitted to the department student services office at least three weeks prior to the date of the oral for departmental review and approval.

## Ph.D. Minor in Bioengineering

Doctoral students pursuing a Ph.D. degree in a major other than Bioengineering may apply for the Ph.D. minor in Bioengineering. A minor is not a requirement for any degree, but is available when agreed upon by the student and the major and minor department.

Application forms, including the University's general requirements, can be found at <http://registrar.stanford.edu/shared/forms.htm>.

A student desiring a Ph.D. minor in Bioengineering must have a minor program advisor who is a regular Bioengineering faculty member. This advisor must be a member of the student's reading committee for the doctoral dissertation, and the entire reading committee must meet at least one year prior to the date of the student's dissertation defense.

The Ph.D. minor program must include at least 20 units of course work in Stanford Bioengineering or Bioengineering cognate courses at or above the 200 level. Of these 20 units, no more than 10 can be in cognate courses. All courses listed to fulfill the 20-unit requirement must be taken for a letter grade and the GPA must be at least 3.25. Courses used for a minor may not be used to also meet the requirements for a master's degree.

### M.D./Ph.D. Dual Degree Program

Students interested in a career oriented towards bioengineering and medicine can pursue the combined M.D./Ph.D. degree program. Stanford has two ways to do an M.D./Ph.D. U.S. citizens and permanent residents can apply to the Medical Scientist Training Program and can be accepted with funding from both M.D. and Ph.D. programs for stipend and tuition. They can then select a bioengineering laboratory for their Ph.D. Students not admitted to the Medical Scientist Training Program must apply to be admitted separately to the M.D. program and the Ph.D. program of their choice.

The Ph.D. is administered by the Department of Bioengineering. To be formally admitted as a Ph.D. degree candidate in this combined degree program, the student must apply through normal departmental channels and must have earned or have plans to earn an M.S. in bioengineering or other engineering discipline at Stanford or another university. The M.S. requires 45 units of course work which consists of core bioengineering courses, technical electives, seminars, and 6 unrestricted units. Students must also pass the Department of Bioengineering Ph.D. qualifying examination.

For students fulfilling the full M.D. requirements who earned their master's level engineering degree at Stanford, the Department of Bioengineering waives the normal departmental requirement of 15 units applied towards the Ph.D. degree beyond the master's degree level through formal course work. Consistent with the University Ph.D. requirements, the department accepts 15 units comprised of courses, research, or seminars approved by the student's academic adviser and the department chair. Students not completing their M.S. engineering degree at Stanford are required to take 15 units of formal course work in engineering-related areas as determined by their academic adviser.

## Joint Degree Programs in Bioengineering and the School of Law

The School of Law and the Department of Bioengineering offer joint programs leading to either a J.D. degree combined with an M.S. degree in Bioengineering or to a J.D. degree combined with a Ph.D. in Bioengineering.



The J.D./M.S. and J.D./Ph.D. degree programs are designed for students who wish to prepare themselves intensively for careers in areas relating to both law and bioengineering. Students interested in either joint degree program must apply and gain entrance separately to the School of Law and the Department of Bioengineering and, as an additional step, must secure permission from both academic units to pursue degrees in those units as part of a joint degree program. Interest in either joint degree program should be noted on the student's admission applications and may be considered by the admission committee of each program. Alternatively, an enrolled student in either the Law School or the Bioengineering Department may apply for admission to the other program and for joint degree status in both academic units after commencing study in either program.

Joint degree students may elect to begin their course of study in either the School of Law or the Department of Bioengineering. Faculty advisers from each academic unit will participate in the planning and supervising of the student's joint program. Students must be enrolled full time in the Law School for the first year of law school, and, at some point during the joint program, may be required to devote one or more quarters largely or exclusively to studies in the Bioengineering program regardless of whether enrollment at that time is in the Law School or in the Department of Bioengineering. At all other times, enrollment may be in the graduate school or the Law School, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. and the M.S. or Ph.D. degrees as specified in the *Stanford Bulletin* or elsewhere.

The Law School shall approve courses from the Bioengineering Department that may count toward the J.D. degree, and the Bioengineering Department shall approve courses from the Law School that may count toward the M.S. or Ph.D. degree in Bioengineering. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program. The lists may differ depending on whether the student is pursuing an M.S. or a Ph.D. in Bioengineering.

In the case of a J.D./M.S. program, no more than 45 units of approved courses may be counted toward both degrees. In the case of a J.D./Ph.D. program, no more than 54 units of approved courses may be counted toward both degrees. In either case, no more than 36 units of courses that originate outside the Law School may count toward the law degree. To the extent that courses under this joint degree program originate outside of the Law School but count toward the law degree, the law school credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis, but not below zero. The maximum number of law school credits that may be counted toward the M.S. or Ph.D. in Bioengineering is the greater of: (i) 15 units; or (ii) the maximum number of units from courses outside of the department that M.S. or Ph.D. candidates in Bioengineering are permitted to count toward the applicable degree under general departmental guidelines or in the case of a particular student's individual program. Tuition and financial aid arrangements will normally be through the school in which the student is then enrolled.

*Chair:* Norbert J. Pelc

*Professors:* Russ B. Altman, Annelise E. Barron, Dennis R. Carter, Scott L. Delp, Norbert J. Pelc, Stephen R. Quake, Matthew Scott, James R. Swartz, Paul Yock

*Associate Professors:* Kwabena Boahen, Karl Deisseroth, Christina D. Smolke

*Assistant Professors:* Zev David Bryant, David B. Camarillo, Jennifer R. Cochran, Markus Willard Covert, Andrew Endy, Kerwyn C. Huang, Jin Hyung Lee, Michael Lin, Manu Prakash, Ingmar Riedel-Kruse, Fan Yang

*Courtesy Professors:* Daniel S. Fisher, Sanjiv Sam Gambhir, Stuart B. Goodman, Thomas Krummel, Craig Levin, Michael T. Longaker, Stefanos Zenios, Paul J. Wang, Stefanos Zenios

*Courtesy Associate Professors:* Jeffrey A. Feinstein, Garry E. Gold, Kim Butts Pauly, Marc E. Levenston, Sakti Srivastava

*Courtesy Assistant Professors:* Sarah Heilshorn, Ellen Kuhl,

*Student Services:* Clark Center, Room S-165

## Cognate Courses

		Units
BIOC 218	Computational Molecular Biology	3
BIOMEDIN 210	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
BIOMEDIN 217	Translational Bioinformatics	4
CHEMENG 450	Advances in Biotechnology	3
EE 369A	Medical Imaging Systems I	3
EE 369B	Medical Imaging Systems II	3
ME 280	Skeletal Development and Evolution	3
ME 287	Mechanics of Biological Tissues	3
ME 381	Orthopaedic Bioengineering	3
ME 382A	Biomedical Engineering in Research and Development	4
RAD 226	In Vivo Magnetic Resonance Spectroscopy and Imaging	3

## Chemical Engineering

Courses offered by the Department of Chemical Engineering are listed under the subject code CHEMENG on the *Stanford Bulletin's* ExploreCourses web site.

Research investigations are currently being carried out in the following fields: applied statistical mechanics, biocatalysis, bioengineering, biophysics, colloid science, computational materials science, electronic materials, hydrodynamic stability, kinetics and catalysis, Newtonian and non-Newtonian fluid mechanics, polymer science, renewable energy, rheo-optics of polymeric systems, and surface and interface science. Additional information may be found at <http://cheme.stanford.edu>.

The Department of Chemical Engineering offers opportunities for both undergraduates and graduate students to pursue course work in interdisciplinary biosciences, which include the chemical, biological, physical, mathematical, and engineering sciences. Courses include:

		Units
CHEMENG 25B	Biotechnology	3
CHEMENG 150	Biochemical Engineering	3
CHEMENG 181/283	Biochemistry I	3
CHEMENG 185B	Chemical Engineering Laboratory B	4
CHEMENG 355	Advanced Biochemical Engineering	3
CHEMENG 450	Advances in Biotechnology	3
CHEMENG 454	Synthetic Biology and Metabolic Engineering	3
CHEMENG 456	Microbial Bioenergy Systems	3
Total Units		25

In addition, students seeking a broad introduction to current topics in the interdisciplinary biosciences and engineering should consider CHEMENG 459 *Frontiers in Interdisciplinary Biosciences*, which covers emerging technologies and other subject matter at the intersection of engineering and biology, ranging from molecular to complex systems; see <http://biox.stanford.edu>. Students are encouraged to review course offerings in all departments of the School of Engineering.

Further information about the department may be found at <http://cheme.stanford.edu>. Undergraduates considering majoring in Chemical Engineering are encouraged to talk with faculty and meet with staff in the departmental student services office. Students interested in pursuing advanced work in chemical engineering, including coterminal degrees, should contact the department as well. Admission to the Master of Science program for an active undergraduate Stanford student is by approval of an Application for Admission to Coterminal Master's Program. Admission to an advanced degree program for an active Stanford graduate student is by approval of a Graduate Authorization Petition. All other students should go to <http://studentaffairs.stanford.edu/gradadmissions> for general and departmental information about the requirements and processes for applying for admission to a graduate degree program.

## Mission of the Undergraduate Program in Chemical Engineering

Chemical engineers are responsible for the conception and design of processes for the purpose of production, transformation, and transportation of materials. This activity begins with experimentation in the laboratory and is followed by implementation of the technology in full-scale production. The mission of the undergraduate program in Chemical Engineering is to develop students' understanding of the core scientific, mathematical, and engineering principles that serve as the foundation underlying these technological processes. The program's core mission is reflected in its curriculum which is built on a foundation in the sciences of chemistry, physics, and biology. Course work includes the study of applied mathematics, material and energy balances, thermodynamics, fluid mechanics, energy and mass transfer, separations technologies, chemical reaction kinetics and reactor design, and process design. The program provides students with excellent preparation for careers in the corporate sector and government or for advanced study.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able to demonstrate:

1. proficiency in and ability to apply knowledge of engineering and mathematics through differential equations, probability and statistics, and science including physics, chemistry, and biology.
2. ability to design and to conduct experiments, as well as to analyze and to interpret data.
3. ability to design a system, component, or process to meet desired needs.
4. ability to function on multidisciplinary teams.
5. ability to identify, formulate, and solve engineering problems.
6. professional and ethical responsibility.
7. ability to communicate effectively.
8. the broad education necessary to understand the impact of engineering solutions in a global and societal context.
9. recognition of the need for and an ability to engage in life-long learning.
10. knowledge of contemporary issues.
11. ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
12. the background for admission to engineering or other professional graduate programs.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through advanced course work in the fundamentals of the field, including microhydrodynamics, molecular thermodynamics, kinetics, spectroscopy, applied mathematics, and biochemical engineering, in addition to the student's area of specialization. All students must master the fundamental chemical, physical, and biological concepts that govern molecular behavior.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Chemical Engineering and related fields.

## Graduate Programs in Chemical Engineering

The University's requirements, including residency requirements, for the M.S., Engineer, and Ph.D. degrees are summarized in the "Graduate Degrees" section of this bulletin.

Current research and teaching activities cover a number of advanced topics in chemical engineering, including applied statistical mechanics, biocatalysis, biochemical engineering, bioengineering, biophysics, computational materials science, colloid science, dynamics of complex fluids, energy conversion, functional genomics, hydrodynamic stability, kinetics and catalysis, microrheology, molecular assemblies, nanoscience and technology, Newtonian and non-Newtonian fluid mechanics, polymer physics, protein biotechnology, renewable fuels, semiconductor processing, soft materials science, solar utilization, surface and interface science, and transport mechanics.

## Fellowships and Assistantships

Qualified predoctoral applicants are encouraged to apply for nationally competitive fellowships, for example, those from the National Science Foundation. Applicants to the Ph.D. program should consult with their financial aid officers for application information and advice. In the absence of other awards, incoming Ph.D. students normally are awarded departmental fellowships. Matriculated Ph.D. students are primarily supported by fellowship awards and assistantship appointments. All students are encouraged to apply for external, competitive fellowships and may obtain information about various awarding agencies from faculty advisers and student services. Assistantships are paid positions for graduate students that, in addition to a salary, provide the benefit of a tuition allocation. Individual faculty members appoint students to research assistantships; the department chair appoints doctoral students to teaching assistantships. Contact departmental student services for additional information.

## Bachelor of Science in Chemical Engineering

The University's basic requirements for the bachelor's degree and coterminal bachelor's and master's degrees are discussed in the "Undergraduate Degrees" section of this bulletin.

The Chemical Engineering B.S. program requires basic courses in biology, chemistry, engineering, mathematics, and physics. The depth sequence of courses required for the major in chemical engineering provides training in applied chemical kinetics, biochemical engineering, electronic materials,

engineering thermodynamics, plant design, polymers, process analysis and control, separation processes, and transport phenomena. Undergraduates who wish to major in the department should consult the curriculum outlined in the "Undergraduate Program in Chemical Engineering" section of this bulletin. Courses taken to fulfill the requirements for the major (courses in mathematics; science; technology and society; engineering fundamentals; and engineering depth) must be taken for a letter grade if this option is offered.

Representative sequences of courses leading to a B.S. in Chemical Engineering, in both flow chart and 4-year, quarter-by-quarter formats, can be found in the *Handbook for Undergraduate Engineering Programs*, available at <http://ughb.stanford.edu>. These are explanatory examples, with each sequence starting at a different level and demonstrating how a student, based on his or her pre-college preparation, can complete the major in four years. These typical course schedules are available as well from departmental student services and chemical engineering faculty advisers for undergraduates. It is recommended that students discuss their prospective programs with chemical engineering faculty advisers, especially if transferring from another major such as Biology, Chemistry, Physics, or another Engineering major. With advance planning, students can usually arrange to attend one of the overseas campuses.

Students interested in a minor in Chemical Engineering should consult the requirements for a "Minor in Chemical Engineering" section of this bulletin.

## Chemical Engineering (CHE)

Completion of the undergraduate program in Chemical Engineering leads to the conferral of the Bachelor of Science in Chemical Engineering.

### Mission of the Undergraduate Program in Chemical Engineering

Chemical engineers are responsible for the conception and design of processes for the purpose of production, transformation, and transportation of materials. This activity begins with experimentation in the laboratory and is followed by implementation of the technology in full-scale production. The mission of the undergraduate program in Chemical Engineering is to develop students' understanding of the core scientific, mathematical, and engineering principles that serve as the foundation underlying these technological processes. The program's core mission is reflected in its curriculum which is built on a foundation in the sciences of chemistry, physics, and biology. Course work includes the study of applied mathematics, material and energy balances, thermodynamics, fluid mechanics, energy and mass transfer, separations technologies, chemical reaction kinetics and reactor design, and process design. The program provides students with excellent preparation for careers in the corporate sector and government, or for graduate study.

### Requirements

	Units
<b>Mathematics (25) <sup>1</sup></b>	
MATH 41	Calculus 5
MATH 42	Calculus 5
Select one of the following:	5
CME 100	Vector Calculus for Engineers
MATH 51 & MATH 52	Linear Algebra and Differential Calculus of Several Variables and Integral Calculus of Several Variables
CME 102 or MATH 53	Ordinary Differential Equations for Engineers or Ordinary Differential Equations with Linear Algebra 5

CME 104 or CME 106	Linear Algebra and Partial Differential Equations for Engineers or Introduction to Probability and Statistics for Engineers	5
<b>Science (23) <sup>1</sup></b>		
CHEM 31X	Chemical Principles (or CHEM 31A and CHEM 31B)	4
CHEM 33	Structure and Reactivity	4
CHEM 35	Organic Monofunctional Compounds	4
CHEM 36	Organic Chemistry Laboratory I	3
PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
<b>Technology in Society (3-5)</b>		
One course required, see Basic Requirement 4		3-5
<b>Engineering Fundamentals (9-11)</b>		
Three courses minimum; see Basic Requirement 3		
ENGR/CHEMENG 20	Introduction to Chemical Engineering	3
Select one of the following:		3
ENGR/CHEMENG 25B	Biotechnology	
ENGR/CHEMENG 25E	Energy: Chemical Transformations for Production, Storage, and Use	
Fundamentals Elective		3-5
<b>Chemical Engineering Depth (60)</b>		
Minimum 68 Engineering Science and Design units; see Basic Requirement 5		
CHEMENG 10	The Chemical Engineering Profession	1
CHEMENG 100	Chemical Process Modeling, Dynamics, and Control	3
CHEMENG 110	Equilibrium Thermodynamics	3
CHEMENG 120A	Fluid Mechanics	4
CHEMENG 120B	Energy and Mass Transport	4
CHEMENG 130	Separation Processes	3
CHEMENG 150	Biochemical Engineering	3
CHEMENG 170	Kinetics and Reactor Design	3
CHEMENG 180	Chemical Engineering Plant Design	3
CHEMENG 185A	Chemical Engineering Laboratory A (WIM)	4
CHEMENG 185B	Chemical Engineering Laboratory B	4
CHEMENG 181	Biochemistry I	3
CHEM 130	Organic Chemistry Laboratory II	4
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 175	Physical Chemistry	3
Select two of the following: <sup>2</sup>		6
CHEMENG 140	Micro and Nanoscale Fabrication Engineering	
CHEMENG 142	Basic Principles of Heterogeneous Catalysis with Applications in Energy Transformations	
CHEMENG 160	Polymer Science and Engineering	

CHEMENG 174	Environmental Microbiology I
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CHEMENG 183	Biochemistry II
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Note 3

Total Units	120-124
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- Unit count is higher if program includes one of more of the following: MATH 51 and MATH 52 in lieu of CME 100; or CHEM 31A and CHEM 31B in lieu of CHEM 31X.
- Any two acceptable except combining 174 and 183.
- For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/chemicalengineering/http://ughb.stanford.edu>)

## Honors Program

The Department of Chemical Engineering offers a program leading to the degree of Bachelor of Science in Chemical Engineering with Honors. Qualified undergraduate majors conduct independent study and research at an advanced level with faculty mentors, graduate students, and fellow undergraduates. This three quarter sequential program requires concurrent participation each quarter in the CHEMENG 191H Undergraduate Honors Seminar; completion of a faculty-approved thesis; and participation in the Chemical Engineering Honors Poster Session held annually during the Mason Lecture Series Spring Quarter. The last requirement may also be fulfilled through an alternative, public, oral presentation with the approval of the department chair. A research proposal/application must be submitted at least five quarters prior to graduation with work to begin at a minimum of four quarters prior to graduation.

Admission to the honors program is by application and submission of a research proposal and is subject to approvals by faculty advisers, sponsors, and the chair of the department. Declared Chemical Engineering majors with a cumulative grade point average (GPA) of 3.5 or higher are encouraged to apply. Students must submit their applications no later than the first week of March Winter Quarter of their junior year, assuming a June degree conferral the following year. An application includes a research proposal, approved by both the student's research thesis adviser and a faculty reader. The research adviser or the reader or, alternatively, a faculty sponsor, must be a faculty member in the Department of Chemical Engineering. Students must start their research no later than Spring Quarter their junior year and are encouraged to consider incorporating research opportunities such as those sponsored by Undergraduate Academic Life into their honors research proposal; see [http://ual.stanford.edu/OO/research\\_opps/Grants](http://ual.stanford.edu/OO/research_opps/Grants) [http://ual.stanford.edu/OO/research\\_opps/Grants](http://ual.stanford.edu/OO/research_opps/Grants). See departmental student services staff in Stauffer III, room 113, for more information about the application process, a proposal template, and other assistance.

In order to receive departmental honors, students admitted to the honors program must:

- Maintain an overall grade point average (GPA) of at least 3.5 as calculated on the unofficial transcript.
- Complete at least three quarters of research with a minimum of 9 units of CHEMENG 190H Undergraduate Honors Research in Chemical Engineering for a letter grade. All quarters must focus on the same topic. The same faculty adviser and faculty reader should be maintained throughout if feasible.
- Enroll in CHEMENG 191H Undergraduate Honors Seminar, concurrently with each quarter of enrollment in CHEMENG 190H Undergraduate Honors Research in Chemical Engineering.

- Participate with a poster and oral presentation of thesis work at the Chemical Engineering Honors Poster Session held during Spring Quarter or, at the Undergraduate Program Committee's discretion, at a comparable public event. Submit at the same time to student services one copy of the poster in electronic format.
- Submit final drafts of a thesis simultaneously to the adviser and the reader and, if appropriate, to the Chemical Engineering faculty sponsor, no later than April 8, 2013, or the first school day of the second week of the quarter in which the degree is to be conferred.
- Complete all work and thesis revisions and obtain indicated faculty approvals on the Certificate of Final Reading of Thesis forms by the end of the last full week of April, or the first month of the graduation quarter.
- Submit to departmental student services five (5) final copies of the honors thesis, as approved by the appropriate faculty. Include in each thesis an original, completed, faculty signature sheet immediately following the title page. The 2012-13 deadline is April 30, 2013, or the Tuesday at the beginning of the first week of the second month of the graduation quarter.
- Submit to student services one copy of the honors thesis in electronic format at the same time as the final copies of the thesis or no later than April 30, 2013.
- Submit one copy of the thesis, upon departmental approval, to the School of Engineering.

## Chemical Engineering (CHE) Minor

The following core courses fulfill the minor requirements:

		Units
ENGR/ CHEMENG 20	Introduction to Chemical Engineering	3
CHEMENG 100	Chemical Process Modeling, Dynamics, and Control	3
CHEMENG 110	Equilibrium Thermodynamics	3
CHEMENG 120A	Fluid Mechanics	4
CHEMENG 120B	Energy and Mass Transport	4
Select one of the following:		3
CHEMENG 140	Micro and Nanoscale Fabrication Engineering	
CHEMENG 142	Basic Principles of Heterogeneous Catalysis with Applications in Energy Transformations	
CHEMENG 160	Polymer Science and Engineering	
CHEMENG 174	Environmental Microbiology I	
CHEMENG 181	Biochemistry I	
CHEMENG 170	Kinetics and Reactor Design	3
CHEMENG 185A	Chemical Engineering Laboratory A	4
CHEM 171	Physical Chemistry	3
Total Units		30

# Master of Science in Chemical Engineering

A range of M.S. programs comprising appropriate course work is available to accommodate students wishing to obtain further academic preparation before pursuing a professional chemical engineering career. This degree is lecture course based; there are no research or thesis requirements. It is a terminal M.S. degree, i.e. this degree is not a prerequisite for nor does it lead to admission to the department's Ph.D. program. For conferral of an M.S. degree in chemical engineering the following departmental requirements must be met.

## Coterminal Bachelor's and Master's Degrees in Chemical Engineering

University requirements for the coterminal B.S./M.S. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>. Stanford undergraduates with strong academic records may apply to study for a master's degree while at the same time completing their bachelor's degree(s). Interested students should discuss their educational goals with their faculty advisers and talk with departmental graduate student services about the application requirements before submitting an application. Students, who have completed at least 120 units toward an undergraduate degree and submit their applications by the seventh week of a quarter, may be admitted to the Chemical Engineering M.S. program the following quarter.

## Unit and Course Requirements

Students terminating their graduate work with the M.S. degree in Chemical Engineering must develop a graduate-level, thematic M.S. program consisting of a minimum of 45 completed units of academic work that includes:

1. Four Chemical Engineering lecture courses selected from the CHEMENG 300 series
2. 3 units of CHEMENG 699 Colloquia
3. An additional 30 units, selected from graduate-level science or engineering lecture courses in any department and, by petition to the Chair of the Department of Chemical Engineering, from upper-division undergraduate lecture courses in science and engineering

Alternatively, up to 6 units of research may be used in lieu of up to 6 units of the additional 30 lecture units to partially satisfy the 45 unit minimum requirement. Another option is an up-to-six-unit combination of research units and 1, 2, or 3 units of CHEMENG 459 or other similar 1- or 2-unit graduate seminar courses, with faculty developed curricula, used in lieu of up to 6 units of the required additional 30 lecture units. Credit toward the required minimum of 45 completed units for the M.S. degree is not given for CHEMENG 296 or the Chemical Engineering special topics courses numbered in the 500 series nor for similar courses in other departments.

To ensure that an appropriate Chemical Engineering graduate program is pursued by each M.S. candidate, students who first matriculate at Stanford at the graduate level must, during the first quarter, no later than the eighth week, (a) complete a Program Proposal for a Master's Degree form, that is approved by the M.S. adviser; (b) submit this petition to departmental student services, for review by the department chair; and (c) obtain approval for any subsequent program change or changes from the M.S. adviser and the department chair. Stanford undergraduates admitted to the coterminal master's program must (a) submit an adviser-approved Program Proposal for a Master's Degree (a graduate degree progress form) either during their second quarter of graduate standing or upon the completion of 9 units of

graduate work (whichever occurs first), and (b) document with student services their M.S. adviser's review and approval of their graduate program when they have accrued 30 units toward the M.S. degree in Chemical Engineering. Each M.S. candidate must obtain approvals for the final M.S. program no later than the eighth week of the quarter preceding the quarter of degree conferral, in order to permit amendment of the final quarter's study list if the faculty deem this necessary. Students with questions should contact departmental student services.

## Minimum Grade Requirement

Any course used to satisfy the 45-unit minimum for the M.S. degree must be taken for a letter grade, if offered. An overall grade point average (GPA) of 3.0 must be maintained for these courses.

## Research Experience

Students in the M.S. program wishing to obtain research experience should work with the M.S. faculty adviser on the choice of research adviser as early as feasible and in advance of the anticipated quarter(s) of research. Once arrangements are mutually agreed upon, including the number of units, students enroll in the appropriate section of CHEMENG 600 Graduate Research in Chemical Engineering. A written report describing the results of the research undertaken must be submitted to and approved by the research adviser. CHEMENG 600 Graduate Research in Chemical Engineering may not be taken in lieu of any of the required four 300-level lecture courses.

## Engineer in Chemical Engineering

The degree of Engineer is awarded after the completion of a minimum of 90 units of graduate work beyond the B.S. degree and the satisfactory completion of all University requirements plus the following departmental requirements. This degree is not a prerequisite for the Ph.D. program.

## Unit and Course Requirements

A minimum of 90 total units (including research) within which 45 units of lecture course work are required, including:

CHEMENG 300	Applied Mathematics in the Chemical and Biological Sciences	3
CHEMENG 310	Microhydrodynamics	3
CHEMENG 320	Chemical Kinetics and Reaction Engineering	3
CHEMENG 340	Molecular Thermodynamics	3
CHEMENG 345	Fundamentals and Applications of Spectroscopy	3
CHEMENG 355	Advanced Biochemical Engineering	3
(2) 3 units of:		
CHEMENG 699	Colloquium	1

The remaining lecture courses, to total at least 45 completed units, may be chosen from graduate level science and engineering courses according to the guidelines given in the Master of Science section and with the consent of the graduate curriculum committee chair and the department chair. In fulfilling the required 45-unit requirement for lecture course units, an aggregate of 6 units maximum of the required 45-unit minimum of course work may include such courses as CHEMENG 459 Frontiers in Interdisciplinary Biosciences and CHEMENG 699 Colloquium, but not 500 level seminar courses or research units. Students seeking the Engineer degree may petition to add a M.S. program and apply for the M.S. degree once the requirements for that degree have been fulfilled (see General Requirements in the "Graduate Degrees" section of this bulletin and Chemical Engineering's "Master of Science" section).

## Minimum Grade Requirement

Any course intended to satisfy the degree requirements must be taken for a letter grade, if offered. An overall grade point average (GPA) of 3.0 must be maintained for these courses.

## Reading Committee Requirement

All candidates are required to have an initial meeting with their reading committees, consisting of two members of the Chemical Engineering faculty, by the end of their seventh quarter. Following this initial meeting, additional committee meetings must occur no less than once a year until all the requirements for the degree are satisfied. Students are encouraged to hold meetings on a more frequent basis to help focus and guide the thesis project. It is each student's responsibility to schedule these meetings and to assist in the keeping of accurate degree progress records by informing student services when meetings have taken place.

## Thesis Requirement

The thesis must represent a substantial piece of research equivalent to nine months of full-time effort and must be approved by the student's reading committee.

## Qualification for the Ph.D. Program by Students Ready to Receive the Degree of Engineer

After completing the requirements for the Engineer degree, a student may request to be examined on the research work completed for that degree, for the purpose of qualifying for admission to Ph.D. candidacy. If the request is granted, the student's thesis must be approved by the reading committee and available in its final form for inspection by the entire faculty at least two weeks prior to the scheduled date of said examination.

## Doctor of Philosophy in Chemical Engineering

The Ph.D. degree is awarded after the completion of a minimum of 135 units of graduate work as well as satisfactory completion of any additional University requirements and the following departmental requirements. Completion of a M.S. degree is not a prerequisite for beginning, pursuing, or completing doctoral work.

## Unit and Course Requirements

A minimum of 135 completed units, including a minimum of 45 units of lecture course work, is required for the Ph.D. degree. The following courses are required:

	<b>Units</b>
CHEMENG 300 Applied Mathematics in the Chemical and Biological Sciences	3
CHEMENG 310 Microhydrodynamics	3
CHEMENG 320 Chemical Kinetics and Reaction Engineering	3
CHEMENG 340 Molecular Thermodynamics	3
CHEMENG 345 Fundamentals and Applications of Spectroscopy	3
CHEMENG 355 Advanced Biochemical Engineering	3
Plus two courses at the 400 course level; in 2012-13 the following are available:	
CHEMENG 442 Structure and Reactivity of Solid Surfaces	3
CHEMENG 444 Electronic Structure Theory and Applications to Chemical Kinetics	3
CHEMENG 450 Advances in Biotechnology	3

CHEMENG 454 Synthetic Biology and Metabolic Engineering	3
CHEMENG 456 Microbial Bioenergy Systems	3
CHEMENG 466 Polymer Physics	3

These are to be taken at Stanford, and any petition to substitute another graduate-level course for any of these core courses must be approved by the department chair. The remaining lecture courses may be chosen from graduate-level science and engineering lecture courses in any department and, by petition to the department chair, from upper-division undergraduate lecture courses in the sciences and engineering. Three units of CHEMENG 699 Colloquium must be completed and may be included in the required 45 units of lecture courses. Additionally, 1, 2, or 3 units of seminar courses with faculty developed curricula, such as CHEMENG 459 Frontiers in Interdisciplinary Biosciences, may be substituted for up to 3 units of the unspecified lecture courses, but not for any of the specified CHEMENG courses above. All proposals for Ph.D. course work must be approved by the student's adviser and the department chair or his designee. Students admitted to Ph.D. candidacy should enroll each quarter in the 500 series, 600, and 699 as appropriate and as study list unit limits permit. Students with questions or issues should see departmental student services. Predoctoral students may petition for a M.S. degree program to be added to their university record. Once this petition is approved, students may apply in Axxess for M.S. degree conferral upon completion of the requirements for this degree. (See the "Master of Science in Chemical Engineering" section in this bulletin.) The M.S. degree must be awarded within the University's candidacy period for completion of a master's degree.

## Minimum Grade Requirement

Any course intended to satisfy the Ph.D. degree requirements must be taken for a letter grade, if offered. An overall grade point average (GPA) of 3.0 must be maintained for these courses.

## Qualifying Examination

To be advanced to candidacy for the Ph.D. degree, the student must pass both parts of the qualifying examination. The first part is held at the beginning of Spring Quarter or the third quarter of study, and the first-year student is asked to make an oral presentation to the faculty of a critical review of a published paper. This preliminary examination, in addition to performance in courses and during research rotations, is the basis for determining whether or not a first-year student is to be allowed by faculty to choose a research adviser and to begin doctoral research work immediately. Failure in the first part of the qualifying examination normally leads to termination of a student's study towards the Ph.D. degree; however, the student may continue to work toward an M.S. degree (see the "Master of Science in Chemical Engineering" section of this bulletin). It also precludes any financial aid beyond that already awarded. Students who pass the preliminary examination take the second part of the qualifying examination at the beginning of their second year or the fifth quarter. This second examination before the faculty is an oral presentation of their thinking about their research proposal and current progress and an examination of the specifics as well as their understanding of the fundamental chemical, physical, and biological concepts that govern the molecular behavior of the system being studied. Students who pass both parts of the qualifying examination must promptly submit to graduate student services an Application for Candidacy for Doctoral Degree form which has been approved by their research adviser(s), and at the same time establish their doctoral dissertation reading committees.

## Reading Committee Requirement

All Ph.D. candidates are required to assemble reading committees and to have an initial meeting with the full committee by the end of their seventh quarter. Reading committee meetings are not examinations; they are intended to be discussion sessions to help focus and guide the dissertation project. Following the initial committee meeting, additional meetings must take place no less than once per year until all the requirements for the Ph.D. degree are satisfied. The department encourages students to take

advantage of the benefits of more frequent meetings with their full reading committee. It is the student's responsibility to schedule committee meetings and to assist in the maintenance of degree progress records by reporting the meeting dates to the student services manager.

## Teaching Requirement

Teaching experience is considered an essential component of doctoral training because it assists in the further development and refinement of candidates' skills in conveying what they know, think, and conclude, based on articulated assumptions and knowledge. All Ph.D. candidates, regardless of the source of their financial support, are required to assist in the teaching of a minimum of two chemical engineering courses.

## Dissertation and Oral Defense Requirements

A dissertation based on a successful investigation of a fundamental problem in chemical engineering is required. Within approximately five calendar years after enrolling in the Ph.D. program, a student is expected to have fulfilled all the requirements for this degree, including the completion of a dissertation approved by his or her research adviser(s). Upon adviser approval, copies of the final draft of a dissertation must be distributed to each reading committee member. No sooner than three weeks after this distribution, a student may schedule an oral examination. This examination is a dissertation defense, based on the candidate's dissertation research, and is in the form of a public seminar followed by a private examination by the faculty members on the student's oral examination committee. Satisfactory performance in the oral examination and acceptance of an approved dissertation by Graduate Degree Progress, Office of the University Registrar, leads to Ph.D. degree conferral.

## Ph.D. Minor in Chemical Engineering

The University's general requirements for the Ph.D. minor are specified in the "Graduate Degrees" section of this bulletin. An application for a Ph.D. minor must be approved by both the major and minor departments.

A student desiring a Ph.D. minor in Chemical Engineering must work with a minor program adviser who has a faculty appointment in Chemical Engineering. At a minimum, this adviser must be a member of the student's reading committee for the doctoral dissertation, and the entire reading committee must meet at least once and at least one year prior to the scheduling of the student's oral examination. The department strongly prefers that regular meetings of the full reading committee start in the second year of graduate study or when the student is admitted to Ph.D. candidacy. In addition, the Chemical Engineering faculty member who is the minor adviser must be a member of the student's University oral examination committee.

The Ph.D. minor program must include at least 20 units of graduate-level lecture courses (numbered at the 200 level or above), but may not include any 1-2 unit lecture courses in the 20-unit minimum. The list of courses must form a coherent program and must be approved by the minor program adviser and the chair of this department. All courses for the minor must be taken for a letter grade, and a GPA of at least 3.0 must be earned for these courses.

*Emeriti: (Professors)* Andreas Acrivos, George M. Homsy, Robert J. Madix, Channing R. Robertson

*Chair:* Eric S. G. Shaqfeh

*Professors:* Zhenan Bao, Stacey F. Bent, Curtis W. Frank, Gerald G. Fuller, Chaitan Khosla, Jens K. Nørskov, Eric S. G. Shaqfeh, Alfred M. Spormann, James R. Swartz

*Assistant Professors:* Alexander R. Dunn, Thomas F. Jaramillo, Elizabeth S. Sattely, Andrew J. Spakowitz, Clifford L. Wang

*Courtesy Professors:* Gordon E. Brown, Jennifer R. Cochran, Sarah C. Heilshorn, Daniel Herschlag, Anders R. Nilsson, Robert M. Waymouth

*Lecturers:* Lisa Y. Hwang, Ricardo B. Levy, Shari B. Libicki, Sara Loesch-Frank, John E. Moalli, Anthony Pavone, Howard B. Rosen

*Consulting Professors:* Thomas Bliggard, Douglas C. Cameron, Jae Chun Hyun, Do Yeung Yoon

*Visiting Professors:* Won-Gun Koh, Yongtaek Hong, Subhash Risbud

## Cognate Courses for Advanced Degrees in Chemical Engineering

In addition to core CHEMENG graduate courses in the 300 series and elective CHEMENG graduate courses in the 200 and 400 series, students pursuing advanced degrees in chemical engineering include elective courses offered by other departments. The following list is a partial list of the more frequently chosen courses and is subdivided into five focus areas.

	Units
<b>Broadly Applicable (25)</b>	
APPPHYS 207	Laboratory Electronics 4
CHEM 221	Advanced Organic Chemistry 3
CHEM 271	Advanced Physical Chemistry 3
CHEM 273	Advanced Physical Chemistry 3
EE 261	The Fourier Transform and Its Applications 3
EE 268	Introduction to Modern Optics 3
MS&E 234	Organization Change and Information Systems 3
STATS 200	Introduction to Statistical Inference 3
<b>Biochemistry and Bioengineering focus (28-32) *</b>	
BIO 217	Neuronal Biophysics 4
BIOE 331	Protein Engineering 3
BIOPHYS 228	Computational Structural Biology 3
BIOPHYS/SBIO 241	Biological Macromolecules 3-5
CBIO 241	Molecular, Cellular, and Genetic Basis of Cancer 5
MCP 256	How Cells Work: Energetics, Compartments, and Coupling in Cell Biology 4
SBIO 228	Computational Structural Biology 3
SBIO 241	Biological Macromolecules 3-5
<b>Fluid Mechanics, Applied Mathematics, and Numerical Analysis focus (21) **</b>	
AA 218	Introduction to Symmetry Analysis 3
CME 200	Linear Algebra with Application to Engineering Computations 3
CME 204	Partial Differential Equations in Engineering 3
CME 206	Introduction to Numerical Methods for Engineering 3
CME 212	Advanced Programming for Scientists and Engineers 3
ME 351A	Fluid Mechanics 3
ME 457	Fluid Flow in Microdevices 3
<b>Materials Science focus (15) ***</b>	
MATSCI 210	Organic and Biological Materials 3
MATSCI 251	Microstructure and Mechanical Properties 3
MATSCI 316	Nanoscale Science, Engineering, and Technology 3
MATSCI 343	Organic Semiconductors for Electronics and Photonics 3
MATSCI 380	Nano-Biotechnology 3

**Microelectronics focus (18) \*\*\*\***

AA 218	Introduction to Symmetry Analysis	3
CME 200	Linear Algebra with Application to Engineering Computations	3
CME 204	Partial Differential Equations in Engineering	3
CME 206	Introduction to Numerical Methods for Engineering	3
CME 212	Advanced Programming for Scientists and Engineers	3
ME 457	Fluid Flow in Microdevices	3

**Microelectronics focus (18)**

AA 218	Introduction to Symmetry Analysis	3
CME 200	Linear Algebra with Application to Engineering Computations	3
CME 204	Partial Differential Equations in Engineering	3
CME 206	Introduction to Numerical Methods for Engineering	3
CME 212	Advanced Programming for Scientists and Engineers	3
ME 457	Fluid Flow in Microdevices	3

\* e.g., with CHEMENG 281 Biochemistry I, CHEMENG 283 Biochemistry II, CHEMENG 454 Synthetic Biology and Metabolic Engineering, CHEMENG 456 Microbial Bioenergy Systems.

\*\* e.g., with CHEMENG 462 Complex Fluids and Non-Newtonian Flows.

\*\*\* e.g., with CHEMENG 260 Polymer Science and Engineering, CHEMENG 442 Structure and Reactivity of Solid Surfaces, CHEMENG 460, CHEMENG 461, CHEMENG 464 Polymer Chemistry, CHEMENG 466 Polymer Physics.

\*\*\*\* e.g., with CHEMENG 240 Micro and Nanoscale Fabrication Engineering.

# Civil and Environmental Engineering

Courses offered by the Department of Civil and Environmental Engineering are listed under the subject code CEE on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Civil and Environmental Engineering (CEE) at Stanford conducts fundamental and applied research to advance the civil and environmental engineering professions, educate future academic and industry leaders, and prepare students for careers in professional practice. Civil and environmental engineers work to sustain the natural environment while creating and maintaining the built environment. Civil and environmental engineers are essential to providing the necessities of human life, including water, air, shelter, the infrastructure, energy, and food in increasingly more efficient and renewable ways.

Our department focuses on the theme of engineering for sustainability, including three core areas: the Built Environment, Environmental and Water studies, and Atmosphere and Energy. The built environment includes creating processes, techniques, materials, and monitoring technologies for planning, design, construction and operation of environmentally sensitive, economically efficient, performance-based buildings and infrastructure, and managing associated risks from natural and man-made hazards. The water environment includes creating plans, policies, science-based assessment models and engineered systems to manage water in ways that protect human health, promote human welfare, and provide freshwater and coastal ecosystem services. Atmosphere and Energy includes studying

fundamental energy and atmospheric engineering and science, assessing energy-use effects on atmospheric processes and air quality, and analyzing and designing energy-efficient generation and use systems with minimal environmental impact.

The department oversees undergraduate programs in Civil Engineering and in Environmental Engineering. The department also hosts the School of Engineering undergraduate major in Architectural Design and the undergraduate major in Atmosphere/Energy; both of these programs lead to a B.S. in Engineering.

## Mission of the Undergraduate Program in Civil Engineering

The mission of the undergraduate program in Civil Engineering is to provide students with the principles of engineering and the methodology needed for civil engineering practice. This pre-professional program balances the fundamentals common to many specialties in civil engineering and allows for concentration in structures and construction or environmental and water studies. Students in the major learn to apply knowledge of mathematics, science, and civil engineering to conduct experiments, design structures and systems to creatively solve engineering problems, and communicate their ideas effectively. The curriculum includes course work in structural, construction, and environmental engineering. The major prepares students for careers in consulting, industry and government, as well as for graduate school in Engineering.

## Mission of the Undergraduate Program in Environmental Engineering

The mission of the undergraduate program in Environmental Engineering is to equip students with the problem solving skills and knowledge necessary to assess and develop solutions to environmental problems impacting the biosphere, land, water, and air quality. The Environmental Engineering major offers a more focused program in Environmental and Water Studies than the Environmental and Water Studies concentration in the Civil Engineering degree program. Courses in the program are multidisciplinary in nature, combining fundamental principles drawn from physics, chemistry, geology, engineering, and biology. Students learn to apply analytical methods necessary to evaluate environmental changes and to design strategies to remediate problems that inevitably may have resulted from human activities. The program prepares students for careers in consulting, industry, and government, and for graduate school in engineering.

## Learning Outcomes (Undergraduate)

Undergraduates in the Civil Engineering and the Environmental Engineering programs are expected to achieve the following learning outcomes through their major. These learning outcomes are used both in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. understanding of engineering principles as well as the analytical, problem solving, design, and communication skills necessary to succeed and continue learning in diverse careers.



2. preparation for successful engineering practice with a longer term perspective that takes into account new tools such as advanced information technology and biotechnology, and increasingly complex professional and societal expectations.
3. sufficient breadth and depth for graduate study in engineering or other professional fields.
4. the awareness, background, and skills necessary to become responsible citizens and leaders in service to society.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. Students are prepared through course work with specialization within one of three broad areas including the built environment, atmosphere/energy, and environmental and water studies. All graduate students must master the analytical, quantitative, and interpretive skills necessary for successful leadership in their chosen field.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Civil and Environmental Engineering and related fields.

## Graduate Programs in Civil and Environmental Engineering

The Department of Civil and Environmental Engineering (CEE), in collaboration with other departments, offers graduate degrees structured in three degree programs.

- The Atmosphere and Energy Program offers degrees with the designation of Atmosphere/Energy.
- The Built Environment Program offers degrees with five designations:
  - Construction Engineering and Management
  - Design/Construction Integration
  - Structural Engineering
  - Geomechanics
  - Sustainable Design and Construction.
- The Environmental and Water Studies Program offers degrees with two designations:
  - Environmental Engineering and Science
  - Environmental Fluid Mechanics and Hydrology

For detailed information on these programs and degree designations, see the "Programs of Graduate Study in Civil and Environmental Engineering" section of this bulletin.

## Admissions and Financial Aid

Applications require online submission of the application form and statement of purpose, followed by three letters of recommendation, results of the General Section of the Graduate Record Examination, and transcripts of all courses taken at colleges and universities. See <http://gradadmissions.stanford.edu>. Policies for each of the department's programs are available on the department website. See: <http://cee.stanford.edu>. Successful applicants are advised as to the degree and program for which they are admitted. If students wish to transfer from one CEE program to another after being accepted, an application for the

intradepartmental change must be filed within the department; they will then be advised whether the change is possible. If, after enrollment at Stanford, students wish to continue toward a degree beyond the one for which they were originally admitted, a written application must be made to the Department of Civil and Environmental Engineering.

The department maintains a continuing program of merit-based financial aid for graduate students. Applications for financial aid and assistantships should be filed by December 4, 2012; it is important that Graduate Record Examination scores be available at that time. Applicants not requesting financial assistance have until February 5, 2013 to submit their online application. Merit-based financial aid consists of teaching assistantships and research assistantships for up to half-time work. Engineer and Ph.D. candidates may be able to use research results as a basis for their thesis or dissertation. Fellowship and scholarship awards or loans may supplement assistantships and other basic support. Continued support is generally provided for further study toward the Engineer or Ph.D. degree based on the student's performance, the availability of research funds, and requisite staffing of current research projects.

## Facilities

Research work and instruction under the three programs are carried out in these facilities: Building Energy Laboratory; Environmental Engineering and Science Laboratory; Environmental Fluid Mechanics Laboratory (EFML); Geotechnical Engineering Laboratory; Structural Engineering Laboratory; and water quality control research and teaching laboratories. The John A. Blume Earthquake Engineering Center conducts research on earthquake engineering including advanced sensing and control, innovative materials, and risk hazard assessment. Research and advanced global teamwork education is conducted in the Project Based Learning (PBL) Laboratory. In collaboration with the Department of Computer Science, the Center for Integrated Facility Engineering (CIFE) employs advanced CAD, artificial intelligence, communications concepts, and information management to integrate participants in the facility development process and to support design and construction automation. The Collaboratory for Research on Global Projects (CRGP) is a multi-school, multi-university research program aimed at improving the performance of global engineering and construction projects, with a special focus on sustainable infrastructure in developing countries. The Stanford Sustainable Systems Lab (S3L) aims to advance the state of the art in the design, monitoring and management of built environment systems, with a special focus on smart grid, smart buildings and smart infrastructures.

## Programs of Graduate Study in Civil and Environmental Engineering Atmosphere / Energy Program

The Atmosphere / Energy program in Civil and Environmental Engineering combines atmospheric science with energy science and engineering. The main goals of the program are to educate students and the public, through courses, research, and public outreach, about the causes of climate, air pollution, and weather problems and methods of addressing these problems through renewable and efficient energy systems. In addition, students learn about feedbacks between the atmosphere and renewable energy systems and the effects of the current energy infrastructure on the atmosphere.

Major focus areas of energy research include examining the resource availability of renewable energies, such as wind, solar, and wave, and studying optimal methods of combining renewable energies together to match energy supply with instantaneous demand. This type of work is generally done through a combination of data analysis, three-dimensional atmospheric computer modeling of wind, solar, wave, and hydroelectric power resources, and transmission load flow computer modeling. Other

energy research, performed through three-dimensional computer modeling, focuses on the effects, for example, of hydrogen fuel cell vehicles on air pollution and the ozone layer and the effects of ethanol and diesel vehicles on air quality and climate. Studies also examine the feedback of wind turbines to the atmosphere and the effects of climate change on wind and solar energy resources.

Atmospheric research in the program generally involves laboratory work, field measurements, or three-dimensional computer modeling of the combined atmosphere, ocean, and land surface. An example of laboratory work includes measuring the properties of organic particulate matter that forms in the atmosphere. Examples of fieldwork include measuring exposures to secondhand smoke, allergens, and emissions from building materials.

Computer modeling is performed at a variety of spatial scales, from the globe down to the size of a building or smaller. Some examples of modeling studies include examining the effects of air pollution particles on clouds, rainfall, water supply, ultraviolet radiation, the stratospheric ozone layer, and climate, simulating the dispersion of toxic contaminants in an urban street canyon, studying the effects of aircraft exhaust and biomass burning on climate, studying the effects of carbon dioxide domes over cities on air pollution mortality, and studying the leading causes of global warming and their impacts.

## Environmental and Water Studies Programs

Environmental and water studies include subprograms in environmental engineering and science and environmental fluid mechanics and hydrology, which includes environmental planning. Course offerings permit study in a single area or interrelated study between areas. Programs are flexible to foster interaction among students and encourage the development of individual programs. The Stanford laboratories for water quality control and environmental fluid mechanics are well equipped for advanced research and instruction.

Courses from other programs and departments complement our programs' course offerings. Examples include Computer Science (numerical methods), Geological and Environmental Sciences (geostatistics, hydrogeology), Mechanical Engineering (applied math, experimental methods, fluid mechanics, heat transfer), Energy Resources Engineering (reservoir engineering, well-test analysis), and Statistics (probability and statistics).

The major areas of specialization in the two subprograms, environmental engineering and science, and environmental fluid mechanics and hydrology, are described following. Admission to these subprograms are handled separately; prospective students should indicate their preference on their application.

## Environmental Engineering and Science

The Environmental Engineering and Science (EES) subprogram emphasizes the chemical and biological processes involved in water quality engineering, pollution treatment, remediation, and environmental protection.

Course offerings include: the biological, chemical, and engineering aspects of water supply; the movement and fate of pollutants in surface and ground waters, soil, and the atmosphere; hazardous substance control; molecular environmental biotechnology; and water and air pollution. Companion courses in the Environmental Fluid Mechanics and Hydrology Program (EFMH) include environmental planning and impact assessment, and environmental fluid mechanics, hydrology, and transport modeling.

## Environmental Fluid Mechanics and Hydrology

The Environmental Fluid Mechanics and Hydrology (EFMH) subprogram focuses on understanding the physical processes controlling the movement

of mass, energy, and momentum in the water environment and the atmosphere. The subprogram also considers environmental and institutional issues involved in planning water resources development projects.

Environmental fluid mechanics courses address: experimental methods; fluid transport and mixing processes; the fluid mechanics of stratified flows; natural flows in coastal waters, estuaries, lakes, and open channels; and turbulence and its modeling. Hydrology courses consider flow and transport in porous media, stochastic methods in both surface and subsurface hydrology, and watershed hydrology and modeling. Atmosphere courses deal with climate, weather, storms and air pollution and their modeling. Planning courses emphasize environmental policy implementation and sustainable water resources development.

The research of this group is focused in the Environmental Fluid Mechanics Laboratory, which includes the P. A. McCuen Environmental Computer Center.

## Sustainable Built Environment Programs

The Sustainable Built Environment programs include subprograms in construction engineering and management, design-construction integration, structural engineering and geomechanics, and sustainable design and construction. These programs focus on educating practitioners and researchers to plan, design, build, and operate more sustainable buildings and infrastructure.

The Construction Engineering and Management (CEM) subprogram prepares students for careers with progressive construction firms worldwide, interested in building more sustainable buildings and infrastructure using advanced modeling and visualization methods and tools known as virtual design and construction.

The Structural Engineering and Geomechanics (SEG) subprogram educates designers and researchers who want to progress beyond traditional life safety code-based design, to develop and disseminate performance-based structural and geotechnical engineering methods and tools that maximize the lifecycle economic value of facilities.

The Design-Construction Integration (DCI) subprogram combines courses from CEM and SEG to educate and prepare students for design construction firms that provide integrated design-build project delivery, construction management, and pre-construction services.

The Sustainable Design and Construction (SDC) subprogram provides courses in sustainable, multi-stakeholder design methods and tools that incorporate lifecycle cost analysis, green architectural design, lighting, and energy analysis, power systems, transportation, water supply and wastewater treatment to educate students interested in promoting more sustainable development of buildings and infrastructure.

Admission is managed separately for each of these programs; prospective students should indicate their preference on their application.

## Construction Engineering and Management

The Construction Engineering and Management (CEM) subprogram prepares technically qualified students for responsible engineering and management roles in all phases of the development of major constructed facilities. It emphasizes management techniques useful in organizing, planning, and controlling the activities of diverse specialists working within the unique project environment of the construction industry, and it covers construction engineering aspects of heavy, industrial and building construction.

The CEM subprogram offers courses in: building systems, construction administration, construction law, project finance, accounting, real estate development, structural design, HVAC design and construction, equipment and methods, estimating, international construction, labor relations, managing human resources, planning and control techniques, productivity improvement, and project and company organizations. Additional related

course work is available from other programs within the department, from other engineering departments, and from other schools in the University such as Earth Sciences and the Graduate School of Business.

The CEM program allows students substantial flexibility to tailor their program of study for careers with general contractors, specialty contractors, real estate, or infrastructure developers or facility owners and operators.

## Design-Construction Integration

The Design-Construction Integration (DCI) subprogram prepares students for multidisciplinary collaborative teamwork in an integrated design and construction process. The subprogram extends a student's design or construction background with core courses in each of these areas and develops the background needed to understand the concerns and expertise of the many project stakeholders. It includes a comprehensive project-based learning experience.

The subprogram in Design-Construction Integration is open to applicants with backgrounds in engineering and science. Applicants should also have a background in the planning, design, or construction of facilities by virtue of work experience and/or their undergraduate education. Knowledge in subjects from the traditional areas of civil engineering is necessary for students to receive the degree and to satisfy prerequisite requirements for some of the required graduate courses.

Students with an undergraduate degree in Civil Engineering, and who expect to pursue careers with design or construction firms that emphasize design-build, EPC, or turnkey projects should consider DCI.

## Structural Engineering and Geomechanics

The Structural Engineering and Geomechanics (SEG) subprogram encompasses teaching and research in structural design and analysis, structural materials, earthquake engineering and structural dynamics, advanced sensing and structural health monitoring, risk and reliability analysis, computational science and engineering, and geotechnical engineering including geomechanics. The SEG subprogram prepares students for industrial or academic careers.

Students can balance engineering fundamentals with modern computational and experimental methods to customize programs to launch careers as consultants on large and small projects, designers, and engineering analysts.

Structural design and analysis focuses on the conceptual design of structural systems and on computational methods for predicting the static and dynamic, linear and nonlinear responses of structures.

Structural materials research and teaching focuses on the design and analysis of high-performance as well as low-environmental impact materials.

Earthquake engineering and structural dynamics addresses earthquake phenomena, ground shaking, and the behavior, analysis, and design of structures under seismic and other dynamic forces.

Reliability and risk analysis focuses on advanced methods for structural safety evaluation and design, including methods for loss estimation from damage and failures of structures and lifeline systems.

Computational science and engineering emphasizes the application of modern computing methods to structural engineering and geomechanics and encompasses numerical, structural, and geotechnical analysis, including finite element analysis and boundary element methods.

In the area of geomechanics, students focus on the application of the principles of applied mechanics to problems involving geologic materials including theoretical soil and rock mechanics, computational methods, and analysis and design of foundations and earth structures.

## Sustainable Design Construction

The Sustainable Design and Construction (SDC) subprogram prepares students for careers in planning, designing, building, and operating

sustainable buildings and infrastructure to maximize their lifecycle economic value, their net contribution to environmental functions and services, and their social equity.

The subprogram offers courses in: project finance; sustainable multidisciplinary, multi-stakeholder planning and design processes; green architecture; performance-based structural design; building energy systems; renewable power generation and smart electrical grids; water supply; wastewater treatment; transportation; and sustainable construction materials and processes. Classes on cutting-edge information technology, sensor networks embedded in intelligent buildings and infrastructure, strategy, economics, entrepreneurship and organization design for new businesses, and corporate or governmental initiatives aimed at enhancing the sustainability of buildings and infrastructure round out the subprogram.

This subprogram is intended for students with undergraduate degrees in architecture, engineering, science, construction management, economics or business who wish to pursue careers that enhance the sustainability of the built environment.

Employers of past SDC graduates include: architectural and engineering design firms, constructors, design-build firms and developers focused on delivering green buildings and infrastructure; energy and sustainability consultants; facility management or sustainability departments within large companies; clean-tech start ups, and clean-tech venture funds.

## Engineer in Civil and Environmental Engineering

A student with an M.S. in Civil Engineering may satisfy the requirements of the degree of Engineer in Civil and Environmental Engineering by completing 45 unduplicated course work and research units for a total of 90 units. Engineer candidates must submit an acceptable thesis (12 to 15 units) and maintain a minimum GPA of 3.0. The program of study must be approved by a faculty member in the department.

This degree is recommended for those desiring additional graduate education, especially those planning a career in professional practice. The thesis normally should be started in the first quarter of graduate study after the M.S. degree. Programs are offered in the fields of specialization mentioned for the M.S. degree. The Engineer thesis topic, for students who will continue study toward a CEE Ph.D., must be significantly different from their doctoral research.

## Bachelor of Science in Civil and Environmental Engineering

The B.S. in Civil Engineering and the B.S. in Environmental Engineering are ABET accredited programs, which place high priority on integrating research with engineering education. Four major objectives structure both degree programs:

1. To provide an understanding of engineering principles and the analytical, problem solving, design, and communication skills to continue succeeding and learning in diverse careers.
2. To prepare for successful engineering practice with a longer term perspective that takes into account new tools such as advanced information technology and biotechnology, and increasingly complex professional and societal expectations.
3. To prepare for possible graduate study in engineering or other professional fields.
4. To develop the awareness, background, and skills necessary to become responsible citizens and leaders in service to society.

Students who major in Civil Engineering or in Environmental Engineering must complete the appropriate requirements for the B.S. degree listed.

Each student has elective units, which may be used in any way the student desires, including additional studies in Civil and Environmental Engineering or any other school or department in the University. Because the undergraduate engineering curriculum provides breadth of study, students who intend to enter professional practice in civil or environmental engineering should plan to obtain their professional education at the graduate level.

A number of undergraduate programs at Stanford may be of interest to students seeking to specialize in environmental studies. In addition to the two majors offered in the department, students should examine related programs such as Earth Systems, Geological and Environmental Sciences, Urban Studies, and Human Biology.

## Overseas Studies Courses in Civil and Environmental Engineering

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (<http://explorecourses.stanford.edu>) or the Bing Overseas Studies web site (<http://bosp.stanford.edu>). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

	Units
	Autumn
Australia	
Coral Reef Ecosystems (OSPAUSTL 10)	3
Coastal Forest Ecosystems (OSPAUSTL 30)	3
<b>Total Units in Sequence:</b>	<b>0</b>

## Honors Program

This program leads to a B.S. with honors for undergraduates majoring in Civil Engineering or in Environmental Engineering. It is designed to encourage qualified students to undertake a more intensive study of civil and environmental engineering than is required for the normal majors through a substantial, independent research project.

The program involves an in-depth research study in an area proposed to and agreed to by a Department of Civil and Environmental Engineering faculty adviser and completion of a thesis of high quality. A written proposal for the research to be undertaken must be submitted and approved by the faculty advisor in the fourth quarter prior to graduation. At the time of application, the student must have an overall grade point average (GPA) of at least 3.3 for course work at Stanford; this GPA must be maintained to graduation. The thesis is supervised by a CEE faculty adviser and must involve input from the School of Engineering writing program by means of ENGR 202S or its equivalent. The written thesis must be approved by the thesis adviser. Students are encouraged to present their results in a seminar for faculty and students. Up to 10 units of CEE 199H, Undergraduate Honors Research in Civil and Environmental Engineering, may be taken to support the research and writing (not to duplicate ENGR 202S). These units are beyond the normal Civil Engineering or Environmental Engineering major program requirements.

## Civil Engineering (CE)

Completion of the undergraduate program in Civil Engineering leads to the conferral of the Bachelor of Science in Civil Engineering.

# Mission of the Undergraduate Program in Civil Engineering

The mission of the undergraduate program in Civil Engineering is to provide students with the principles of engineering and the methodology needed for civil engineering practice. This pre-professional program balances the fundamentals common to many specialties in civil engineering and allows for concentration in structures and construction or environmental and water studies. Students in the major learn to apply knowledge of mathematics, science, and civil engineering to conduct experiments, design structures and systems to creatively solve engineering problems, and communicate their ideas effectively. The curriculum includes course work in structural, construction, and environmental engineering. The major prepares students for careers in consulting, industry and government, as well as for graduate school in Engineering.

## Requirements

	Units
<b>Mathematics and Science (45)</b>	45
45 units minimum; see Basic Requirements 1 and 2 <sup>1</sup>	
<b>Technology in Society (3-5)</b>	
One course; see Basic Requirement 4 <sup>2</sup>	3-5
<b>Engineering Fundamentals (10-12)</b>	
Three courses minimum, see Basic Requirement 3	
ENGR 14 Intro to Solid Mechanics	4
ENGR 90 Environmental Science and Technology	3
Fundamentals Elective	3-5
<b>Engineering Depth (57-61)</b>	
Minimum of 68 Engineering Fundamentals plus Engineering Depth; see Basic Requirement 5	
CEE 100 Managing Sustainable Building Projects <sup>3</sup>	4
CEE 101A Mechanics of Materials	4
CEE 101B Mechanics of Fluids	4
CEE 101C Geotechnical Engineering	4
CEE 146A Engineering Economy	3
Specialty courses in either:	35-42
Environmental and Water Studies (see below)	
Structures and Construction (see below)	
Other School of Engineering Electives	3-0
<b>Total Units</b>	<b>115-123</b>

- <sup>1</sup> Mathematics must include CME 100 Vector Calculus for Engineers/ CME 102 Ordinary Differential Equations for Engineers (or Math 51 Linear Algebra and Differential Calculus of Several Variables/ MATH 53 Ordinary Differential Equations with Linear Algebra) and a Statistics course. Science must include Physics 41 Mechanics; either ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology, CHEM31A Chemical Principles I or CHEM 31X Chemical Principles; two additional quarters in either chemistry or physics and GES 1A Introduction to Geology: The Physical Science of the Earth (or GES 1B or 1C); for students in the Environmental and Water Studies track, the additional chemistry or physics must include CHEM 33; for students in the Structures and Construction track, it must include PHYSICS 43 or 45.
- <sup>2</sup> Chosen TiS class must specifically include an ethics component, such as STS 101 Science Technology and Contemporary Society, STS 110 Ethics and Public Policy, STS 115 Ethical Issues in Engineering.
- <sup>3</sup> CEE 100 meets the Writing in the Major (WIM) requirement

## Environmental and Water Studies

		Units
ENGR 30	Engineering Thermodynamics <sup>1</sup>	3
CEE 101D	Computations in Civil and Environmental Engineering <sup>2</sup>	3
CEE 160	Mechanics of Fluids Laboratory	2
CEE 161A	Rivers, Streams, and Canals	3-4
CEE 166A	Watersheds and Wetlands	3
CEE 166B	Floods and Droughts, Dams and Aqueducts	3
CEE 171	Environmental Planning Methods	3
CEE 172	Air Quality Management	3
CEE 177	Aquatic Chemistry and Biology	4
CEE 179A	Water Chemistry Laboratory	3
Remaining specialty units from:		
CEE 63	Weather and Storms <sup>2</sup>	3
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions <sup>2</sup>	3
CEE 109	Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision	2
CEE 129	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future	3
CEE 164	Introduction to Physical Oceanography	4
CEE 166D	Water Resources and Water Hazards Field Trips	2
CEE 172A	Indoor Air Quality	2-3
CEE 173A	Energy Resources	3-5
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 178	Introduction to Human Exposure Analysis	3
CEE 199	Undergraduate Research in Civil and Environmental Engineering	1-4

## Structures and Construction

		Units
Select one of the following:		
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	4
ENGR 50E	Introduction to Materials Science - Energy Emphasis	
ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis	

CEE 102	Legal Aspects of Engineering and Construction	3
CEE 156	Building Systems	4
CEE 180	Structural Analysis	4
CEE 181	Design of Steel Structures	4
CEE 182	Design of Reinforced Concrete Structures	4
CEE 183	Integrated Civil Engineering Design Project	4

Remaining specialty units from:

ENGR 15	Dynamics	4
CME 104	Linear Algebra and Partial Differential Equations for Engineers	5
CEE 101D	Computations in Civil and Environmental Engineering	3
CEE 122A	Computer Integrated Architecture/Engineering/Construction	2
CEE 122B	Computer Integrated A/E/C	2
CEE 129	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future	3
CEE 141A/141B	Infrastructure Project Development	3
CEE 142A	Negotiating Sustainable Development	3
CEE 151	Negotiation	3
CEE 155	Introduction to Sensing Networks for CEE	4
CEE 160	Mechanics of Fluids Laboratory	2
CEE 161A	Rivers, Streams, and Canals	3-4
CEE 171	Environmental Planning Methods	3
CEE 176A	Energy Efficient Buildings	3-4
CEE 176B	Electric Power: Renewables and Efficiency	3-4
CEE 195	Fundamentals of Structural Geology	3
CEE 196	Engineering Geology and Global Change	3
CEE 199	Undergraduate Research in Civil and Environmental Engineering	1-4
CEE 203	Probabilistic Models in Civil Engineering	3-4
One of the following can also count as remaining specialty units.		
CEE 110	Building Information Modeling	3-4
CEE 130	Architectural Design: 3-D Modeling, Methodology, and Process	
CEE 131A	Professional Practice: Mixed-Use Design in an Urban Setting	
CEE 134B	Intermediate Arch Studio	

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/civilandenvironmentalengineering/http://ughb.stanford.edu>).

## Environmental Engineering (ENV)

Completion of the undergraduate program in Environmental Engineering leads to the conferral of the Bachelor of Science in Environmental Engineering.

## Mission of the Undergraduate Program in Environmental Engineering

The mission of the undergraduate program in Environmental Engineering is to equip students with the problem solving skills and knowledge necessary to assess and develop solutions to environmental problems

impacting the biosphere, land, water, and air quality. The Environmental Engineering major offers a more focused program in Environmental and Water Studies than the Environmental and Water Studies concentration in the Civil Engineering degree program. Courses in the program are multidisciplinary in nature, combining fundamental principles drawn from physics, chemistry, geology, engineering, and biology. Students learn to apply analytical methods necessary to evaluate environmental changes and to design strategies to remediate problems that inevitably may have resulted from human activities. The program prepares students for careers in consulting, industry, and government, and for graduate school in engineering.

## Requirements

	Units
<b>Mathematics and Science (45)</b>	
See Basic Requirement 1 and 2 <sup>1</sup>	45
<b>Technology in Society (TiS) (3-5)</b>	
One 3-5 unit course required, see Basic Requirement 4 <sup>2</sup>	3-5
<b>Engineering Fundamentals (9-11)</b>	
Three courses minimum, including the two listed below; see Basic Requirement 3	
ENGR 30      Engineering Thermodynamics	3
ENGR 90/CEE 70      Environmental Science and Technology	3
Fundamentals Elective	3-5
<b>Environmental Engineering Depth (57)</b>	
Minimum of 68 units of Engineering Fundamentals plus Engineering Depth; see Basic Requirement 5	
CEE 64      Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 100      Managing Sustainable Building Projects	4
CEE 101B      Mechanics of Fluids	4
CEE 101D      Computations in Civil and Environmental Engineering	3
CEE 146A      Engineering Economy	3
CEE 160      Mechanics of Fluids Laboratory	2
CEE 161A      Rivers, Streams, and Canals	4
CEE 166A      Watersheds and Wetlands	3
CEE 166B      Floods and Droughts, Dams and Aqueducts	3
CEE 171      Environmental Planning Methods	3
CEE 172      Air Quality Management	3
CEE 177      Aquatic Chemistry and Biology	4
CEE 179A      Water Chemistry Laboratory	3
CEE 179C      Environmental Engineering Design (or CEE 169 (offered alt years))	5
CEE Breadth Electives <sup>3</sup>	10
Other School of Engineering Electives (0-2 units)	
<b>Total Units</b>	<b>114-118</b>

- Math must include CME 100 Vector Calculus for Engineers/CME 102 Ordinary Differential Equations for Engineers (or MATH 51 Linear Algebra and Differential Calculus of Several Variables/MATH 53 Ordinary Differential Equations with Linear Algebra) and a Statistics course. Science must include PHYSICS 41 Mechanics; either ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology, CHEM 31A Chemical Principles I or CHEM 31X Chemical Principles; CHEM 33 Structure and Reactivity; GES 1A Introduction to Geology: The Physical Science of the Earth (or GES 1B or 1C); and one other physics or chemistry class for at least 3 units.
- Chosen TiS class must specifically include an ethics component, such as STS 1 The Public Life of Science and Technology; COMM 169 Computers and Interfaces; CS 181 Computers, Ethics, and Public Policy; or MS&E 181 Issues in Technology and Work for a Postindustrial Economy
- Breadth electives currently include CEE 63 Weather and Storms, CEE 101C Geotechnical Engineering, CEE 109 Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision, CEE 129 Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future, CEE 164 Introduction to Physical Oceanography, CEE 166D Water Resources and Water Hazards Field Trips, CEE 172A Indoor Air Quality, CEE 173A Energy Resources, CEE 176A Energy Efficient Buildings, CEE 176B Electric Power: Renewables and Efficiency, CEE 178 Introduction to Human Exposure Analysis, and CEE 199 Undergraduate Research in Civil and Environmental Engineering.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/civilandenvironmentalengineering/http://ughb.stanford.edu>).

## Minor in Civil Engineering or Environmental Engineering

The department offers a minor in Civil Engineering and a minor in Environmental Engineering. Departmental expertise and undergraduate course offerings are available in the areas of architectural design, construction engineering, construction management, structural/geotechnical engineering, environmental engineering and science, environmental fluid mechanics and hydrology, and atmosphere/energy. The courses required for the minors typically have prerequisites. Minors are not ABET-accredited programs.

## Civil Engineering (CE) Minor

The civil engineering minor is intended to give students a focused introduction to one or more areas of civil engineering. Departmental expertise and undergraduate course offerings are available in the areas of Architectural Design, Construction Engineering and Management, and Structural and Geotechnical Engineering. Students interested in Environmental and Water Studies should refer to the environmental engineering minor.

The minimum prerequisite for a civil engineering minor is MATH 42 Calculus (or MATH 21 Calculus); however, many courses of interest require PHYSICS 41 Mechanics and/or MATH 51 Linear Algebra and Differential Calculus of Several Variables as prerequisites. The minimum prerequisite for a Civil Engineering minor focusing on architectural design is MATH 41 Calculus (or MATH 19 Calculus) and a course in Statistics.

Students should recognize that a minor in civil engineering is not an ABET-accredited degree program.

Since undergraduates having widely varying backgrounds may be interested in obtaining a civil engineering minor, and the field itself is so broad, no single set of course requirements will be appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below. Additional information, including example minor programs, are provided on the CEE web site ([http://cee.stanford.edu/prospective/undergrad/minor\\_overview.html](http://cee.stanford.edu/prospective/undergrad/minor_overview.html)) and in Chapter 6 of the Handbook for Undergraduate Engineering Programs (<http://ughb.stanford.edu>).

General guidelines are:

1. A civil engineering minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes of at least 3 units each of letter-graded work, except where letter grades are not offered.
2. The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another. Example programs are given on the CEE webpage.

Professor Anne Kiremidjian ([kiremidjian@stanford.edu](mailto:kiremidjian@stanford.edu)) is the CEE undergraduate minor adviser in Structural Engineering and Construction Engineering and Management. John Barton ([jhbarton@stanford.edu](mailto:jhbarton@stanford.edu)), Program Director for Architectural Design, is the undergraduate minor adviser in Architectural Design. Students must consult the appropriate adviser when developing their minor program, and obtain approval of the finalized study list from them.

## Environmental Engineering (ENV) Minor

The Environmental Engineering minor is intended to give students a focused introduction to one or more areas of Environmental Engineering. Departmental expertise and undergraduate course offerings are available in the areas of environmental engineering and science, environmental fluid mechanics and hydrology, and atmosphere/energy. The minimum prerequisite for an Environmental Engineering minor is MATH 42 Calculus (or MATH 21 Calculus); however, many courses of interest require PHYSICS 41 Mechanics and/or MATH 51 Linear Algebra and Differential Calculus of Several Variables as prerequisites. Students should recognize that a minor in Environmental Engineering is not an ABET-accredited degree program.

Since undergraduates having widely varying backgrounds may be interested in obtaining an environmental engineering minor, no single set of course requirements is appropriate for all students. Instead, interested students are encouraged to propose their own set of courses within the guidelines listed below. Additional information on preparing a minor program is available in Chapter 6 of the Handbook for Undergraduate Engineering Programs (<http://ughb.stanford.edu>).

General guidelines are—

- An Environmental Engineering minor must contain at least 24 units of course work not taken for the major, and must consist of at least six classes of at least 3 units each of letter-graded work, except where letter grades are not offered.
- The list of courses must represent a coherent body of knowledge in a focused area, and should include classes that build upon one another. Example programs are available on the CEE web site ([http://cee.stanford.edu/prospective/undergrad/minor\\_overview.html](http://cee.stanford.edu/prospective/undergrad/minor_overview.html)).

Professor Lynn Hildemann ([hildemann@stanford.edu](mailto:hildemann@stanford.edu)) is the CEE undergraduate minor adviser in Environmental Engineering. Students must consult with Professor Hildemann in developing their minor program, and obtain approval of the finalized study list from her.

## Coterminal B.S./M.S. Program in Civil and Environmental Engineering

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminal program at Stanford must have earned a minimum of 120 units towards graduation. This includes allowable Advanced Placement (AP) and transfer credit. Applicants must submit their application no later than the quarter prior to the expected completion of their undergraduate degree and are expected to meet the Department of Civil and Environmental Engineering application deadlines for all applicants for graduate study (January 18, 2013) to be considered for financial aid, and also if no financial aid is requested). Applications are considered once a year near the beginning of Winter Quarter. An application must display evidence of potential for strong academic performance as a graduate student.

It is recommended that students who contemplate advanced study at Stanford discuss their plans with their advisers in the junior year.

University requirements for the coterminal M.S. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

## Master of Science in Civil and Environmental Engineering

The following programs are available leading to the M.S. degree in Civil and Environmental Engineering:

- Atmosphere/Energy
- Construction Engineering and Management
- Design/Construction Integration
- Environmental Engineering and Science
- Environmental Fluid Mechanics and Hydrology
- Geomechanics
- Structural Engineering
- Sustainable Design Construction

Students admitted to graduate study with a B.S. in Civil Engineering, or equivalent, from an accredited curriculum can satisfy the requirements for the M.S. degree in Civil and Environmental Engineering by completing a minimum of 45 units beyond the B.S. All 45 units must be taken at Stanford. A minimum 2.75 grade point average (GPA) is required for candidates to be recommended for the M.S. degree. No thesis is required.

The program of study must be approved by the faculty of the department and should include at least 45 units of courses in engineering, mathematics, science, and related fields unless it can be shown that other work is pertinent to the student's objectives. Additional program area requirements are available on the department web site and from the department's student services office (Y2E2 room 316).

Candidates for the M.S. in Civil and Environmental Engineering who do not have a B.S. in Civil Engineering may, in addition to the above, be required to complete those undergraduate courses deemed important to their graduate programs. In such cases, more than three quarters is often required to obtain the degree.

# Doctor of Philosophy in Civil and Environmental Engineering

The Ph.D. is offered under the general regulations of the University as set forth in the “Graduate Degrees” section of this bulletin. This degree is recommended for those who expect to engage in a professional career in research, teaching, or technical work of an advanced nature. The Ph.D. program requires a total of 135 units of graduate study, at least 90 units of which must be at Stanford. Up to 45 units of graduate study can be represented by the M.S. program described above. Students must maintain a minimum GPA of 3.0 in post-M.S. course work. All candidates for the Ph.D. degree are required to complete CEE 200 in conjunction with a one-quarter teaching assistantship/course assistantship to gain training and instructional experience. Further information on Ph.D. requirements and regulations is found in the department handbook.

The program of study is arranged by the prospective candidate at the beginning of the second year with the advice of a faculty committee whose members are nearest in the field of interest to that of the student. The chair of the committee serves as the student’s interim adviser until such time as a member of the faculty has agreed to direct the dissertation research. Insofar as possible, the program of study is adapted to the interests and needs of the student within the framework of the requirements of the department and the University.

By the end of the second year of graduate study (or by the end of the first year for students who enroll at Stanford with an M.S.), the student is expected to pass the department’s General Qualifying Examination (GQE) to be admitted to candidacy for the doctoral degree. The purpose of the GQE is to ensure that the student is adequately prepared to undertake doctoral research and has a well planned research topic. The exam may take the form of (1) a written and/or oral general examination of the candidate’s major field, (2) a presentation and defense of the candidate’s doctoral research dissertation proposal, or (3) a combination research proposal and general examination. The GQE is administered by an advisory committee consisting of at least three Stanford faculty members, including a chair who is a faculty member in Civil and Environmental Engineering. All members are normally on the Stanford Academic Council. A petition for appointment of one advisory committee member who is not on the Academic Council may be made if the proposed person contributes an area of expertise that is not readily available from the faculty. Such petitions are subject to approval by the department chair. When the primary research adviser is not a member of the CEE Academic Council faculty, the committee must consist of four examiners, with two members from the CEE department.

## Ph.D. Minor in Civil and Environmental Engineering

A Ph.D. minor is a program outside a major department. Requirements for a minor are established by the minor department. Acceptance of the minor as part of the total Ph.D. program is determined by the major department. Application for the Ph.D. minor must be approved by both the major and the minor department, and the minor department must be represented at the University oral examination.

A student desiring a Ph.D. minor in Civil and Environmental Engineering (CEE) must have a minor program adviser who is a regular CEE faculty member in the program of the designated subfield. This adviser must be a member of the student’s University oral examination committee and the reading committee for the doctoral dissertation.

The program must include at least 20 units of graduate-level course work (courses numbered 200 or above, excluding special studies and thesis) in CEE completed at Stanford University. The list of courses must form a coherent program and must be approved by the minor program adviser and the CEE chair. A minimum GPA of 3.0 must be achieved in these courses.

*Emeriti: (Professors)* James Douglas, Joseph B. Franzini, Gilbert M. Masters\*, Perry L. McCarty\*, Henry W. Parker, Martin Reinhard\*, Haresh C. Shah, Robert L. Street\*, Clyde B. Tatum\*, Paul M. Teicholz

*Chair:* Stephen G. Monismith

*Associate Chair:* Sarah Billington

*Professors:* Ronaldo I. Borja, Craig S. Criddle, Gregory G. Deierlein, Martin A. Fischer (on leave Spring), Lynn M. Hildemann, Mark Z. Jacobson, Anne S. Kiremidjian, Peter K. Kitanidis, Jeffrey R. Koseff (on leave Winter), Kincho H. Law, James O. Leckie, Raymond E. Levitt, Richard G. Luthy, Stephen G. Monismith, Leonard Ortolano (on leave Autumn), Alfred M. Spormann

*Associate Professors:* Alexandria B. Boehm, Sarah L. Billington, Jennifer Davis, David L. Freyberg, Oliver B. Fringer, Eduardo Miranda

*Assistant Professors:* Jack W. Baker, Michael D. Lepech, Ram Rajagopal

*Courtesy Professors:* Peter M. Pinsky, David D. Pollard

*Courtesy Associate Professor:* Margot G. Gerritsen

*Courtesy Assistant Professor:* Karen L. Casciotti

*Lecturers:* Cassiana Aaronson Wright, Montgomery Anderson, Deborah Ballati, John H. Barton II, Thomas Beischer, Stanley F. Christensen, Charles Debbas, Derek Fong, Renate Fruchter, Robert R. Groves, Andrew G. Hudacek, Glenn Katz, Nelson A. Koen Cohen, Erik Kolderup, Royal J. Kopperud, Drew Krafcik, John C. Kunz, Amy Larimer, Ashby Monk, Ryan J. Orr, Alexander P. Robertson, Peter Rumsey, Raphael Sperry, Mark Sarkisian, Patti J. Walters, Christopher S. Wasney

*Consulting Professors:* Vladimir Bazjanac, James E. Cloern, Angelos N. Findikakis, Gary E. Griggs, Robert F. Hickey, Thomas L. Holzer, Michael C. Kavanaugh, Mark R. Kroll, Francis L. Ludwig, Martin W. McCann, Jr., Paul K. Meyer, Piotr D. Moncarz, Wayne R. Ott, Ingo Pinnau, Harry F. Ridgway, Benedict R. Schwegler, Jr, Avram S. Tucker, Antonio L. Vives, Michael W. Walton

*Consulting Associate Professors:* William J. Behrman, Robert D. Bornstein, Edward S. Gross, Charles S. Han, Jonathan G. Koomey, Gloria T. Lau, Lisa V. Lucas, Karl Knapp, Colin Ong, Joel N. Swisher, Jie Wang, Jane Woodward

*Consulting Assistant Professors:* Murray D. Einarson, Calvin K. Kam, Neil E. Klepeis, Michael L. MacWilliams, Pooya Sarabandi

*Shimizu Visiting Professor:* John E. McCray

*UPS Visiting Associate Professor:* Geert Dewulf

\* Recalled to active duty.

## Overseas Studies Courses in Civil and Environmental Engineering

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofengineering/civilandenvironmentalengineering/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program’s student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin’s ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofengineering/civilandenvironmentalengineering/http://explorecourses.stanford.edu>) or Bing Overseas Studies



(<http://exploreddegrees.stanford.edu/schoolofengineering/civilandenvironmentalengineering/http://bosp.stanford.edu>).

		Units
OSPAUSTL 10	Coral Reef Ecosystems	3
OSPAUSTL 30	Coastal Forest Ecosystems	3
OSPPARIS 74	Climate Change Challenges in France and Europe: from Project to Policy	4

## Computer Science

Courses offered by the Department of Computer Science are listed under the subject code CS on the *Stanford Bulletin's* ExploreCourses (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CS&filter-catalognumber=CS=on&filter-coursestatus=Active=on>) web site.

The Department of Computer Science (CS) operates and supports computing facilities for departmental education, research, and administration needs. All CS students have access to the departmental student machine for general use (mail, news, etc.), as well as computer labs with public workstations located in the Gates Building. In addition, most students have access to systems located in their research areas.

Each research group in Computer Science has systems specific to its research needs. These systems include workstations (PCs, Macs), multi-CPU computer clusters, and local mail and file servers. Servers and workstations running Linux or various versions of Windows are commonplace. Support for course work and instruction is provided on systems available through Information Technology Services (<http://itservices.stanford.edu>) (ITS) and the School of Engineering (<http://engineering.stanford.edu>) (SoE).

### Mission of the Undergraduate Program in Computer Science

The mission of the undergraduate program in Computer Science is to develop students' breadth of knowledge across the subject areas of computer sciences, including their ability to apply the defining processes of computer science theory, abstraction, design, and implementation to solve problems in the discipline. Students take a set of core courses. After learning the essential programming techniques and the mathematical foundations of computer science, students take courses in areas such as programming techniques, automata and complexity theory, systems programming, computer architecture, analysis of algorithms, artificial intelligence, and applications. The program prepares students for careers in government, law, and the corporate sector, and for graduate study.

### Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able to:

1. Apply the knowledge of mathematics, science, and engineering.
2. Design and conduct experiments, as well to analyze and interpret data.

3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Function on multidisciplinary teams.
5. Identify, formulate, and solve engineering problems.
6. Understand professional and ethical responsibility.
7. Communicate effectively.
8. Understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. Demonstrate a working knowledge of contemporary issues.
10. Apply the techniques, skills, and modern engineering tools necessary for engineering practice.
11. Transition from engineering concepts and theory to real engineering application.

### Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course work in the foundational elements of the field and in at least one graduate specialization. Areas of specialization include artificial intelligence, biocomputation, computer and network security, human-computer interaction, information management and analytics, mobile and internet computing, real-world computing.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Computer Science and related fields.

### Graduate Programs in Computer Science

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

### Computer Science Course Catalog Numbering System

The first digit of a CS course number indicates its general level of sophistication:

Digit	Description
001-099	Service courses for nontechnical majors
100-199	Other service courses, basic undergraduate
200-299	Advanced undergraduate/beginning graduate
300-399	Advanced graduate
400-499	Experimental
500-599	Graduate seminars

The tens digit indicates the area of Computer Science it addresses:

Digit	Description
00-09	Introductory, miscellaneous
10-19	Hardware and Software Systems
20-39	Artificial Intelligence

40-49	Software Systems
50-59	Mathematical Foundations of Computing
60-69	Analysis of Algorithms
70-79	Computational Biology and Interdisciplinary Topics
90-99	Independent Study and Practicum

## Bachelor of Science in Computer Science

The department offers both a major in Computer Science and a minor in Computer Science. Further information is available in the *Handbook for Undergraduate Engineering Programs* published by the School of Engineering. The Computer Science major offers a number of tracks (programs of study) from which students can choose, allowing them to focus their program on the areas of most interest. These tracks also reflect the broad diversity of areas in computing disciplines. The department has an honors program, which is described in the following section.

In addition to Computer Science itself, Stanford offers several interdisciplinary degrees with a substantial computer science component. The Symbolic Systems major (in the School of Humanities and Sciences) offers an opportunity to explore computer science and its relation to linguistics, philosophy, and psychology. The Mathematical and Computational Sciences major (also Humanities and Sciences) allows students to explore computer science along with more mathematics, statistics, and operations research.

### Computer Science (CS)

Completion of the undergraduate program in Computer Science leads to the conferral of the Bachelor of Science in Computer Science.

## Mission of the Undergraduate Program in Computer Science

The mission of the undergraduate program in Computer Science is to develop students' breadth of knowledge across the subject areas of computer sciences, including their ability to apply the defining processes of computer science theory, abstraction, design, and implementation to solve problems in the discipline. Students take a set of core courses. After learning the essential programming techniques and the mathematical foundations of computer science, students take courses in areas such as programming techniques, automata and complexity theory, systems programming, computer architecture, analysis of algorithms, artificial intelligence, and applications. The program prepares students for careers in government, law, and the corporate sector, and for graduate study.

## Requirements

### Mathematics (26 units minimum)

CS 103	Mathematical Foundations of Computing <sup>1</sup>	5
CS 109	Introduction to Probability for Computer Scientists <sup>2</sup>	5

MATH 41 & MATH 42	Calculus and Calculus <sup>3</sup>	10
Plus two electives <sup>4</sup>		

### Science (11 units minimum)—

PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
Science elective <sup>5</sup>		3

### Technology in Society (3-5 units)

One course; see Basic Requirement 4

### Engineering Fundamentals (13 units minimum; see Basic Requirement 3)—

CS 106B or CS 106X	Programming Abstractions (Accelerated)	5
ENGR 40 or ENGR 40N	Introductory Electronics / Engineering Wireless Networks	5
Fundamentals Elective (may not be 70A, B, or X)		3-5

### Writing in the Major—

Select one of the following:

CS 181W	Computers, Ethics and Public Policy
CS 191W	Writing Intensive Senior Project
CS 194W	Software Project
CS 210B	Software Project Experience with Corporate Partners

### Computer Science Core (15 units)

CS 107	Computer Organization and Systems	5
CS 110	Principles of Computer Systems <sup>6</sup>	5
CS 161	Design and Analysis of Algorithms <sup>7</sup>	5

## Computer Science Depth

Choose one of the following ten CS degree tracks (a track must consist of at least 25 units and 7 classes):

### Artificial Intelligence Track—

		Units
CS 221	Artificial Intelligence: Principles and Techniques	4
Select two of the following:		
CS 223A	Introduction to Robotics	6-8
CS 224M	Multi-Agent Systems	
CS 224N	Natural Language Processing	6-8
CS 226	Statistical Techniques in Robotics	
CS 227	Knowledge Representation and Reasoning	6-8
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 229	Machine Learning	6-8
One additional course from the list above or the following:		
		3-4

CS 124	From Languages to Information
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics
CS 222	Rational Agency and Intelligent Interaction
CS 224S	Speech Recognition and Synthesis
CS 224U	Natural Language Understanding
CS 224W	Social and Information Network Analysis
CS 225A	Experimental Robotics
CS 227B	General Game Playing
CS 231B	The Cutting Edge of Computer Vision
CS 262	Computational Genomics
CS 276	Information Retrieval and Web Search
CS 277	Experimental Haptics
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks
CS 321	Information Processing for Sensor Networks
CS 326A	Motion Planning
CS 327A	Advanced Robotic Manipulation
CS 329	Topics in Artificial Intelligence (with adviser consent)
CS 331	Advanced Reading in Computer Vision
CS 379	Interdisciplinary Topics (with adviser consent)
EE 263	Introduction to Linear Dynamical Systems
EE 376A	Information Theory
ENGR 205	Introduction to Control Design Techniques
ENGR 209A	Analysis and Control of Nonlinear Systems
MS&E 251	Stochastic Decision Models
MS&E 351	Dynamic Programming and Stochastic Control
STATS 315A	Modern Applied Statistics: Learning
STATS 315B	Modern Applied Statistics: Data Mining
Note: CS225B and MS&E 339 no longer offered	
Note: CS 374 not given this year	
Track Electives (at least three additional courses from the above lists, 9-13 the general CS electives list, or the following): <sup>9</sup>	
CS 275	Translational Bioinformatics
CS 334A	Convex Optimization I
or EE 364A	Convex Optimization I
EE 364B	Convex Optimization II
MS&E 252	Decision Analysis I: Foundations of Decision Analysis
MS&E 352	Decision Analysis II: Professional Decision Analysis
MS&E 355	Influence Diagrams and Probabilistics Networks
PHIL 152	Computability and Logic
PSYCH 202	Cognitive Neuroscience
PSYCH 204A	Human Neuroimaging Methods
PSYCH 204B	Computational Neuroimaging: Analysis Methods
STATS 200	Introduction to Statistical Inference
STATS 202	Data Mining and Analysis
STATS 205	Introduction to Nonparametric Statistics
Note: CS 278 no longer offered	
Note: ECON 286 not given this year	

## Biocomputation Track—

Units

The Mathematics, Science, and Engineering Fundamentals requirements are non-standard for this track. See Handbook for Undergraduate Engineering Programs for details.

Select one of the following: 3-4

CS 221	Artificial Intelligence: Principles and Techniques
CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 229	Machine Learning
CS 231A	Introduction to Computer Vision

Select one of the following:

CS 173	A Computational Tour of the Human Genome
or CS 273A	A Computational Tour of the Human Genome
CS 262	Computational Genomics
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving

CS 274	Representations and Algorithms for Computational Molecular Biology
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CS 275	Translational Bioinformatics
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CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks
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Note: CS 278 no longer offered

One additional course from the lists above or the following: 3-4

CS 124	From Languages to Information
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CS 145	Introduction to Databases
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CS 147	Introduction to Human-Computer Interaction Design
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CS 148	Introduction to Computer Graphics and Imaging
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CS 248	Interactive Computer Graphics
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One course from either the general CS electives list, BIOE 101, or the list of Biomedical Computation (BMC) Informatics electives (see <http://bmc.stanford.edu> and select Informatics from the elective options)<sup>9</sup> 3-4

One course from the BMC Informatics elective list 3-4

One course from either the BMC Informatics, Cellular/Molecular, or Organs/Organisms electives lists 3-5

One course from either the BMC Cellular/Molecular or Organs/Organisms electives lists 3-5

## Computer Engineering Track—

Units

EE 108A & EE 108B	Digital Systems I and Digital Systems II	6-8
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Select two of the following: 8

EE 101A	Circuits I
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EE 101B	Circuits II
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EE 102A	Signal Processing and Linear Systems I
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EE 102B	Signal Processing and Linear Systems II
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Satisfy the requirements of one of the following concentrations:

1) Digital Systems Concentration

CS 140	Operating Systems and Systems Programming
or CS 143	Compilers

EE 109	Digital Systems Design Lab
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EE 271	Introduction to VLSI Systems
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Select two of the following (6-8 units):

CS 140	Operating Systems and Systems Programming <sup>8</sup>
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or CS 143	Compilers
CS 144	Introduction to Computer Networking
CS 149	Parallel Computing
CS 244	Advanced Topics in Networking
EE 273	Digital Systems Engineering
EE 282	Computer Systems Architecture

Note: CS 240E no longer offered

2) Robotics and Mechatronics Concentration

CS 205A	Mathematical Methods for Robotics, Vision, and Graphics
CS 223A	Introduction to Robotics
ME 210	Introduction to Mechatronics
ENGR 105	Feedback Control Design

Select one of the following (3-4 units):

CS 225A	Experimental Robotics
CS 231A	Introduction to Computer Vision
CS 235	Applied Robot Design for Non-Robot-Designers: How to Fix, Modify, Design, and Build
CS 277	Experimental Haptics
ENGR 205	Introduction to Control Design Techniques
ENGR 207A	Linear Control Systems I

Note: AA 278 no longer offered

Note: CS 225B, ENGR 206, and ENGR 207B not given this year

3) Networking Concentration

CS 140 & CS 144	Operating Systems and Systems Programming and Introduction to Computer Networking
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Select three of the following (9-11 units):

CS 240	Advanced Topics in Operating Systems
CS 244	Advanced Topics in Networking
CS 244B	Distributed Systems
CS 244E	Networked Wireless Systems
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective
CS 249B	Large-scale Software Development
EE 179	Analog and Digital Communication Systems
EE 276	Introduction to Wireless Personal Communications

Note: CS 240E no longer offered

## Graphics Track—

	Units	
CS 148 & CS 248	Introduction to Computer Graphics and Imaging and Interactive Computer Graphics	8
Select one of the following: <sup>10</sup>		3-5
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	
CME 104	Linear Algebra and Partial Differential Equations for Engineers	
CME 108	Introduction to Scientific Computing	
MATH 52	Integral Calculus of Several Variables	
MATH 113	Linear Algebra and Matrix Theory	
Select two of the following:		6-8
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	
CS 178	Digital Photography	
CS 205B	Mathematical Methods for Fluids, Solids, and Interfaces	
CS 231A	Introduction to Computer Vision	

CS 268	Geometric Algorithms
CS 348A	Computer Graphics: Geometric Modeling
CS 348B	Computer Graphics: Image Synthesis Techniques
CS 448	Topics in Computer Graphics

Track Electives: at least two additional courses from the lists above, 6-8 the general CS electives list, or the following:<sup>9</sup>

ARTSTUDI 160	Design I : Fundamental Visual Language
ARTSTUDI 170	Introduction to Photography
ARTSTUDI 179	Digital Art I
CME 302	Numerical Linear Algebra
CME 306	Numerical Solution of Partial Differential Equations
EE 262	Two-Dimensional Imaging
EE 264	Digital Signal Processing
EE 368	Digital Image Processing
ME 101	Visual Thinking
PSYCH 30	Introduction to Perception
PSYCH 221	Applied Vision and Image Systems

Note: CME 324 no longer offered

Note: CS 48N, EE 278, and STS 144 not given this year

## Human-Computer Interaction Track—

	Units	
CS 147	Introduction to Human-Computer Interaction Design	4
Select one of the following:		4
CS 247	Human-Computer Interaction Design Studio	
CS 377	Topics in Human-Computer Interaction	
CS 448B	Data Visualization	
or CS 210A	Software Project Experience with Corporate Partners	
Select one of the following:		3-6
PSYCH 55	Introduction to Cognition and the Brain	
PSYCH 70	Introduction to Social Psychology	
PSYCH 252	Statistical Methods for Behavioral and Social Sciences	
ME 101	Visual Thinking	
Or any MS&E 18*		
Select one of the following:		3-4
CS 108	Object-Oriented Systems Design	
CS 124	From Languages to Information	
CS 140	Operating Systems and Systems Programming	
CS 142	Web Applications	
CS 221	Artificial Intelligence: Principles and Techniques	
CS 229	Machine Learning	
CS 229A	Applied Machine Learning	
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	
Select one of the following:		3-4
CS 148	Introduction to Computer Graphics and Imaging	
CS 376	Research Topics in Human-Computer Interaction	
CS 378	Phenomenological Foundations of Cognition, Language, and Computation	
CS 447	Software Design Experiences	

Track Electives: at least two additional courses from the lists above, 6-9  
the general CS electives list, or the following: <sup>9</sup>

ARTSTUDI 160	Design I : Fundamental Visual Language
COMM 169	Computers and Interfaces
ME 115A	Introduction to Human Values in Design
ME 115B	Product Design Methods

Note: CS 476A not given this year

## Information Track—

	Units	
CS 124	From Languages to Information	4
CS 145	Introduction to Databases	4
Two courses, from different areas:		6-9
1) Information-based AI applications		
CS 224N	Natural Language Processing	
CS 224S	Speech Recognition and Synthesis	
CS 229	Machine Learning	
CS 229A	Applied Machine Learning	
2) Database and Information Systems		
CS 140	Operating Systems and Systems Programming	
CS 142	Web Applications	
CS 245	Database Systems Principles	
CS 246	Mining Massive Data Sets	
CS 341	Project in Mining Massive Data Sets	
CS 345	Advanced Topics in Database Systems	
CS 347	Parallel and Distributed Data Management	
Note: CS 346 no longer offered		
3) Information Systems in Biology		
CS 262	Computational Genomics	
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	
CS 274	Representations and Algorithms for Computational Molecular Biology	
4) Information Systems on the Web		
CS 224W	Social and Information Network Analysis	
CS 276	Information Retrieval and Web Search	
CS 364B	Topics in Algorithmic Game Theory	
At least three additional courses from the above areas or the general CS electives list. <sup>9</sup>		

## Systems Track—

	Units	
CS 140	Operating Systems and Systems Programming	4
Select one of the following:		3-4
CS 143	Compilers	
EE 108B	Digital Systems II	
Two additional courses from the list above or the following:		6-8
CS 144	Introduction to Computer Networking	
CS 145	Introduction to Databases	
CS 149	Parallel Computing	
CS 155	Computer and Network Security	
CS 240	Advanced Topics in Operating Systems	
CS 242	Programming Languages	
CS 243	Program Analysis and Optimizations	
CS 244	Advanced Topics in Networking	

CS 245	Database Systems Principles
EE 271	Introduction to VLSI Systems
EE 282	Computer Systems Architecture

Track Electives: at least three additional courses selected from the list 9-12  
above, the general CS electives list, or the following: <sup>9</sup>

CS 244C	Readings and Projects in Distributed Systems
CS 244E	Networked Wireless Systems
CS 315A	Parallel Computer Architecture and Programming
or CS 316	Advanced Multi-Core Systems
CS 315B	Parallel Computing Research Project
CS 341	Project in Mining Massive Data Sets
CS 343	Advanced Topics in Compilers
CS 344	Topics in Computer Networks
CS 344E	Advanced Wireless Networks
CS 345	Advanced Topics in Database Systems
CS 347	Parallel and Distributed Data Management
CS 349	Topics in Programming Systems (with adviser consent)
CS 448	Topics in Computer Graphics
EE 382C	Interconnection Networks
EE 384A	Internet Routing Protocols and Standards
EE 384C	Wireless Local and Wide Area Networks
EE 384M	Network Science
EE 384S	Performance Engineering of Computer Systems & Networks
EE 384X	Packet Switch Architectures

Note: CS 240E, CS 346, EE 382A, and EE 384Y no longer offered  
Note: EE 384B not given this year

## Theory Track—

	Units	
CS 154	Introduction to Automata and Complexity Theory	4
Select one of the following:		3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	
CS 255	Introduction to Cryptography	
CS 261	Optimization and Algorithmic Paradigms	
CS 268	Geometric Algorithms	
CS 361A	Advanced Algorithms	
CS 365	Randomized Algorithms	
Two additional courses from the list above or the following:		6-8
CS 143	Compilers	
CS 155	Computer and Network Security	
CS 157	Logic and Automated Reasoning	
or PHIL 151	First-Order Logic	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 242	Programming Languages	
CS 254	Computational Complexity	
CS 259	Security Analysis of Network Protocols	
CS 262	Computational Genomics	
CS 354	Topics in Circuit Complexity	
CS 355	Advanced Topics in Cryptography	
CS 357	Advanced Topics in Formal Methods	

CS 358	Topics in Programming Language Theory
CS 359	Topics in the Theory of Computation (with adviser consent)
CS 364A	Algorithmic Game Theory
CS 364B	Topics in Algorithmic Game Theory
CS 366	Graph Partitioning and Expanders
CS 369	Topics in Analysis of Algorithms (with adviser consent)
MS&E 310	Linear Programming

Note: CS 374 not given this year

Track Electives: at least three additional courses from the list above, 9-12 the general CS electives list, or the following: <sup>9</sup>

CME 302	Numerical Linear Algebra
CME 305	Discrete Mathematics and Algorithms
PHIL 152	Computability and Logic

## Unspecialized Track—

	Units	
CS 154	Introduction to Automata and Complexity Theory	4
Select one of the following:		4
CS 140	Operating Systems and Systems Programming	
CS 143	Compilers	
One additional course from the list above or the following:		3-4
CS 144	Introduction to Computer Networking	
CS 155	Computer and Network Security	
CS 242	Programming Languages	
CS 244	Advanced Topics in Networking	
EE 108B	Digital Systems II	
Select one of the following:		3-4
CS 221	Artificial Intelligence: Principles and Techniques	
CS 223A	Introduction to Robotics	
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 229	Machine Learning	
CS 231A	Introduction to Computer Vision	
Select one of the following:		3-4
CS 145	Introduction to Databases	
CS 147	Introduction to Human-Computer Interaction Design	
CS 148	Introduction to Computer Graphics and Imaging	
CS 248	Interactive Computer Graphics	
CS 262	Computational Genomics	

At least two courses from the general CS electives list <sup>9</sup>

## Individually Designed Track—

Students may propose an individually designed track. Proposals should include a minimum of seven courses, at least four of which must be CS courses numbered 100 or above. See Handbook for Undergraduate Engineering Programs for further information.

## Senior Capstone Project (3 units minimum)

CS 191	Senior Project <sup>11</sup>
CS 191W	Writing Intensive Senior Project <sup>11</sup>
CS 194	Software Project
CS 194W	Software Project

CS 210B	Software Project Experience with Corporate Partners
CS 294	Research Project in Computer Science

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/computerscience/http://ughb.stanford.edu>)

## Honors Program

The Department of Computer Science (CS) offers an honors program for undergraduates whose academic records and personal initiative indicate that they have the necessary skills to undertake high-quality research in computer science. Admission to the program is by application only. To apply for the honors program, students must be majoring in Computer Science, have a grade point average (GPA) of at least 3.6 in courses that count toward the major, and achieve senior standing (135 or more units) by the end of the academic year in which they apply. Coterminal master's students are eligible to apply as long as they have not already received their undergraduate degree. Beyond these requirements, students who apply for the honors program must find a Computer Science faculty member who agrees to serve as the thesis adviser for the project. Thesis advisers must be members of Stanford's Academic Council.

Students who meet the eligibility requirements and wish to be considered for the honors program must submit a written application to the CS undergraduate program office by May 1 of the year preceding the honors work. The application must include a letter describing the research project, a letter of endorsement from the faculty sponsor, and a transcript of courses taken at Stanford. Each year, a faculty review committee selects the successful candidates for honors from the pool of qualified applicants.

In order to receive departmental honors, students admitted to the honors program must, in addition to satisfying the standard requirements for the undergraduate degree, do the following:

1. Complete at least 9 units of CS 191 or CS 191W under the direction of their project sponsor.
2. Attend a weekly honors seminar Winter and Spring quarters.
3. Complete an honors thesis deemed acceptable by the thesis adviser and at least one additional faculty member.
4. Present the thesis at a public colloquium sponsored by the department.
5. Maintain the 3.6 GPA required for admission to the honors program.

## Guide to Choosing Introductory Courses

Students arriving at Stanford have widely differing backgrounds and goals, but most find that the ability to use computers effectively is beneficial to their education. The department offers many introductory courses to meet the needs of these students.

For students whose principal interest is an exposure to the fundamental ideas behind computer science and programming, CS 101 or CS 105 are the most appropriate courses. They are intended for students in nontechnical disciplines who expect to make some use of computers, but who do not expect to go on to more advanced courses. CS 101 and CS 105 meet the General Education Disciplinary Breadth Requirement in Engineering and Applied Sciences and include an introduction to programming and the use of modern Internet-based technologies. Students interested in learning to use the computer should consider CS 1C, Introduction to Computing at Stanford.

Students who intend to pursue a serious course of study in computer science may enter the program at a variety of levels, depending on their background. Students with little prior experience or those who wish to

take more time to study the fundamentals of programming should take CS 106A followed by CS 106B. Students in CS 106A need not have prior programming experience. Students with significant prior exposure to programming or those who want an intensive introduction to the field should take CS 106X or may start directly in CS 106B. CS 106A uses Java as its programming language; CS 106B and X use C++. No prior knowledge of these languages is assumed, and the prior programming experience required for CS 106B or X may be in any language. In all cases, students are encouraged to discuss their background with the instructors responsible for these courses.

After the introductory sequence, Computer Science majors and those who need a significant background in computer science for related majors in engineering should take CS 103, CS 107 and X use C++. No prior knowledge of these languages is assumed, and the prior programming experience required for CS 106B or X may be in any language. In all cases, students are encouraged to discuss their background with the instructors responsible for these courses.

**In summary:**

For exposure:

CS 1C	Introduction to Computing at Stanford
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For nontechnical use:

CS 101 or CS 105	Introduction to Computing Principles Introduction to Computers
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For scientific use:

CS 106A	Programming Methodology
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For a technical introduction:

CS 106A	Programming Methodology
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For significant use:

CS 106A & CS 106B or CS 106X	Programming Methodology and Programming Abstractions Programming Abstractions (Accelerated)
CS 103	Mathematical Foundations of Computing
CS 107	Computer Organization and Systems
CS 110	Principles of Computer Systems

## Overseas Studies Courses in Computer Science

For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses web site (<http://explorecourses.stanford.edu>) or the Bing Overseas Studies web site (<http://bosp.stanford.edu>). Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

## Computer Science (CS) Minor

The following core courses fulfill the minor requirements. Prerequisites include the standard mathematics sequence through MATH 51.

		Units
Introductory Programming (AP Credit may be used to fulfill this requirement):		
CS 106B or CS 106X	Programming Abstractions Programming Abstractions (Accelerated)	5
Core:		
CS 103	Mathematical Foundations of Computing	5
CS 107	Computer Organization and Systems	5

CS 109	Introduction to Probability for Computer Scientists <sup>1</sup>	5
Electives (choose two courses from different areas):		
Artificial Intelligence—		
CS 124	From Languages to Information	4
CS 221	Artificial Intelligence: Principles and Techniques	4
Human-Computer Interaction—		
CS 147	Introduction to Human-Computer Interaction Design	4
Software—		
CS 108	Object-Oriented Systems Design	4
CS 110	Principles of Computer Systems	5
Systems—		
CS 140	Operating Systems and Systems Programming	4
CS 143	Compilers	4
CS 144	Introduction to Computer Networking	4
CS 145	Introduction to Databases	4
CS 148	Introduction to Computer Graphics and Imaging	4
Theory—		
CS 154	Introduction to Automata and Complexity Theory	4
CS 157	Logic and Automated Reasoning	3
CS 161	Design and Analysis of Algorithms	5

<sup>1</sup> Students who completed STATS 116, MS&E 120, or CME 106 in Winter 2008-09 or earlier may count that course as satisfying the CS 109 requirement. These same courses taken in Spring 2008-09 or later cannot be used to satisfy the CS 109 requirement.

*Note:* for students with no programming background and who begin with CS 106A, the minor consists of seven or eight courses.

## Master of Science in Computer Science

In general, the M.S. degree in Computer Science is intended as a terminal professional degree and does not lead to the Ph.D. degree. Most students planning to obtain the Ph.D. degree should apply directly for admission to the Ph.D. program. Some students, however, may wish to complete the master's program before deciding whether to pursue the Ph.D. To give such students a greater opportunity to become familiar with research, the department has instituted a program leading to a master's degree with distinction in research. This program is described in more detail below.

### Admission

Applications to the M.S. program and all supporting documents must be submitted and received online by the published deadline. Information on admission requirements and deadlines is available at <http://cs.stanford.edu/admissions/>. Exceptions are made for applicants who are already students at Stanford and are applying to the coterminal program. See <http://cs/content/coterminal-program-deadline>.

University requirements for the coterminal M.S. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

### Requirements

A candidate is required to complete a program of 45 units. At least 36 of these must be graded units, passed with a grade point average (GPA) of 3.0 (B) or better. The 45 units may include no more than 10 units of courses from those listed below in Requirement 1. Thus, students needing to take

more than two of the courses listed in Requirement 1 actually complete more than 45 units of course work in the program. Only well-prepared students may expect to finish the program in one year; most students complete the program in six quarters. Students hoping to complete the program with 45 units should already have a substantial background in computer science, including course work or experience equivalent to all of Requirement 1 and some prior course work related to their specialization area.

## Requirement 1: Foundations—

Students must complete the following courses, or waive out of them by providing evidence to their advisers that similar or more advanced courses have been taken, either at Stanford or another institution (total units used to satisfy foundations requirement may not exceed 10):

Logic, Automata, and Computability

CS 103	Mathematical Foundations of Computing
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Probability

Select one of the following:

CS 109	Introduction to Probability for Computer Scientists
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STATS 116	Theory of Probability
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MS&E 220	Probabilistic Analysis
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CME 106	Introduction to Probability and Statistics for Engineers
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Algorithms

CS 161	Design and Analysis of Algorithms
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Computer Organization and Systems

CS 107	Computer Organization and Systems
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Principles of Computer Systems

CS 110	Principles of Computer Systems
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## Requirement 2: Significant Software Implementation—

Students must complete at least one course designated as having a significant software implementation component. The list of such courses includes:

CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
CS 145	Introduction to Databases	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 210B	Software Project Experience with Corporate Partners	3-4
CS 221	Artificial Intelligence: Principles and Techniques	3-4
CS 243	Program Analysis and Optimizations	3-4
CS 248	Interactive Computer Graphics	3-4

## Requirement 3: Specialization—

Students may choose to satisfy this requirement through one of two options, Single Depth or Dual Depth, outlined following. All courses taken for this requirement must be taken for letter grades.

### Option 1—Single Depth

- A program of 27 units in a single area of specialization must be completed. A maximum of 9 units of independent study (CS 393, CS 395, CS 399) may be counted toward the specialization.

- Additionally, students must complete three breadth courses from the list of approved breadth courses associated with their chosen specialization. Individual specializations explicitly have different breadth requirements; see the individual specialization sheets at <http://cs.stanford.edu/degrees/mscs/programsheets> for details.
- Breadth courses may not be waived and must be completed for a letter grade.

### Option 2—Dual Depth

- Students select distinct primary and secondary areas.
- A program of 21 units in the primary area of specialization must be completed. A maximum of 9 units of independent study (CS 393, CS 395, CS 399) may be counted toward the primary specialization.
- Students must also complete a program of five courses satisfying the requirements for their secondary area of specialization.
- Breadth courses are not required.

## Specialization Areas—

Ten approved specialization areas which may be used to satisfy Requirement 3 are listed following. Students may propose to the M.S. program committee other coherent programs that meet their goals and satisfy the basic requirements.

Courses marked with an asterisk (\*) require consent of the faculty adviser. Courses marked with a double asterisk (\*\*) may be waived by students with equivalent course work and with the approval of their adviser.

### 1. Artificial Intelligence—

A.

CS 221	Artificial Intelligence: Principles and Techniques **
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B. Select at least four of the following:

CS 223A	Introduction to Robotics
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CS 224M	Multi-Agent Systems
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CS 224N	Natural Language Processing
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CS 224S	Speech Recognition and Synthesis
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CS 224U	Natural Language Understanding
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CS 224W	Social and Information Network Analysis
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CS 226	Statistical Techniques in Robotics
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CS 227	Knowledge Representation and Reasoning
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CS 228	Probabilistic Graphical Models: Principles and Techniques
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CS 229	Machine Learning
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CS 231A	Introduction to Computer Vision
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C. Sufficient depth units from category (b) and the following:

CS 124	From Languages to Information
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CS 173	A Computational Tour of the Human Genome
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or CS 273A	A Computational Tour of the Human Genome
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CS 205A	Mathematical Methods for Robotics, Vision, and Graphics
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CS 222	Rational Agency and Intelligent Interaction
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CS 225A	Experimental Robotics
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CS 225B	Robot Programming Laboratory (not given this year)
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CS 227B	General Game Playing
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CS 229A	Applied Machine Learning
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CS 229T	Statistical Learning Theory
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CS 231B	The Cutting Edge of Computer Vision
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CS 235	Applied Robot Design for Non-Robot-Designers: How to Fix, Modify, Design, and Build
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CS 246	Mining Massive Data Sets
CS 262	Computational Genomics
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving
CS 274	Representations and Algorithms for Computational Molecular Biology
CS 275	Translational Bioinformatics
CS 276	Information Retrieval and Web Search
CS 277	Experimental Haptics
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks
CS 294A	Research Project in Artificial Intelligence *
CS 321	Information Processing for Sensor Networks
CS 327A	Advanced Robotic Manipulation
CS 328	Topics in Computer Vision
CS 329	Topics in Artificial Intelligence
CS 331	Advanced Reading in Computer Vision
CS 334A	Convex Optimization I
or EE 364A	Convex Optimization I
CS 341	Project in Mining Massive Data Sets
CS 345	Advanced Topics in Database Systems
CS 364A	Algorithmic Game Theory
CS 364B	Topics in Algorithmic Game Theory
CS 374	Algorithms in Biology (not given this year)
CS 377	Topics in Human-Computer Interaction *
CS 379	Interdisciplinary Topics *
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *
EE 263	Introduction to Linear Dynamical Systems
EE 364B	Convex Optimization II
EE 376A	Information Theory
ENGR 205	Introduction to Control Design Techniques
ENGR 209A	Analysis and Control of Nonlinear Systems
MS&E 251	Stochastic Decision Models
MS&E 252	Decision Analysis I: Foundations of Decision Analysis
MS&E 351	Dynamic Programming and Stochastic Control
MS&E 352	Decision Analysis II: Professional Decision Analysis
MS&E 353	Decision Analysis III: Frontiers of Decision Analysis
PSYCH 202	Cognitive Neuroscience
PSYCH 205	Foundations of Cognition
STATS 202	Data Mining and Analysis
STATS 315A	Modern Applied Statistics: Learning
STATS 315B	Modern Applied Statistics: Data Mining

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Artificial Intelligence must take five total courses satisfying the area (a) and (b) requirements above.
- Those students who have waived out of CS 221 may take an additional course in either area (b) or (c).

## Artificial Intelligence Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 240	Advanced Topics in Operating Systems	3
CS 242	Programming Languages	3
CS 243	Program Analysis and Optimizations	3-4
CS 244	Advanced Topics in Networking	3-4
CS 244B	Distributed Systems	3
CS 244E	Networked Wireless Systems	3
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 255	Introduction to Cryptography	3
CS 259	Security Analysis of Network Protocols	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 268	Geometric Algorithms	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 2. Biocomputation—

A. Select at least four of the following:

CS 173	A Computational Tour of the Human Genome
or CS 273A	A Computational Tour of the Human Genome
CS 262	Computational Genomics
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving
CS 272	Introduction to Biomedical Informatics Research Methodology
CS 274	Representations and Algorithms for Computational Molecular Biology
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks

B. Sufficient depth units from category (a) and the following:

CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 229	Machine Learning
CS 229A	Applied Machine Learning
CS 245	Database Systems Principles
CS 246	Mining Massive Data Sets
CS 261	Optimization and Algorithmic Paradigms

CS 268	Geometric Algorithms
CS 275	Translational Bioinformatics
CS 277	Experimental Haptics
CS 341	Project in Mining Massive Data Sets
CS 345	Advanced Topics in Database Systems
CS 365	Randomized Algorithms
CS 374	Algorithms in Biology (not given this year)
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *
BIOC 218	Computational Molecular Biology
GENE 211	Genomics
SBIO 228	Computational Structural Biology

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) and (b) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Biocomputation must take five total courses, three courses of which must come from area (a) and the remaining two courses may come from either area (a) or (b).

## Biocomputation Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 231A	Introduction to Computer Vision	3
CS 240	Advanced Topics in Operating Systems	3
CS 242	Programming Languages	3
CS 243	Program Analysis and Optimizations	3-4
CS 244	Advanced Topics in Networking	3-4

CS 244B	Distributed Systems	3
CS 244E	Networked Wireless Systems	3
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 255	Introduction to Cryptography	3
CS 259	Security Analysis of Network Protocols	3
CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 3. Computer and Network Security—

A.

CS 140	Operating Systems and Systems Programming **
CS 144	Introduction to Computer Networking **
CS 155	Computer and Network Security
CS 244	Advanced Topics in Networking
CS 255	Introduction to Cryptography

B. Select at least three of the following:

CS 142	Web Applications
CS 240	Advanced Topics in Operating Systems
CS 241	Secure Web Programming
CS 244B	Distributed Systems
CS 244C	Readings and Projects in Distributed Systems
CS 259	Security Analysis of Network Protocols
CS 261	Optimization and Algorithmic Paradigms
CS 240	Advanced Topics in Operating Systems
CS 344	Topics in Computer Networks
CS 355	Advanced Topics in Cryptography
CS 365	Randomized Algorithms

C. Sufficient depth units from category (b) and the following:

CS 244E	Networked Wireless Systems
CS 245	Database Systems Principles
CS 294S	Research Project in Software Systems and Security *
CS 295	Software Engineering
CS 341	Project in Mining Massive Data Sets
CS 344B	Advanced Topics in Distributed Systems
CS 345	Advanced Topics in Database Systems
CS 347	Parallel and Distributed Data Management
CS 361A	Advanced Algorithms
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *
EE 384A	Internet Routing Protocols and Standards
EE 384C	Wireless Local and Wide Area Networks
EE 384M	Network Science
EE 384S	Performance Engineering of Computer Systems & Networks
EE 384X	Packet Switch Architectures

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Computer and Network Security must take five courses; those five courses must satisfy the area (a) requirement and additional courses from area (b) should be taken if any area (a) requirements are waived.

## Computer and Network Security Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 143	Compilers	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 173 or CS 273A	A Computational Tour of the Human Genome	3
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 229A	Applied Machine Learning	3-4
CS 231A	Introduction to Computer Vision	3
CS 242	Programming Languages	3
CS 243	Program Analysis and Optimizations	3-4
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 262	Computational Genomics	3
CS 268	Geometric Algorithms	3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3

EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 4. Human-Computer Interaction—

A.

CS 147	Introduction to Human-Computer Interaction Design **
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B. Select one of the following:

CS 247	Human-Computer Interaction Design Studio
CS 294H	Research Project in Human-Computer Interaction

C. Select one of the following:

CS 376	Research Topics in Human-Computer Interaction
CS 378	Phenomenological Foundations of Cognition, Language, and Computation
CS 448B	Data Visualization

D. Select one of the following:

CS 124	From Languages to Information
CS 142	Web Applications
CS 148	Introduction to Computer Graphics and Imaging

E. Select one of the following:

CS 303	Designing Computer Science Experiments
COMM 206	Communication Research Methods
COMM 268	Experimental Research in Advanced User Interfaces
PSYCH 110	Research Methods and Experimental Design
PSYCH 252	Statistical Methods for Behavioral and Social Sciences
PSYCH 254	Lab in Experimental Methods
SOC 257	Causal Inference in Quantitative Educational and Social Science Research

F. Select one of the following:

ARTSTUDI 160	Design I : Fundamental Visual Language
ME 203	Design and Manufacturing
ME 216A	Advanced Product Design: Needfinding
ME 377	Design Thinking Bootcamp: Experiences in Innovation and Design

Any d.school course

G. One or more courses from areas (b) through (f), or the following:

ARTSTUDI 260	Design II: The Bridge
CS 229	Machine Learning
CS 229A	Applied Machine Learning
CS 242	Programming Languages
CS 246	Mining Massive Data Sets
CS 248	Interactive Computer Graphics
CS 295	Software Engineering
CS 341	Project in Mining Massive Data Sets
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *

- Or any d.school class listed at <http://dschool.stanford.edu>, or any HCI class listed at <http://hci.stanford.edu/courses> noted as counting toward the CS M.S. degree. Such courses must be numbered 100 or above and be taken for at least 3 units to count for this requirement.

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) through (g) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Human-Computer Interaction must take five courses as follows:
  - one course each from areas (a), (d), (e), and (f)
  - then one course from either area (b) or (c)
- Students waiving out of the area (a) requirement should take one additional course from areas (b) through (g).

## Human-Computer Interaction Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 173	A Computational Tour of the Human Genome	3
or CS 273A	A Computational Tour of the Human Genome	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 231A	Introduction to Computer Vision	3
CS 240	Advanced Topics in Operating Systems	3
CS 243	Program Analysis and Optimizations	3-4
CS 244	Advanced Topics in Networking	3-4
CS 244E	Networked Wireless Systems	3
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 255	Introduction to Cryptography	3
CS 259	Security Analysis of Network Protocols	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 262	Computational Genomics	3
CS 268	Geometric Algorithms	3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4

CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 5. Information Management and Analytics—

A.

CS 145	Introduction to Databases **	3-4
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B. Select at least four of the following:

CS 224N	Natural Language Processing	
CS 224W	Social and Information Network Analysis	
CS 229	Machine Learning	
CS 245	Database Systems Principles	
CS 246	Mining Massive Data Sets	
CS 276	Information Retrieval and Web Search	
CS 345	Advanced Topics in Database Systems	
CS 347	Parallel and Distributed Data Management	

C. Sufficient depth units from category (b) and the following:

CS 173	A Computational Tour of the Human Genome	
or CS 273A	A Computational Tour of the Human Genome	
CS 224S	Speech Recognition and Synthesis	
CS 224U	Natural Language Understanding	
CS 228	Probabilistic Graphical Models: Principles and Techniques	
CS 229A	Applied Machine Learning	
CS 229T	Statistical Learning Theory	
CS 231A	Introduction to Computer Vision	
CS 240	Advanced Topics in Operating Systems	
CS 242	Programming Languages	
CS 243	Program Analysis and Optimizations	
CS 244	Advanced Topics in Networking	
CS 244B	Distributed Systems	
CS 244C	Readings and Projects in Distributed Systems	
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	
CS 249B	Large-scale Software Development	
CS 255	Introduction to Cryptography	
CS 262	Computational Genomics	
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	
CS 272	Introduction to Biomedical Informatics Research Methodology	
CS 274	Representations and Algorithms for Computational Molecular Biology	
CS 275	Translational Bioinformatics	
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	
CS 315A	Parallel Computer Architecture and Programming	
or CS 316	Advanced Multi-Core Systems	
CS 321	Information Processing for Sensor Networks	
CS 341	Project in Mining Massive Data Sets	
CS 344	Topics in Computer Networks	

CS 364B	Topics in Algorithmic Game Theory
CS 374	Algorithms in Biology (not given this year)
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *
STATS 315A	Modern Applied Statistics: Learning
STATS 315B	Modern Applied Statistics: Data Mining

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Information Management and Analytics must take five courses satisfying the area (a) and (b) requirements above. Note that if CS145 was waived in area (a), students should take an additional course from either area (b) or (c) in its place.

## Information Management and Analytics Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 140	Operating Systems and Systems Programming	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 244E	Networked Wireless Systems	3
CS 259	Security Analysis of Network Protocols	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 268	Geometric Algorithms	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 6. Mobile and Internet Computing

A. Select two of the following:

CS 140	Operating Systems and Systems Programming **
CS 144	Introduction to Computer Networking
CS 244	Advanced Topics in Networking

B. Select one of the following:

CS 142	Web Applications
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CS 147	Introduction to Human-Computer Interaction Design
CS 247	Human-Computer Interaction Design Studio

C. Select one of the following:

CS 155	Computer and Network Security
CS 255	Introduction to Cryptography

D.

CS 294S	Research Project in Software Systems and Security
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E. Sufficient depth units from categories (a) through (d) and the following:

CS 224W	Social and Information Network Analysis
CS 244E	Networked Wireless Systems
CS 246	Mining Massive Data Sets
CS 344	Topics in Computer Networks
CS 344E	Advanced Wireless Networks
CS 364A	Algorithmic Game Theory
CS 376	Research Topics in Human-Computer Interaction
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *
EE 359	Wireless Communications
EE 384A	Internet Routing Protocols and Standards
EE 384C	Wireless Local and Wide Area Networks
EE 384E	Networked Wireless Systems
EE 384M	Network Science
EE 384S	Performance Engineering of Computer Systems & Networks
COMM 268	Experimental Research in Advanced User Interfaces
PSYCH 252	Statistical Methods for Behavioral and Social Sciences

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) through (e) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Mobile and Internet Computing must take five courses satisfying the area (a) through (d) requirements above.

## Mobile and Internet Computing Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 143	Compilers	3-4
CS 145	Introduction to Databases	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 173	A Computational Tour of the Human Genome	3
or CS 273A	A Computational Tour of the Human Genome	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3

CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 229A	Applied Machine Learning	3-4
CS 231A	Introduction to Computer Vision	3
CS 240	Advanced Topics in Operating Systems	3
CS 242	Programming Languages	3
CS 243	Program Analysis and Optimizations	3-4
CS 244B	Distributed Systems	3
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 259	Security Analysis of Network Protocols	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 262	Computational Genomics	3
CS 268	Geometric Algorithms	3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 7. Real-World Computing—

A. Select at least three of the following:

CS 148	Introduction to Computer Graphics and Imaging
CS 223A	Introduction to Robotics
CS 231A	Introduction to Computer Vision
CS 248	Interactive Computer Graphics

B. Select at least three of the following:

CS 205A	Mathematical Methods for Robotics, Vision, and Graphics
CS 205B	Mathematical Methods for Fluids, Solids, and Interfaces
CS 226	Statistical Techniques in Robotics
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective
CS 249B	Large-scale Software Development
CS 262	Computational Genomics
CS 268	Geometric Algorithms
CS 277	Experimental Haptics
CS 348A	Computer Graphics: Geometric Modeling
CS 348B	Computer Graphics: Image Synthesis Techniques
CS 374	Algorithms in Biology (not given this year)
CME 302	Numerical Linear Algebra

CME 306	Numerical Solution of Partial Differential Equations
CME 326	Numerical Methods for Initial Boundary Value Problems

C. Sufficient additional units chosen from the above and from the following:

CS 173	A Computational Tour of the Human Genome
or CS 273A	A Computational Tour of the Human Genome
CS 225A	Experimental Robotics
CS 225B	Robot Programming Laboratory (not given this year)
CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 229	Machine Learning
CS 229A	Applied Machine Learning
CS 232	Digital Image Processing
or EE 368	Digital Image Processing
CS 235	Applied Robot Design for Non-Robot-Designers: How to Fix, Modify, Design, and Build
CS 247	Human-Computer Interaction Design Studio
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving
CS 272	Introduction to Biomedical Informatics Research Methodology
CS 274	Representations and Algorithms for Computational Molecular Biology
CS 294A	Research Project in Artificial Intelligence *
CS 327A	Advanced Robotic Manipulation
CS 328	Topics in Computer Vision
CS 331	Advanced Reading in Computer Vision
CS 448	Topics in Computer Graphics
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a), (b), and (c) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Real-World Computing must take five total courses satisfying area (a) and two of the three courses in the area (b) requirements above (i.e., three courses in area (a) and two courses in area (b)).

## Real-World Computing Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3

CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 240	Advanced Topics in Operating Systems	3
CS 242	Programming Languages	3
CS 243	Program Analysis and Optimizations	3-4
CS 244	Advanced Topics in Networking	3-4
CS 244B	Distributed Systems	3
CS 244E	Networked Wireless Systems	3
CS 246	Mining Massive Data Sets	3
CS 255	Introduction to Cryptography	3
CS 259	Security Analysis of Network Protocols	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 8. Software Theory—

A.

CS 242	Programming Languages
CS 243	Program Analysis and Optimizations

B. Select at least one of the following:

CS 241	Secure Web Programming
CS 259	Security Analysis of Network Protocols

C. Select at least one of the following:

CS 244	Advanced Topics in Networking
CS 245	Database Systems Principles
CS 295	Software Engineering
CS 341	Project in Mining Massive Data Sets
CS 343	Advanced Topics in Compilers
CS 345	Advanced Topics in Database Systems

D. Select at least one course from the following:

CS 255	Introduction to Cryptography
CS 261	Optimization and Algorithmic Paradigms
CS 268	Geometric Algorithms
CS 355	Advanced Topics in Cryptography
CS 361A	Advanced Algorithms
CS 365	Randomized Algorithms

E. At least two additional courses chosen from (b), (c), (d), or the following:

CS 294S	Research Project in Software Systems and Security *
CS 393	Computer Laboratory *

CS 395	Independent Database Project *
CS 399	Independent Project *

- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a)-(e) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Software Theory need to take 5 total courses satisfying the area (a) through (d) requirements above:
  - two courses in area (a)
  - one course each in areas (b) through (d).

## Software Theory Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 140	Operating Systems and Systems Programming	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 173	A Computational Tour of the Human Genome	3
or CS 273A	A Computational Tour of the Human Genome	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 229A	Applied Machine Learning	3-4
CS 231A	Introduction to Computer Vision	3
CS 240	Advanced Topics in Operating Systems	3
CS 244B	Distributed Systems	3
CS 244E	Networked Wireless Systems	3
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 262	Computational Genomics	3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3

CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

## 9. Systems—

A.

CS 140	Operating Systems and Systems Programming **
CS 144	Introduction to Computer Networking **
CS 240	Advanced Topics in Operating Systems
CS 242	Programming Languages

B. Select at least three of the following:

CS 243	Program Analysis and Optimizations
CS 244	Advanced Topics in Networking
CS 245	Database Systems Principles
CS 248	Interactive Computer Graphics
CS 348B	Computer Graphics: Image Synthesis Techniques
EE 271	Introduction to VLSI Systems
EE 282	Computer Systems Architecture

C. At least two additional courses chosen from category (b) and the following:

CS 244B	Distributed Systems
CS 244C	Readings and Projects in Distributed Systems
CS 244E	Networked Wireless Systems
CS 246	Mining Massive Data Sets
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective
CS 249B	Large-scale Software Development
CS 255	Introduction to Cryptography
CS 259	Security Analysis of Network Protocols
CS 262	Computational Genomics
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving
CS 272	Introduction to Biomedical Informatics Research Methodology
CS 276	Information Retrieval and Web Search
CS 294S	Research Project in Software Systems and Security *
CS 295	Software Engineering
CS 315A	Parallel Computer Architecture and Programming
or CS 316	Advanced Multi-Core Systems
CS 315B	Parallel Computing Research Project
CS 340	Topics in Computer Systems
CS 341	Project in Mining Massive Data Sets
CS 343	Advanced Topics in Compilers
CS 344	Topics in Computer Networks
CS 344B	Advanced Topics in Distributed Systems
CS 345	Advanced Topics in Database Systems
CS 347	Parallel and Distributed Data Management
CS 348A	Computer Graphics: Geometric Modeling
CS 349	Topics in Programming Systems
CS 374	Algorithms in Biology (not given this year)
CS 448	Topics in Computer Graphics
CS 393	Computer Laboratory *
CS 395	Independent Database Project *

CS 399	Independent Project *
EE 273	Digital Systems Engineering
EE 382C	Interconnection Networks
EE 384A	Internet Routing Protocols and Standards
EE 384C	Wireless Local and Wide Area Networks
EE 384M	Network Science
EE 384S	Performance Engineering of Computer Systems & Networks
EE 384X	Packet Switch Architectures

- Students with a 27-unit depth option (Option 1 above) must take 27 units subject to satisfying the area (a), (b), and (c) requirements above.
- Students with a 21-unit depth option (Option 2 above) must take that many units subject to satisfying the area (a) and (b) requirements above, and additional courses may be taken from area (c) if any courses in the area (a) requirement are waived.
- Students with a secondary area of specialization (per Option 2 above) in Systems need to take five courses; those courses must satisfy the area (a) requirement and additional courses may be taken from area (b).

## Systems Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 173	A Computational Tour of the Human Genome	3
or CS 273A	A Computational Tour of the Human Genome	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 229A	Applied Machine Learning	3-4
CS 231A	Introduction to Computer Vision	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 268	Geometric Algorithms	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3



## 10. Theoretical Computer Science

A.

CS 241 or CS 258 or CS 259	Secure Web Programming Security Analysis of Network Protocols
CS 261	Optimization and Algorithmic Paradigms ***

B. Sufficient additional units chosen from:

CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 241	Secure Web Programming
CS 246	Mining Massive Data Sets
CS 254	Computational Complexity
CS 255	Introduction to Cryptography
CS 259	Security Analysis of Network Protocols
CS 262	Computational Genomics
CS 268	Geometric Algorithms
CS 334A or EE 364A	Convex Optimization I Convex Optimization I
CS 341	Project in Mining Massive Data Sets
CS 345	Advanced Topics in Database Systems
CS 355	Advanced Topics in Cryptography
CS 357	Advanced Topics in Formal Methods
CS 358	Topics in Programming Language Theory
CS 359	Topics in the Theory of Computation *
CS 361A	Advanced Algorithms
CS 364A	Algorithmic Game Theory
CS 364B	Topics in Algorithmic Game Theory
CS 365	Randomized Algorithms
CS 366	Graph Partitioning and Expanders
CS 369	Topics in Analysis of Algorithms *
CS 374	Algorithms in Biology (not given this year)
CS 393	Computer Laboratory *
CS 395	Independent Database Project *
CS 399	Independent Project *
CS 468	Geometry Processing Algorithms *
MS&E 310	Linear Programming

- Multiple CS 359, CS 369, and/or CS 468 courses may be taken as long as they are each on different topics, denoted by different letter suffixes for the courses.
- Students with a 27- or 21-unit depth option (Option 1 or 2 above) must take 27 or 21 units respectively subject to satisfying the area (a) and (b) requirements above.
- Students with a secondary area of specialization (per Option 2 above) in Theoretical Computer Science need to take 5 total courses satisfying the area (a) and (b) requirements above:
  - two courses in area (a)
  - three courses in area (b).

### Theoretical Computer Science Breadth Courses

Students in the single depth specialization must complete three of the following breadth courses and receive a letter grade for each.

CS 124	From Languages to Information	3-4
CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 173	A Computational Tour of the Human Genome	3
or CS 273A	A Computational Tour of the Human Genome	
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 224W	Social and Information Network Analysis	3
CS 226	Statistical Techniques in Robotics	3
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 229	Machine Learning	3-4
CS 229A	Applied Machine Learning	3-4
CS 231A	Introduction to Computer Vision	3
CS 240	Advanced Topics in Operating Systems	3
CS 242	Programming Languages	3
CS 243	Program Analysis and Optimizations	3-4
CS 244	Advanced Topics in Networking	3-4
CS 244B	Distributed Systems	3
CS 244E	Networked Wireless Systems	3
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 276	Information Retrieval and Web Search	3
CS 279	Computational Methods for Analysis and Reconstruction of Biological Networks	3
CME 108	Introduction to Scientific Computing	3-4
CME 302	Numerical Linear Algebra	3
EE 108B	Digital Systems II	3-4
EE 282	Computer Systems Architecture	3

\* With consent of faculty adviser.

\*\* Students with equivalent course work may waive with approval of their adviser.

\*\*\* CS 361A or CS 361B may be used as substitutes for CS 261.

## Requirement 4

Additional elective units must be technical courses (numbered 100 or above) related to the degree program and approved by the adviser. All CS courses numbered above 110 (with the exception of CS 196 and 198) taken for 3 or more units are pre-approved as elective courses. Additionally, up to a maximum of 3 units of 500-level CS seminars, CS 300, EE 380, EE 385A, or other 1-2 unit seminars offered in the School of Engineering may be counted as electives. Elective courses may be taken on a satisfactory/no credit basis provided that a minimum of 36 graded units is presented within the 45-unit program.

## Master of Science with Distinction in Research

A student who wishes to pursue the M.S. in CS with distinction in research must first identify a faculty adviser who agrees to supervise and support the research work. The research adviser must be a member of the Academic Council and must hold an appointment in Computer Science. The student and principal adviser must also identify another faculty member, who need not be in the Department of Computer Science, to serve as a secondary adviser and reader for the research report. In addition, the student must complete the following requirements beyond those for the regular M.S. in CS degree:

- 1. Research Experience**—The program must include significant research experience at the level of a half-time commitment over the course of three academic quarters. In any given quarter, the half-time research commitment may be satisfied by a 50 percent appointment to a departmentally supported research assistantship, 6 units of independent study (CS 393, CS 395, or CS 399), or a prorated combination of the two (such as a 25 percent research assistantship supplemented by 3 units of independent study). This research must be carried out under the direction of the primary or secondary adviser.
- 2. Supervised Writing and Research**—In addition to the research experience outlined in the previous requirement, students must enroll in at least 3 units of independent research (CS 393, CS 395, or CS 399) under the direction of their primary or secondary adviser. These units should be closely related to the research described in the first requirement, but focused more directly on the preparation of the research report described in the next section. The writing and research units described in parts (1) and (2) may be counted toward the 45 units required for the degree.
- 3.** All independent study units (CS 393, CS 395, CS 399) must be taken for letter grades and a GPA of 3.0 (B) or better must be maintained.
- 4. Research Report**—Students must complete a significant report describing their research and its conclusions. The research report represents work that is publishable in a journal or at a high-quality conference, although it is presumably longer and more expansive in scope than a typical conference paper. A copy of the research report must be submitted to the student services office in the department three weeks before the beginning of the examination period in the student's final quarter. Both the primary and secondary adviser must approve the research report before the distinction-in-research designation can be conferred.

## Joint M.S. and Law Degree

Law students interested in pursuing an M.S. in Computer Science must apply for admission to the Computer Science Department either (i) concurrently with applying to the Law School; or (ii) after being admitted to the Law School, but no later than the earlier of: (a) the end of the second year of Law School; or (b) the Computer Science Department's admission deadline for the year following that second year of Law School.

In addition to being admitted separately to the Law School and the Computer Science Department, students must secure permission from both academic units to pursue degrees in those units as part of a joint degree program.

J.D./M.S. students may elect to begin their course of study in either the Law School or the Computer Science Department. Faculty advisors from each academic unit participate in the planning and supervising of the student's joint program. Students must be enrolled full-time in the Law School for the first year of law studies. Otherwise, enrollment may be in the graduate school or the Law School, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. degree as specified by the Law School and the M.S. degree as specified in this Bulletin.

The Law School approves courses from the Department of Computer Science that may count toward the J.D. degree, and the Computer Science Department approves courses from the Law School that may count toward the M.S. degree in Computer Science. In either case, approval may consist of a list applicable to all joint-degree students or may be tailored to each individual student program. No more than 45 units of approved courses may be counted toward both degrees. No more than 36 units of courses that originate outside the Law School may count toward the Law degree. To the extent that courses under this joint degree program originate outside of the Law School but count toward the Law degree, the Law School credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis, but not below zero. The maximum number of Law School credits that may be counted toward the M.S. in Computer Science is the greater of: (i) 12 units; or (ii) the maximum number of units from courses outside of the department that M.S. candidates in Computer Science are permitted to count toward the M.S. in the case of a particular student's individual program. Tuition and financial aid arrangements are normally through the school in which the student is then enrolled.

## Teaching and Research Assistantships in Computer Science

Graduate student assistantships are available. Half-time assistants receive a tuition scholarship for 8, 9, or 10 units per quarter during the academic year, and in addition receive a monthly stipend.

Duties for half-time assistants during the academic year involve approximately 20 hours of work per week. Course assistants (CAs) help an instructor teach a course by conducting discussion sections, consulting with students, and grading examinations. Research assistants (RAs) help faculty and senior staff members with research in computer science. Most course and research assistantships are held by Ph.D. students. If there is an insufficient number of Ph.D. students to staff teaching and research assistantships, then these positions are open to master's students. However, master's students should not plan on being appointed to an assistantship.

Students with fellowships may have the opportunity to supplement their stipends by serving as graduate student assistants.

## Doctor of Philosophy in Computer Science

The University's basic requirements for the Ph.D. degree are outlined in the "Graduate Degrees (p. 38)" section of this bulletin. Department requirements are stated below.

## Requirements

Applications to the Ph.D. program and all supporting documents must be submitted and received online by the published deadline. Please see <http://www-cs.stanford.edu/admissions> for admissions requirements and

the application deadline. Changes or updates to the admission process are posted in September.

The following are general department requirements. Contact the Computer Science Ph.D. administrator for details.

1. A student should plan and complete a coherent program of study covering the basic areas of computer science and related disciplines. The student's adviser has primary responsibility for the adequacy of the program, which is subject to review by the Ph.D. program committee.
2. The first year of the Ph.D. program is spent working with 1-3 different professors on a rotating basis. The intent is to allow the first-year Ph.D. student to work with a variety of professors before aligning with a permanent program adviser. Students who don't need the full year to find a professor to align with have the option of aligning within the first or second quarter.
3. The CS 300 Departmental Lecture Series seminar gives faculty the opportunity to explain their research to first year CS Ph.D. students. First year CS Ph.D. students are required to attend 2/3 of the classes to receive credit. This is a mandatory requirement for all first year CS Ph.D. students.
4. A student must complete 135 course units for graduation. Computer Science Ph.D. students take 9-10 units per quarter. Credit for coursework done elsewhere (up to the maximum of 45 course units) may be applied to graduation requirements. Students must also take courses from at least four different faculty members.
5. Each student, to remain in the Ph.D. program, must satisfy the breadth requirement covering introductory-level graduate material in major areas of computer science. A student must fulfill two breadth-area requirements in each of three general areas by the end of the second year in the program. If students have fulfilled the six breadth-area requirements they are eligible to apply for candidacy prior to the second year in the program. An up-to-date list of courses that satisfy the breadth requirements can be found at <http://cs.stanford.edu/education/phd>. The student must completely satisfy the breadth requirement by the end of the second year in the program and must pass a qualifying exam in the general area of their expected dissertation by the end of the third year in the program.
6. University policy requires that all doctoral students declare candidacy by the end of the sixth quarter in residence, excluding summers. However, after passing six breadth requirements and taking classes with four different faculty, a student is eligible to file for candidacy prior to the sixth quarter. The candidacy form serves as a "contract" between the department and the student. The department acknowledges that the student is a *bona fides* candidate for the Ph.D. and agrees that the program submitted by the student is sufficient to warrant granting the Ph.D. upon completion. The student may petition the department for modification of his or her program. Candidacy expires five years from the date of submission of the candidacy form, rounded to the end of the quarter. In special cases, the department may extend a student's candidacy, but is under no obligation to do so.
7. Each student is required to pass a qualifying exam in their area by the end of their third year in the program. A student may only take the qualifying exam twice. If the student fails the qualifying exam a second time, the Ph.D. Program Committee is convened to discuss the student's lack of a reasonable academic progress. Failing the exam a second time is cause for dismissal from the Computer Science Ph.D. program and the committee will meet to discuss the final outcome for the student.
8. As part of the training for the Ph.D., the student is also required to complete at least four units (a unit is ten hours per week for one quarter) as a course assistant or instructor for courses in Computer Science numbered 100 or above.
9. The Reading Committee form and Oral Thesis Proposal must be submitted within one year of passing the qualifying exam.
10. The most important requirement is the dissertation. After passing the required qualifying examination, each student must secure the agreement of a member of the department faculty to act as the dissertation adviser. The dissertation adviser is often the student's program adviser.
11. The student must pass a University oral examination in the form of a defense of the dissertation. This is typically held after all or a substantial portion of the dissertation research has been completed.
12. The student is expected to demonstrate the ability to present scholarly material orally in the dissertation defense.
13. The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a second member from within the department, and a third member chosen from within or outside of the University. The department requires at least two committee members to be affiliated with the Computer Science department. The principal adviser and at least one of the other committee members must be Academic Council members.

## Guidelines for Reasonable Progress

By the end of the first academic year, a student should be aligned with a permanent research advisor.

By Spring Quarter of the second year, a student should complete all six breadth area requirements, two breadth area requirements in each of three areas, and file for candidacy.

By Spring Quarter of the third year, a student should pass a Qualifying Examination (<http://cs.stanford.edu/content/qualifying-exams>) in the area of his or her intended dissertation.

Within one year of passing the Qualifying Examination, a student should submit a signed Reading Committee Form ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/doc\\_diss\\_rdg\\_ctte.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/doc_diss_rdg_ctte.pdf)) and Thesis Proposal.

The teaching requirement may be satisfied at any time. As a matter of policy, a student should satisfy half of the teaching requirement in the first two years. Students are encouraged to complete the teaching requirement early in their stay to eliminate conflicts with later dissertation work. The research requirement is routinely satisfied by participation in research throughout the student's career.

## Ph.D. Minor in Computer Science

For a minor in Computer Science, a candidate must complete 20 non-duplicate units of Computer Science coursework numbered 200 or above. At least three of the courses must be master's core courses to provide breadth and one course numbered 300 or above to provide depth. One of the courses taken must include a significant programming project to demonstrate programming efficiency. Courses must be taken for a letter grade and passed with a grade of 'B' or better. Applications for a minor in Computer Science are submitted at the same time as admission to candidacy.

*Emeriti: (Professors)* Tom Binford, Edward Feigenbaum (<http://ksl-web.stanford.edu/people/eaf>), Richard Fikes (<http://www.stanford.edu/~fikes>), Donald E. Knuth (<http://www-cs-faculty.stanford.edu/~knuth>)\*, Jean-Claude Latombe (<http://robotics.stanford.edu/~lato>)\*, Edward J. McCluskey ([http://crc.stanford.edu/users/ejm/McCluskey\\_Edward.html](http://crc.stanford.edu/users/ejm/McCluskey_Edward.html)), Zohar Manna, William F. Miller,

Nils J. Nilsson (<http://robotics.stanford.edu/~nilsson>), Vaughan Pratt (<http://boole.stanford.edu/pratt.html>)\*, Jeffrey D. Ullman (<http://infolab.stanford.edu/~ullman>), Gio Wiederhold (<http://infolab.stanford.edu/people/gio.html>)\*

*Chair:* Jennifer Widom (<http://infolab.stanford.edu/~widom>)

*Associate Chair for Education:* Mehran Sahami (<http://robotics.stanford.edu/users/sahami/bio.html>)

*Professors:* Alex Aiken (<http://theory.stanford.edu/~aiken>), Dan Boneh (<http://crypto.stanford.edu/~dabo>), David Cheriton (<http://www.stanford.edu/~cheriton>), William J. Dally ([http://cva.stanford.edu/billd\\_webpage\\_new.html](http://cva.stanford.edu/billd_webpage_new.html)), David Dill (<http://verify.stanford.edu/dill>), Hector Garcia-Molina (<http://infolab.stanford.edu/people/hector.html>), Leonidas J. Guibas (<http://geometry.stanford.edu/member/guibas>), Patrick Hanrahan (<http://www-graphics.stanford.edu/~hanrahan>), John Hennessy, Mark A. Horowitz (<http://www-vlsi.stanford.edu/~horowitz>), Oussama Khatib (<http://robotics.stanford.edu/~ok>), Daphne Koller (<http://ai.stanford.edu/~koller>), Monica Lam (<http://suif.stanford.edu/~lam>), Marc Levoy (<http://graphics.stanford.edu/~levoy>), Teresa Meng (<http://dualist.stanford.edu/~thm>), Nick McKeown (<http://tiny-tera.stanford.edu/~nickm>), Christopher Manning (<http://nlp.stanford.edu/~manning>), John Mitchell (<http://theory.stanford.edu/people/jcm/home.html>), Kunle Olukotun (<http://ogun.stanford.edu/~kunle>), Balaji Prabhakar (<http://www.stanford.edu/~balaji>), Mendel Rosenblum, Yoav Shoham (<http://robotics.stanford.edu/~shoham>), Luca Trevisan (<http://cs.stanford.edu/people/trevisan>), Jennifer Widom (<http://infolab.stanford.edu/~widom>), Terry Winograd (<http://hci.stanford.edu/winograd>)

*Associate Professors:* Serafim Batzoglou (<http://ai.stanford.edu/~serafim>), Dawson Engler (<http://www.stanford.edu/~engler>), Ronald P. Fedkiw (<http://physbam.stanford.edu/~fedkiw>), Michael Genesereth (<http://logic.stanford.edu/people/genesereth/genesereth.html>), Scott Klemmer (<http://hci.stanford.edu/srk>), Christoforos Kozyrakis (<http://csl.stanford.edu/~christos>), Philip Levis (<http://csl.stanford.edu/~pal>), Fei-Fei Li (<http://vision.stanford.edu>), David Mazieres (<http://www.scs.stanford.edu/~dm>), Subhasish Mitra (<http://www.stanford.edu/~subh>), Andrew Ng (<http://www.cs.stanford.edu/people/ang>), Serge A. Plotkin (<http://troll-w.stanford.edu/plotkin>), Tim Roughgarden (<http://theory.stanford.edu/~tim>)

*Assistant Professors:* Gill Bejerano (<http://bejerano.stanford.edu>), Michael Bernstein (<http://people.csail.mit.edu/msbernst>), Jeffrey Heer (<http://hci.stanford.edu/jheer>), Sachin Katti (<http://www.stanford.edu/~skatti>), Vladlen Koltun (<http://vladlen.org>), Jure Leskovec (<http://cs.stanford.edu/people/jure>), Percy Liang, Ryan Williams

*Professors (Research):* John Ousterhout (<http://www.stanford.edu/~ouster/cgi-bin/home.php>), John K. Salisbury (<http://robotics.stanford.edu/~jks>), Sebastian Thrun (<http://robots.stanford.edu>)

*Professor (Teaching):* Eric S. Roberts (<http://www-cs-faculty.stanford.edu/~eroberts>)

*Associate Professor (Teaching):* Stephen Cooper (<http://www.stanford.edu/~coopers>), Mehran Sahami (<http://robotics.stanford.edu/users/sahami/bio.html>)

*Courtesy Professors:* Russ Altman ([http://bmir.stanford.edu/people/view.php/russ\\_b\\_altman](http://bmir.stanford.edu/people/view.php/russ_b_altman)), Stephen Boyd (<http://www.stanford.edu/~boyd>), Martin Fischer (<http://www.stanford.edu/~fischer>), Bernd Girod (<http://www.stanford.edu/~bgirod>), Michael Levitt, Clifford J. Nass (<http://www.stanford.edu/~nass>), Roy Pea, Fouad A. Tobagi

*Courtesy Associate Professors:* Atul Butte ([http://med.stanford.edu/profiles/Atul\\_Butte](http://med.stanford.edu/profiles/Atul_Butte)), Ashish Goel (<http://www.stanford.edu/~ashishg>), Dan Jurafsky (<http://www.stanford.edu/~jurafsky>), Allison Okamura, Vijay Pande

*Courtesy Assistant Professors:* Paulo Blikstein (<http://www.blikstein.com/paulo>), Noah Goodman (<http://stanford.edu/~ngoodman>), Ramesh Johari, Stephen Montgomery (<http://montgomerylab.stanford.edu>), Ge Wang (<http://ccrma.stanford.edu/~ge>)

*Lecturers:* Gerald Cain, Nicholas J. Parlante (<http://www-cs-faculty.stanford.edu/~nick>), Keith Schwarz, Patrick Young (<http://www.stanford.edu/~psyoung>), Julie Zelenski (<http://www-cs-faculty.stanford.edu/~zelenski>)

*Consulting Professors:* Gary Bradski (<http://exploreddegrees.stanford.edu/instructor?sunet=bradski>), Pei Cao (<http://crypto.stanford.edu/~cao>), Stuart Card, Tom Dean, Kurt Konolige, Prabhakar Raghavan (<http://theory.stanford.edu/people/pragh>)

*Consulting Associate Professors:* Federico Barbagli

*Consulting Assistant Professor:* Martin Casado (<http://yuba.stanford.edu/~casado>)

*Visiting Professors:* Tor Aamodt, Martin Bokeloh, Adrian Butscher, Wangxiang Che, Vassos Hadzilacos, Norbert Pohlmann, Gil Segev, Michael Stark, Ron van der Meijden, Jan Vitek

\* Recalled to active duty.

# Electrical Engineering

Courses offered by the Department of Electrical Engineering are listed under the subject code EE on the *Stanford Bulletin's* ExploreCourses web site.

## Mission of the Undergraduate Program in Electrical Engineering

The mission of the undergraduate program of the Department of Electrical Engineering is to augment the liberal education expected of all Stanford undergraduates, to impart a basic understanding of electrical engineering built on a foundation of physical science, mathematics, computing, and technology, and to provide majors in the department with knowledge of electrical engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering fundamentals. The program develops students' skills in performing and designing experimental projects and communicating their findings to the scientific community effectively. Students in the major are required to select one sub-discipline for specialization. Choices include bioelectronics and bioimaging; circuits and devices; computer hardware; computer software; music; signal processing, communication and controls; and solid state, photonics, and electromagnetics. The program prepares students for careers in government agencies, the corporate sector, or for future study in graduate or professional schools.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. The educational objectives of the program are:

1. Technical knowledge—provide a knowledge of electrical engineering principles along with the required supporting knowledge of computing, engineering fundamentals, mathematics, and science. The program must include depth in at least one specialty area, currently including bioelectronics and bioimaging; circuits and devices; computer hardware; computer software; music; signal processing, communications and controls; and solid state, photonics and electromagnetics.

2. Laboratory and design skills—develop the basic skills needed to perform and design experimental projects. Develop the ability to formulate problems and projects and to plan a process for solution, taking advantage of diverse technical knowledge and skills.
3. Communications skills—develop the ability to organize and present information and to write and speak effective English.
4. Preparation for further study—provide sufficient breadth and depth for successful subsequent graduate study, postgraduate study, or lifelong learning programs.
5. Preparation for the profession—provide an appreciation for the broad spectrum of issues arising in professional practice, including economics, ethics, leadership, professional organizations, safety, service, and teamwork.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course work providing specialization in one area of Electrical Engineering and breadth in several other areas. Areas of specialization include biomedical sensing and imaging; hardware; software; control and system engineering; communication systems; dynamic systems and optimization; circuits; devices, sensors and technology; fields, waves and radioscience; image systems; lasers, optoelectronics and quantum electronics; network systems; signal processing; solid state materials and devices.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Electrical Engineering and related fields.

## Graduate Programs in Electrical Engineering

University regulations governing the M.S., Engineer, and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin.

The profession of electrical engineering demands a strong foundation in physical science and mathematics, a broad knowledge of engineering techniques, and an understanding of the relationship between technology and man. Curricula at Stanford are planned to offer the breadth of education and depth of training necessary for leadership in the profession. To engage in this profession with competence, four years of undergraduate study and at least one year of postgraduate study are recommended. For those who plan to work in highly technical development or fundamental research, additional graduate study is desirable.

A one- to two-year program of graduate study in Electrical Engineering may lead to the degree of Master of Science. The program is typically completed in five academic quarters. A two- to three-year program, offering a wider selection of engineering course work, more opportunity for study in the related fields of engineering, mathematics, and physics, and in particular, more independent work and individual guidance, may lead to the degree of Engineer.

The degree of Doctor of Philosophy is offered under the general regulations of the University. The doctoral program, requiring a minimum of 135 units of graduate study, should be considered by those with the ability and desire to make a life work of research or teaching.

## Application for Admission

Applications for graduate admission in Electrical Engineering (EE) should be completed electronically at <http://gradadmissions.stanford.edu>. For information concerning Electrical Engineering graduate admissions, see

<http://ee-admissions.stanford.edu>. The application deadline for admission for Autumn Quarter 2013-14 is December 18, 2012.

## Electrical Engineering Course Catalog Numbering System

Electrical Engineering courses are typically numbered according to the year in which the courses are normally taken.

Number	Year
010-099	first or second year
100-199	second through fourth year
200-299	mezzanine courses for advanced undergraduates or graduate students
300-399	first graduate year
400-499	second or third graduate year
600-799	special summer courses

The Department of Electrical Engineering (EE) offers courses in the following areas:

- Biomedical Devices and Bioimaging
- Communication Systems: wireless, optical, wireline
- Control, Learning, and Optimization
- Electronic and Magnetic Devices
- Energy: solar cells, smart grid, load control
- Environmental and Remote Sensing: sensor nets, radar systems, space
- Fields and Waves
- Graphics, HCI, Computer Vision, Photography
- Information Theory and Coding: Image and data compression, denoising
- Integrated Circuit Design: MEMS, sensors, analog, RF
- Network Systems and Science: Next gen internet, wireless networks
- Nano and Quantum Science
- Nanofabrication Science and Technology
- Photonic Devices
- Systems Software: OS, compilers, languages
- Systems Hardware: architecture, VLSI, embedded systems

## Areas of Research in Electrical Engineering

Candidates for advanced degrees participate in the research activities of the department as paid research assistants or as students of individual faculty members. At any one time, certain areas of research have more openings than others. A new applicant should express a second choice of research interest in the event that there are no vacancies in the primary area of interest. At present, faculty members and students are actively engaged in research in the following areas:

- **Integrated Electronic Systems Technology**
  - MEMS, Sensors, Actuators
  - Circuits
  - Devices
- **Bio-EE**
  - Instrumentation
  - Imaging
  - Analysis
- **Photonics/EM/Quantum**
  - Photonics
  - Nano

- Quantum
- Communication
- Imaging
- Radio
- **Information Systems**
  - Information Theory and Coding
  - Communications
  - Control & Optimization
  - Signal Processing
  - Stochastic Systems
- **Hardware/Software Systems**
  - Networking
  - Architecture/VLSI
  - Software
- **Energy/Environment**
  - Distributed Control/Optimization
  - Environmental Monitoring Devices

For additional information, see the Department of Electrical Engineering's Research page at <http://ee.stanford.edu/research.php>.

## Undergraduate Programs in Electrical Engineering

To major in Electrical Engineering (EE), undergraduates should follow the depth sequence in the "Undergraduate Degree in Electrical Engineering" section of this bulletin. Students must have a program planning sheet approved by their adviser and the department before the end of the quarter following the quarter in which they declare the EE major. A final version of the completed and signed program sheet is due to the department no later than one month prior to the quarter of senior year. Program sheets are available at <http://ughb.stanford.edu>. Majors must receive at least a 2.0 grade point average (GPA) in courses taken for the EE depth requirement; all classes must be taken for a letter grade.

Students interested in a minor should consult the "Minor in Electrical Engineering" section of this bulletin.

A Stanford undergraduate may work simultaneously toward the B.S. and M.S. degrees. University requirements for the coterminal M.A. or M.S. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

## Electrical Engineering (EE)

Completion of the undergraduate program in Electrical Engineering leads to the conferral of the Bachelor of Science in Electrical Engineering.

### Mission of the Undergraduate Program in Electrical Engineering

The mission of the undergraduate program of the Department of Electrical Engineering is to augment the liberal education expected of all Stanford undergraduates, to impart a basic understanding of electrical engineering built on a foundation of physical science, mathematics, computing, and technology, and to provide majors in the department with knowledge of electrical engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering

fundamentals. The program develops students' skills in performing and designing experimental projects and communicating their findings to the scientific community effectively. Students in the major are required to select one sub-discipline for specialization. Choices include bioelectronics and bioimaging; circuits and devices; computer hardware; computer software; music; signal processing, communication and controls; and solid state, photonics, and electromagnetics. The program prepares students for careers in government agencies, the corporate sector, or for future study in graduate or professional schools.

## Requirements

		Units
<b>Mathematics (28-30)</b>		
MATH 41	Calculus	5
MATH 42	Calculus	5
Select one of the following sequences:		10
MATH 51 & MATH 52	Linear Algebra and Differential Calculus of Several Variables and Integral Calculus of Several Variables	
CME 100 & CME 104	Vector Calculus for Engineers and Linear Algebra and Partial Differential Equations for Engineers (Same as ENGR 154 & ENGR 155B)	
Select one of the following:		5
MATH 53	Ordinary Differential Equations with Linear Algebra	
CME 102/ ENGR 155A	Ordinary Differential Equations for Engineers	
Select one of the following:		3-5
EE 178	Probabilistic Systems Analysis (Preferred)	
STATS 116	Theory of Probability	
MATH 151	Introduction to Probability Theory	
CME 106/ ENGR 155C	Introduction to Probability and Statistics for Engineers	
<b>Science (15-17)</b>		
Select one of the following sequences:		8
PHYSICS 41 & PHYSICS 43	Mechanics and Electricity and Magnetism	
PHYSICS 61 & PHYSICS 63	Mechanics and Special Relativity and Electricity, Magnetism, and Waves	
Math or Science electives <sup>1</sup>		7-9
<b>Technology in Society (3-5)</b>		
One course, see Basic Requirement 4 in the School of Engineering section		3-5
<b>Writing in the Major (WIM) (3-4)</b>		
Select one of the following:		3-4
EE 109	Digital Systems Design Lab (WIM)	
EE 133	Analog Communications Design Laboratory (WIM)	
EE 134	Introduction to Photonics (WIM)	
EE 168	Introduction to Digital Image Processing (WIM)	
EE 191W	Special Studies and Reports in Electrical Engineering (WIM) <sup>2</sup>	
CS 194W	Software Project (WIM)	
<b>Engineering Fundamentals (11-15)</b>		
Three courses minimum, see Basic Requirement 3 in the School of Engineering section		

CS 106B/ENGR 70B	Programming Abstractions	5
or CS 106X/ENGR 70X	Programming Abstractions (Accelerated)	

At least two additional courses, at least one of which is not in EE or CS (CS 106A is not allowed). Choose from table in Undergraduate Handbook. One from ENGR 40, ENGR 40N or ENGR 40P recommended.

**Core Courses Engineering Depth (46-62)**

Minimum 68 Engineering Topics units; see Basic Requirement 5 in the School of Engineering section

EE 100	The Electrical Engineering Profession	1
EE 101A	Circuits I	4
EE 101B	Circuits II	4
EE 102A	Signal Processing and Linear Systems I	4
EE 102B	Signal Processing and Linear Systems II	4
EE 108A	Digital Systems I	4
EE 108B	Digital Systems II	4
Physics in Electrical Engineering:		
EE 41/ENGR 40P	Physics of Electrical Engineering <sup>3</sup>	3-5
or EE 141	Engineering Electromagnetics	
Specialty courses <sup>4</sup>		9-12
One course in Design <sup>5</sup>		
Electrical Engineering electives <sup>6</sup>		9-20
<b>Total Units</b>		<b>106-133</b>

- A minimum of 12 science units must be taken. A minimum of 45 math and science units combined must be taken.
- EE 191W may satisfy WIM if used for Honors Thesis, REU (following a summer REU project), or a research project. A written report that has gone through revision with an advisor is required. An advisor from the Writing Center is recommended.
- EE 41/ENGR 40P can meet this requirement only if it is not used to fulfill the Engineering Fundamentals requirement.
- Three courses from one of the specialty areas shown below (consultation with an adviser in the selection of these courses is especially important):
- The design course may be part of the specialty sequence. The following courses satisfy this requirement: EE 109, EE 133, EE 134, EE 168, EE 262, EE 265, CS 194W.
- May include up to two additional Engineering Fundamentals. May include up to 10 units of EE 191 and EE 191W. May include any CS 193 course.

## Specialty Areas

		Units
<b>Bioelectronics and Bioimaging (23)</b>		
EE 122B	Introduction to Biomedical Electronics	3
EE 124	Introduction to Neuroelectrical Engineering	3
EE 134	Introduction to Photonics (WIM)	4
EE 168	Introduction to Digital Image Processing (WIM)	4
EE 169	Introduction to Bioimaging	3
EE 202	Electrical Engineering in Biology and Medicine	3
EE 225	Bio-chips, Imaging and Nanomedicine	3
<b>Circuits and Devices (26)</b>		
EE 114	Fundamentals of Analog Integrated Circuit Design	4
EE 116	Semiconductor Device Physics	3
EE 122A	Analog Circuits Laboratory	3

EE 133	Analog Communications Design Laboratory (WIM)	4
EE 212	Integrated Circuit Fabrication Processes	3
EE 214B	Advanced Analog Integrated Circuit Design	3
EE 216	Principles and Models of Semiconductor Devices	3
EE 271	Introduction to VLSI Systems	3

**Computer Hardware (16-18)**

EE 109	Digital Systems Design Lab (WIM)	4
EE 271	Introduction to VLSI Systems	3
EE 273	Digital Systems Engineering	3
EE 282	Computer Systems Architecture	3
CS 107	Computer Organization and Systems	3-5

**Computer Software (27-37)**

CS 107	Computer Organization and Systems	3-5
CS 108	Object-Oriented Systems Design	3-4
CS 110	Principles of Computer Systems	3-5
CS 140	Operating Systems and Systems Programming	3-4
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
or EE 284	Introduction to Computer Networks	
CS 145	Introduction to Databases	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 194W	Software Project (WIM)	3

**Music (23-51)**

EE 109	Digital Systems Design Lab (WIM)	4
EE 264	Digital Signal Processing	3-4
or EE 265	Digital Signal Processing Laboratory	
MUSIC 256A	Music, Computing, and Design I: Software Paradigms for Computer Music	1-4
MUSIC 256B	Music, Computing, Design II: Mobile Music	1-4
MUSIC 420A	Signal Processing Models in Musical Acoustics	3-4
MUSIC 420B	Software for Sound Synthesis and Audio Effects	1-10
MUSIC 421A	Audio Applications of the Fast Fourier Transform	3-4
MUSIC 421B	Projects in Spectral Audio Signal Processing	1-10
MUSIC 422	Perceptual Audio Coding	3
MUSIC 424	Signal Processing Techniques for Digital Audio Effects	3-4

**Signal Processing, Communications and Controls (44-45)**

EE 124	Introduction to Neuroelectrical Engineering	3
EE 133	Analog Communications Design Laboratory (WIM)	4
EE 168	Introduction to Digital Image Processing (WIM)	4
EE 169	Introduction to Bioimaging	3
EE 179	Analog and Digital Communication Systems	3
EE 261	The Fourier Transform and Its Applications	3
EE 262	Two-Dimensional Imaging	3
EE 263	Introduction to Linear Dynamical Systems	3
EE 264	Digital Signal Processing	3-4
or EE 265	Digital Signal Processing Laboratory	
EE 276	Introduction to Wireless Personal Communications	3
EE 278B	Introduction to Statistical Signal Processing	3
EE 279	Introduction to Digital Communication	3
ENGR 105	Feedback Control Design	3
ENGR 205	Introduction to Control Design Techniques	3

**Solid State, Photonics and Electromagnetics (37)**

EE 116	Semiconductor Device Physics	3
EE 134	Introduction to Photonics (WIM)	4
EE 136	Introduction to Nanophotonics and Nanostructures	3

EE 141	Engineering Electromagnetics	3
EE 216	Principles and Models of Semiconductor Devices	3
EE 222	Applied Quantum Mechanics I	3
EE 223	Applied Quantum Mechanics II	3
EE 228	Basic Physics for Solid State Electronics	3
EE 235	Guided Wave Optical Devices	3
EE 242	Electromagnetic Waves	3
EE 247	Introduction to Optical Fiber Communications	3
EE 268	Introduction to Modern Optics	3

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/electricalengineering/> <http://ughb.stanford.edu>).

## Honors Program

The Department of Electrical Engineering offers a program leading to a Bachelor of Science in Electrical Engineering with honors. This program offers a unique opportunity for qualified undergraduate majors to conduct independent study and research at an advanced level with a faculty mentor, graduate students, and fellow undergraduates.

Admission to the honors program is by application. Declared EE majors with a grade point average (GPA) of at least 3.5 in Electrical Engineering are eligible to submit an application. Applications must be submitted by Autumn quarter of the senior year, be signed by the thesis adviser and second reader (one must be a member of the EE Faculty), and include an honors proposal. Students need to declare honors on Axess.

In order to receive departmental honors, students admitted to the honors program must:

1. Maintain a grade point average (GPA) of at least 3.5 in EE courses.
2. Complete at least 10 units of EE 191 or EE 191W for a letter grade with their thesis adviser.
3. Submit one final copy of the honors thesis approved by the adviser and second reader.
4. Attend poster and oral presentation in the Electrical Engineering Honors Symposium held at the end of Spring Quarter or present in another suitable forum approved by the faculty adviser.

## Electrical Engineering (EE) Minor

The options for completing a minor in EE are outlined below. Students must complete a minimum of 25 units, as follows:

Select one of the following courses:	5
ENGR 40 Introductory Electronics	
ENGR 40N Engineering Wireless Networks	
ENGR 40P Physics of Electrical Engineering	
Select one of the following options:	8
Option I:	
EE 101A Circuits I	
EE 101B Circuits II	
Option II:	
EE 102A Signal Processing and Linear Systems I	
EE 102B Signal Processing and Linear Systems II	
Option III:	
EE 108A Digital Systems I	
EE 108B Digital Systems II	

In addition, four letter-graded EE or cognate courses at the 100-level or higher must be taken (12 units minimum) 12

# Master of Science in Electrical Engineering

Students with undergraduate degrees in physics, mathematics, or related sciences, as well as in various branches of engineering, are invited to apply for admission. They should typically be able to complete the master's degree in five quarters; note that many courses are not taught during the summer. Capable students without formal undergraduate preparation in electrical engineering may also be admitted for graduate study. Such students may have graduated in any field and may hold either the B.S. or B.A. degree. Graduate study in electrical engineering demands that students be adequately prepared in areas such as circuits, digital systems, fields, lab work, mathematics, and physics. Skill in using modern computing facilities is essential for electrical engineers, and an increasing number of courses routinely require it. This skill should be acquired early in the program, either by taking one of the regular computer science courses or by self-study.

It is the student's responsibility, in consultation with an adviser, to determine whether the prerequisites for advanced courses have been met. Prerequisite courses ordinarily taken by undergraduates may be included as part of the graduate program of study. However, if the number of these is large, the proposed program may contain more than the minimum 45 units, and the time required to meet the degree requirements may be increased.

The master's degree program may provide advanced preparation for professional practice or for teaching at the junior college level, or it may serve as the first step in graduate work leading to the degree of Engineer or Ph.D. The faculty does not prescribe specific courses to be taken. Each student, with the help of a program adviser, prepares an individual program and submits it to the department for approval. The Program Proposal must be submitted to the Degree Progress Office before the end of the first quarter of graduate study (second quarter for Honors Cooperative Program students); a final revised version is due early in the final quarter of study, prior to degree conferral. Detailed requirements and instructions are available at <http://ee.stanford.edu/gradhandbook>. All requirements for a master's degree must be completed within three years after the student's first term of enrollment in the master's program (five years for Honors Cooperative Program students).

Students working toward the Master of Science degree in Electrical Engineering who are considering a Ph.D. or Engineer degree program in Electrical Engineering at Stanford must request the addition of a new degree program by submitting a Graduate Program Authorization Petition in Axess for approval by the department. The petition must be submitted and approved at least one quarter prior to M.S. degree completion. Once the M.S. degree in EE has been conferred, a student may not register for additional course work without this approval.

Students originally admitted only to the M.S. degree may petition the EE Graduate Admissions Committee during autumn quarter of their second year at Stanford for a change of status to the Ph.D. program with permission to take the Ph.D. qualifying exam in January. Requirements for the petition include a grade point average of 3.5 on Stanford courses and a written statement of academic and financial support from an EE faculty member with whom the student has conducted preliminary research through directed reading (EE 390 Special Studies or Projects in Electrical Engineering or EE 391 Special Studies and Reports in Electrical Engineering) or as part of a 300-level project course. Decisions are based on performance and the strength of the support letter.

## Joint Electrical Engineering and Law Degree (J.D./M.S.)

The Department of Electrical Engineering and the School of Law offer a joint degree program leading to an M.S. degree in EE combined with a J.D.



degree. The J.D./M.S. program is designed for students who wish to prepare themselves for careers that involve both Law and Electrical Engineering.

Students interested in this joint degree program must apply to and gain admission separately from the Department of Electrical Engineering and the School of Law, and as an additional step, secure consent from both academic units to pursue both degrees simultaneously. Interest in the program should be noted on a student's application to each academic unit. A student currently enrolled in either the Department of Electrical Engineering or the School of Law may apply for admission to the other academic unit and for joint degree status after commencing study in that unit.

Joint degree students may elect to begin their study in either the Department of Electrical Engineering or the School of Law. Faculty advisers from each academic unit participate in the planning and supervising of the student's joint program. In the first year of the joint degree program, students must be enrolled full-time in the School of Law. Students must satisfy the requirements for both the J.D. and the M.S. degrees as specified in the *Stanford Bulletin*.

The Electrical Engineering Department approves courses from the Law School that may count toward the M.S. degree in Electrical Engineering, and the Law School approves courses from the Department of Electrical Engineering that may count toward the J.D. degree. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program.

No more than 45 quarter hours of approved courses may be counted toward both degrees. No more than 36 quarter hours of courses that originate outside the School of Law may count toward the Law degree. To the extent that courses under this joint degree program originate outside of the School of Law but count toward the Law degree, the School of Law credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis but not below zero.

The maximum number of School of Law units that may be counted toward the M.S. degree in Electrical Engineering is the greater of:

1. 12 units

or

2. the maximum number of units from courses outside of the department that M.S. candidates in Electrical Engineering are permitted to count toward the M.S. degree under general departmental guidelines, or as set forth in the case of a particular student's individual program.

Tuition and financial aid arrangements are typically administered through the school in which the student is enrolled.

## The Honors Cooperative Program

Many of the department's graduate students are supported by the Honors Cooperative Program (HCP), which makes it possible for academically qualified engineers and scientists in nearby companies to be part-time graduate students in Electrical Engineering while continuing nearly full-time professional employment. Prospective HCP students follow the same admission process and must meet the same admission requirements as full-time graduate students. For more information regarding the Honors Cooperative Program, see the "School of Engineering" section of this bulletin.

## Engineer Degree in Electrical Engineering

The Engineer degree is intended for those who desire more graduate training than can be obtained in a Master of Science Program. It differs from the Ph.D. primarily in looking toward professional engineering work

rather than toward theoretical research or university teaching. The Engineer degree is normally awarded at the completion of a comprehensive two-year program of graduate study.

The Engineer degree requires a minimum of 90 units. Students may count up to 45 units completed at Stanford towards a master's degree in an Engineering discipline or a relevant M.S. degree completed elsewhere toward the 90 units. Students who completed an M.S. at another institution must complete the Application for Graduate Residency Credit form and submit it to the Registrar's Office for evaluation.

Applicants currently working toward the Stanford M.S. degree in Electrical Engineering must request permission to continue graduate studies beyond the master's degree by submitting the Graduate Program Authorization Petition in Axxess.

The student and thesis adviser jointly develop a course program, which must be approved by the adviser and then submitted to the department for approval. The Engineer thesis adviser must be an EE faculty member. The Application for Candidacy for Engineer Degree form must be submitted by the end of the second quarter in the program (fourth quarter for Honors Cooperative Program students). It is signed by the student, program adviser and thesis adviser, then approved by the department chair.

The equivalent of at least one quarter is devoted to independent study and thesis work with faculty guidance. The thesis is typically a professional report on the solution of a design problem.

The following requirements assume that the student has completed the requirements for the M.S. degree either at Stanford or elsewhere. The course requirements in addition to the M.S. Degree (or an equivalent amount of graduate work) are as follows:

Total of 45 units beyond the M.S. Degree:

6 units of lecture courses\* in EE (or related courses in EE (cognates)), at the 300 level or higher, taken for a letter grade

21 units of lecture courses\* in EE (or related courses in EE (cognates)), at the 200 level or higher, taken for a letter grade

3 units of lecture courses\* at the 100 level or higher, taken for a letter grade

6-15 Thesis units (EE 400) taken with the Engineer thesis advisor

\*Lecture courses do not include special studies (EE 390/391) and thesis (EE 400)

Additional units taken may include other math/science/engineering courses, seminars, research courses, and courses taken for CR/NC. All courses must be at the 100 level or higher.

Students must maintain a minimum GPA of 3.00 to continue candidacy for and receive the Engineer degree.

Some deviation from the above may be approved, but applications for such deviations should include a statement to support them, which is approved by the student's program adviser and thesis adviser.

Students must review the Directions for Preparing Theses on the Registrar's Office website before preparing the writeup of their thesis work for submission.

## Doctor of Philosophy in Electrical Engineering

The University requirements for the Ph.D. degree are described in the "Graduate Degrees" section of this bulletin.

Admission to a graduate program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement, satisfactory performance on a qualifying examination, and sponsorship by two faculty members. Enrollment in EE 391, Special Studies, is recommended as a means for getting acquainted

with a faculty member who might be willing to serve as the dissertation advisor.

Students admitted to the Ph.D. program must sign up to take the department qualifying examination, given once a year in winter quarter. Students are allowed two attempts to pass the examination. Students are encouraged to take the exam in their first year of study. The first attempt must be made no later than the second year of study. Students who have never taken the qualifying examination by the end of the second year of study will be dismissed from the Ph.D. program for failure to progress. Such students may be allowed to complete a master's degree in Electrical Engineering instead. Students who do not pass the qualifying examination after two attempts will be dismissed from the Ph.D. program for failure to progress. Such students may be allowed to complete a master's degree in Electrical Engineering instead, and may also, with the support of an EE faculty member, be allowed to switch to the Engineer degree.

Upon completion of the qualifying examination and after securing agreement by two faculty members to serve as dissertation adviser and second reader, the student files an Application for Candidacy for Doctoral Degree. One of the two faculty members must have either a full, joint or courtesy appointment in the Electrical Engineering department. Students are expected to advance to candidacy prior to the end of their second year in the graduate program. Students who do not advance to candidacy by the end of their second year may be dismissed from the Ph.D. program for failure to progress.

The Ph.D. in Electrical Engineering is a specialized degree, and is built on a broad base of physics, mathematics, and engineering skills. The course program is expected to reflect competency in Electrical Engineering and specialized study in other areas relevant to the student's research focus. 90 units must be completed at Stanford beyond the 45 units for a master's degree (completed either at Stanford or at another institution and transferred in via the Application for Graduate Residency Credit form), for a total of 135 units. Students must complete 21 units of letter-graded lecture courses in related advanced physics, mathematics, engineering, or computer science courses, depending on the area of research. 12 of these 21 units must be EE/EE Cognate courses at the 200 level or higher. The remaining 69 units should be research with the dissertation advisor (EE 400, or the corresponding course number if the dissertation advisor's primary appointment is in another department).

Only after receiving department approval of the Application for Candidacy does the student become a candidate for the Ph.D. degree.

For the most recent information, see <http://ee.stanford.edu/gradhandbook>.

## Financial Assistance

The department awards a limited number of fellowships, teaching and course assistantships, and research assistantships to incoming graduate students. Applying for financial assistance is part of the admission application.

## Ph.D. Minor in Electrical Engineering

For a minor in Electrical Engineering, students must fulfill the M.S. degree depth requirement, complete at least 20 units of course work at the 200-level or higher in Electrical Engineering (of which 15 units must be letter-graded), and have the Application for Ph.D. Minor approved by the EE department and the major department. A grade point average of at least 3.35 on these courses is required.

*Emeriti: (Professors)* Clayton W. Bates, Richard Bube, John Cioffi\*, Donald C. Cox, Von R. Eshleman, Michael J. Flynn\*, Gene F. Franklin\*, Joseph W. Goodman, Robert M. Gray\*, Stephen E. Harris\*, Martin E. Hellman, Umran S. Inan\*, Thomas Kailath\*, Gordon S. Kino\*, Albert Macovski\*, Laurence A. Manning, Edward J. McCluskey\*, Malcolm M.

McWhorter, James D. Meindl, Richard H. Pantell\*, R. Fabian W. Pease\*, Leonard Tyler\*, Robert L. White, Bernard Widrow\*, Bruce A. Wooley\*; (*Associate Professor*) Bruce B. Lusignan; (*Professors, Research*) Donald L. Carpenter\*, Aldo da Rosa\*, Antony Fraser-Smith\*, C. Robert Helms, Ingolf Lindau\*, David Luckham, Arogyaswami J. Paulraj\*, Calvin F. Quate

*Chair:* Mark Horowitz

*Vice Chairs:* Robert W. Dutton, Dwight G. Nishimura, Benjamin Van Roy

*Associate Chair (Admissions):* Howard Zebker

*Chair (Academic Affairs Committee):* Dwight G. Nishimura

*Professors:* Nicholas Bambos, Dan Boneh, Stephen P. Boyd, Robert W. Dutton, Abbas El Gamal, Hector Garcia-Molina, Bernd Girod, Andrea G. Goldsmith, Patrick Hanrahan, James S. Harris, John L. Hennessy, Lambertus Hesselink, Mark A. Horowitz, Roger T. Howe, Joseph M. Kahn, Gregory T. A. Kovacs, Thomas H. Lee, Marc Levoy, Nick McKeown, Teresa H. Y. Meng, David A. B. Miller, Dwight G. Nishimura, Oyekunle Olukotun, Brad G. Osgood, John M. Pauly, James D. Plummer, Krishna Saraswat, Krishna V. Shenoy, Olav Solgaard, Fouad A. Tobagi, Benjamin Van Roy, Shan X. Wang, Jennifer Widom, H. S. Philip Wong, S. Simon Wong, Yoshihisa Yamamoto, Howard Zebker

*Associate Professors:* Dawson Engler, Shanhui Fan, John T. Gill III, Christoforos E. Kozyrakis, Sanjay Lall, Subhasish Mitra, Andrea Montanari, Boris Murmann, Balaji Prabhakar, Mendel Rosenblum, Jelena Vuckovic, Tsachy Weissman

*Assistant Professors:* Amin Arbabian, Audrey Ellerbee, Sachin Katti, Philip Levis, Ayfer Ozgur Aydin, Ada Poon

*Professors (Research):* William J. Dally, James F. Gibbons, Leonid Kazovsky, Butrus Khuri-Yakub, Yoshio Nishi, Piero Pianetta

*Courtesy Professors:* Stacey Bent, Emmanuel Candes, David Cheriton, Amir Dembo, David L. Dill, Per Enge, Gary Glover, Peter Glynn, Gene Golub, Leonidas Guibas, Monica S. Lam, Craig Levine, David G. Luenberger, John C. Mitchell, Sandy Napel, Richard Olshen, Norbert Pelc, Zhi-Xun Shen, Julius Smith, Claire Tomlin, Brian Wandell, Yinyu Ye, Shoucheng Zhang

*Courtesy Associate Professors:* Kwabena Boahen, Ron Fedkiw, Ramesh Johari, Hari Manoharan, David Mazieres, Michael McConnell, Andrew Ng, David Sanger, Daniel Spielman, Barbara van Schewick

*Courtesy Assistant Professors:* Sigrid Close, Surya Ganguli, Kerwyn C. Huang, David Liang, Ram Rajagoopal, Amin Saberi

*Lecturers:* Dennis Allison, Craig Burkhart, Andrew Freeman, Wendy Ju, My Le, Roger Melen, Aneesh Nainani, David Obershaw, Dan O'Neill, Dinesh Patil, John Provine, David Sirkin, Jason Stinson, James Weaver

*Consulting Professors:* Ahmad Bahai, Richard Dasher, Leslie Field, Silvano Gai, Fred M. Gibbons, Dimitry Gorinevsky, Bob S. Hu, Theodore Kamins, David Leeson, Madihally Narasimha, Ronald Schafer, David Su, Simon Sze, John Wenstrand

*Consulting Associate Professors:* Yang Lu, Micah Siegel, Jatinder Singh, Katelijn Vleugels, Jun Ye

*Consulting Assistant Professor:* Tejes Krishnamohan

*Visiting Professors:* David Allstot, Michael Black, Israel Cidon, Yonina Eldar, Jinyi Qi, Sandip Tiwari, David Tse, Zhiping Yu

*Visiting Associate Professors:* Yong Guo, Kyesan Lee, Jie Lin, Maneesh Sahani, Dongwoo Yang

*Visiting Assistant Professors:* Prabal Dutta, Ofer Levi, Haim Permuter, Peter Vajda

\* recalled to active duty

# Institute for Computational and Mathematical Engineering

Courses offered by the Institute for Computational and Mathematical Engineering are listed under the subject code CME on the (<http://explorecourses.stanford.edu/search.jsessionid=14DE1634FEFCBE32542A001C07860506?view=catalog&catalog=&page=0&q=CME&filter-catalognumber-CME=on&filter-coursestatus-Active=on>) *Stanford Bulletin's* ExploreCourses web site.

The central research mission of the Institute for Computational and Mathematical Engineering (ICME) is to develop sophisticated algorithmic and mathematical tools that impact many applied disciplines. ICME leverages Stanford's strengths in engineering applications and the physical, biological, mathematical and information sciences to guide the development of modern methods for research and education in computational mathematics.

ICME's teaching mission is to provide courses in computing, applied mathematics and numerical analysis for graduate students and undergraduates from all departments at Stanford. CME courses typically provide strong theoretical foundations for the solution of real world problems and numerical computations to facilitate application of mathematical techniques and theories. The institute identifies research areas that benefit from a multidisciplinary approach in which computational mathematics plays a key role such as discrete mathematics, including computational probability and combinatorial optimization, optimization, stochastics, and numerical solution of partial differential equations. Research applications include engineering, physical sciences, business, medicine, and information science.

A strength of ICME is its multidisciplinary intellectual environment, with interaction among students and faculty with diverse backgrounds and expertise. ICME offers service courses for undergraduates and graduate students to fulfill departmental requirements, core courses for M.S. and Ph.D. students in Scientific Computing and Computational Mathematics, and specialized electives in various application areas.

## Graduate Programs in Computational and Mathematical Engineering

University regulations governing the M.S. and Ph.D. degrees are described in the "Graduate Degrees (p. 38)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course work in mathematical modeling, scientific computing, advanced computational algorithms, and a set of courses from a specific area of application or field. The latter includes geosciences, computational medicine, and other interdisciplinary areas that

combine advanced mathematics with the classical physical sciences or with challenging interdisciplinary problems emerging within disciplines such as business, biology, medicine and information.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Computational and Mathematical Engineering and related fields.

## Master of Science in Computational and Mathematical Engineering

The University's basic requirements for the M.S. degree are discussed in the "Graduate Degrees" (p. 38) section of this bulletin. The following are specific departmental requirements.

The M.S. degree in Computational and Mathematical Engineering is intended as a terminal professional degree and does not lead to the Ph.D. program. Students interested in the doctoral program should apply directly to the Ph.D. program. Master's students who have maintained a minimum grade point average (GPA) of 3.5 are eligible to take the Ph.D. qualifying exam; those who pass this examination and secure a research adviser may continue into the Ph.D. program upon acceptance by the institute.

The master's program consists of 45 units of course work taken at Stanford. No thesis is required; however, students may become involved in research projects during the master's program, particularly to explore an interest in continuing to the doctoral program. Although there is no specific background requirement, significant exposure to mathematics and engineering course work is necessary for successful completion of the program.

Applications to the M.S. program and all required supporting documents must be received by January 8, 2013. See <http://icme.stanford.edu/prospective/admissions/index.php> for up-to-date information including departmental deadlines. See <http://studentaffairs.stanford.edu/gradadmissions>.

The University requirements for the coterminal M.S. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

## Requirements

A candidate is required to complete a program of 45 units of courses numbered 200 or above. Courses below 200 level will require special approval from the program office. At least 36 of these must be graded units, passed with a grade point average (GPA) of 3.0 (B) or better. Master's students interested in continuing to the doctoral program must maintain a 3.5 or better grade point average in the program.

## Requirement 1

Students must demonstrate foundational knowledge in the field by completing the courses in two of the three core parts:

		Units
<b>Part I (6)</b>		
CME 303	Partial Differential Equations of Applied Mathematics	3
CME 306	Numerical Solution of Partial Differential Equations	3
<b>Part II (6)</b>		
CME 302	Numerical Linear Algebra	3

CME 304	Numerical Optimization	3
<b>Part III (6)</b>		
CME 305	Discrete Mathematics and Algorithms	3
CME 308	Stochastic Methods in Engineering	3

Courses in this area must be taken for letter grades. Deviations from the core curriculum must be justified in writing and approved by the student's ICME adviser and the chair of the ICME curriculum committee. Courses that are waived may not be counted towards the master's degree.

## Requirement 2

12 units of general electives to demonstrate breadth of knowledge in technical area. The elective course list represents automatically accepted electives within the program. However, electives are not limited to the list below, and the list is expanded on a continuing basis. The elective part of the ICME program is meant to be broad and inclusive of relevant courses of comparable rigor to ICME courses. Courses outside this list can be accepted as electives subject to approval by the student's ICME adviser.

		Units
Aeronautics and Astronautics		
AA 214B	Numerical Methods for Compressible Flows	3
AA 214C	Numerical Computation of Viscous Flow	3
AA 218	Introduction to Symmetry Analysis	3
Computational and Mathematical Engineering		
CME 211	Introduction to Programming for Scientists and Engineers	3
CME 212	Advanced Programming for Scientists and Engineers	3
CME 213	Introduction to parallel computing using MPI, openMP, and CUDA	3
CME 215A/215B	Advanced Computational Fluid Dynamics	3
CME 263	Introduction to Linear Dynamical Systems	3
CME 342	Parallel Methods in Numerical Analysis	3
CME 364A	Convex Optimization I	3
Computational Geosciences		
CEE 260C	Contaminant Hydrogeology	4
CEE 262A	Hydrodynamics	3-4
CEE 262B	Transport and Mixing in Surface Water Flows	3-4
CEE 263A	Air Pollution Modeling	3-4
CEE 263B	Numerical Weather Prediction	3-4
CEE 294	(not offered in 2012-13)	
CEE 362	Numerical Modeling of Subsurface Processes	3-4
EESS 221	Contaminant Hydrogeology	4
EESS 244	Marine Ecosystem Modeling	3
EESS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3
ENERGY 223	Reservoir Simulation	3-4
ENERGY 224	Advanced Reservoir Simulation	3
ENERGY 241	Seismic Reservoir Characterization	3-4
ENERGY 281	Applied Mathematics in Reservoir Engineering	3
ENERGY 252	(not offered in 2012-13)	
ENERGY 284	(not offered in 2012-13)	
ENERGY 290	Numerical Modeling of Fluid Flow in Heterogeneous Porous Media	3
ENERGY 252	Chemical Kinetics Modeling	3
ENERGY 284	Optimization and Inverse Modeling	3
GEOPHYS 190	Near-Surface Geophysics	3
GEOPHYS 200	Fluids and Flow in the Earth: Computational Methods	3

GEOPHYS 202	Reservoir Geomechanics	3
GEOPHYS 210	Basic Earth Imaging	3-4
GEOPHYS 211	Environmental Soundings Image Estimation	3
GEOPHYS 240	Borehole Seismic Modeling and Imaging	3
GEOPHYS 257	Introduction to Computational Earth Sciences	2-4
GEOPHYS 258	Applied Optimization Laboratory (Geophys 258)	3-4
GEOPHYS 260	Rock Physics for Reservoir Characterization	3
GEOPHYS 262	(not offered in 2012-13)	
GEOPHYS 280	3-D Seismic Imaging	2-3
GEOPHYS 281	Geophysical Inverse Problems	3
GEOPHYS 287	Earthquake Seismology	3-5
GEOPHYS 288A	(not offered in 2012-13)	
GEOPHYS 288B	(not offered in 2012-13)	
GEOPHYS 290	Tectonophysics	3
GES 224	Modeling Transport and Transformations in the Environment	2-3
GES 240	Geostatistics	2-3
MS&E 211	Linear and Nonlinear Optimization	3-4
STATS 352	Spatial Statistics	3
Computer Science		
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 221	Artificial Intelligence: Principles and Techniques	3-4
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 255	Introduction to Cryptography	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 268	Geometric Algorithms	3
CS 315A	Parallel Computer Architecture and Programming	3
CS 340	Topics in Computer Systems	3-4
CS 348A	Computer Graphics: Geometric Modeling	3-4
CS 364A	Algorithmic Game Theory	3
Electrical Engineering		
EE 222	Applied Quantum Mechanics I	3
EE 223	Applied Quantum Mechanics II	3
EE 256	Numerical Electromagnetics	3
EE 278B	Introduction to Statistical Signal Processing	3
EE 376A	Information Theory	3
Management Science and Engineering		
MS&E 112	Mathematical Programming and Combinatorial Optimization	3
MS&E 220	Probabilistic Analysis	3-4
MS&E 221	Stochastic Modeling	3
MS&E 223	Simulation	3
MS&E 238	Leading Trends in Information Technology	3
MS&E 251	Stochastic Decision Models	3
MS&E 310	Linear Programming	3
MS&E 313	Vector Space Optimization	3
MS&E 316	Discrete Mathematics and Algorithms	3
MS&E 321	Stochastic Systems	3
MS&E 322	Stochastic Calculus and Control	3
MS&E 323	Stochastic Simulation	3
Mathematics		
MATH 136	Stochastic Processes	3

MATH 171	Fundamental Concepts of Analysis	3
MATH 221A	Mathematical Methods of Imaging	3
MATH 221B	Mathematical Methods of Imaging	3
MATH 227	Partial Differential Equations and Diffusion Processes	3
MATH 236	Introduction to Stochastic Differential Equations	3
MATH 238	Mathematical Finance	3
Mechanical Engineering		
ME 335A/335B/335C	Finite Element Analysis	3
ME 346B	Introduction to Molecular Simulations	3
ME 408	Spectral Methods in Computational Physics	3
ME 412	Engineering Functional Analysis and Finite Elements	3
ME 469	Computational Methods in Fluid Mechanics	3
ME 484	Computational Methods in Cardiovascular Bioengineering	3
Statistics		
STATS 208	Introduction to the Bootstrap	3
STATS 217	Introduction to Stochastic Processes	3
STATS 219	Stochastic Processes	3
STATS 237	Theory of Investment Portfolios and Derivative Securities	3
STATS 250	Mathematical Finance	3
STATS 305	Introduction to Statistical Modeling	2-4
STATS 310A/310B/310C	Theory of Probability	2-4
STATS 324	Multivariate Analysis	3
STATS 345	Computational Algorithms for Statistical Genetics	3
STATS 362	Monte Carlo	2-3
STATS 366	Modern Statistics for Modern Biology	3
Other		
CEE 281	Mechanics and Finite Elements	3
CEE 362G	Stochastic Inverse Modeling and Data Assimilation Methods	3-4
ENGR 209A	Analysis and Control of Nonlinear Systems	3

## Requirement 3

9 units of focused graduate application electives, approved by the ICME graduate adviser, in the areas of engineering, mathematics, physical, biological, information, and other quantitative sciences. These courses should be foundational depth courses relevant to the student's professional development and research interests.

## Requirement 4

3-6 units of programming course work demonstrating programming proficiency. Recommended courses include CME211, 212 and 213. All graduate students in the program are required to complete programming course at the level of CME213 or higher.

## Requirement 5

3 units of ICME graduate seminars or other approved seminars. Additional seminar units may not be counted towards the 45-unit requirement.

## Prerequisite Courses

*Note:* Fundamental courses in mathematics and computing may be needed as prerequisites for other courses in the program. Check the prerequisites of each required course. Preparatory courses include such subjects as: calculus, linear algebra and differential calculus of several variables, integral calculus

of several variables, ODEs with linear algebra, linear algebra and matrix theory, vector calculus for engineers, linear algebra and PDEs for engineers, introduction to scientific computing, linear algebra with application to engineering computations, PDEs in engineering, Computer Programming in C++ for Earth Scientists and Engineers, Introduction to Large-Scale Computing in Engineering, numerical linear algebra, programming methodology, programming abstractions, machine learning, introduction to optimization, theory of probability, and data mining and analysis.

## Computational Geoscience Track

The Computational Geosciences track is designed for students interested in the skills and knowledge required to develop efficient and robust numerical solutions to Earth Science problems using high-performance computing. The CompGeo curriculum is based on four fundamental areas: modern programming methods for Science and Engineering, applied mathematics with an emphasis on numerical methods, algorithms and architectures for high-performance computing and computationally oriented Earth Sciences courses. Earth Sciences/computational project courses give practice in applying methodologies and concepts. CompGeo students are required to complete general and focused application electives (Requirements 2 and 3) from the approved list of courses from the Computational Geosciences program as well as completing EARTHSYS310 seminar as part of Requirement 5. See <http://pangea.stanford.edu/programs/compgeo/>. All other requirements remain the same as set forth above.

*Note:* Students interested in pursuing the ICME M.S. track in CompGeo should obtain pre-approval from the Computational Geosciences Program Director.

## Doctor of Philosophy in Computational and Mathematical Engineering

Applications to the Ph.D. program and all required supporting documents must be received by December 4, 2012. See <http://icme.stanford.edu/admissions> for full information. Prospective graduate students should see <http://gradadmissions.stanford.edu> for information and application materials. Applicants should take the Graduate Record Examination by October of the academic year in which the application is submitted.

Admission to the Ph.D. program does not imply that the student is a candidate for the Ph.D. degree. Advancement to candidacy requires superior academic achievement and passing the qualifying examination.

The University's basic requirements for the Ph.D. degree are outlined in the "Graduate Degrees" (p. 38) section of this bulletin.

## Requirements

1. Complete a minimum of 135 units of residency at Stanford, including:
  - A. 45 units from the master's program; all six core courses have to be completed.
  - B. 27 units of focused electives in an area planned with the student's Ph.D. adviser; 12 of these units should come from ICME specialized electives with significant computational content such as the CME 320-380 series. The focused and specialized elective component of the ICME program is meant to be broad and inclusive of relevant courses of comparable rigor to ICME courses. The elective course list following represents automatically accepted electives within the program. However, electives are not limited to the list below, and the list is expanded on a continuing basis; courses outside the list can be accepted as electives subject to approval by the student's ICME adviser.

- C. 60 units of thesis research
- D. 3 units of free electives

2. Maintain a grade point average (GPA) of 3.5.
3. Pass the qualifying examination administered by ICME.
4. Complete an approved program of original research.
5. Complete a written dissertation based on research.
6. Pass the oral examination that is a defense of the dissertation research.

## Specialized Elective List-See requirement 1b above.

		Units
CEE 362G	Stochastic Inverse Modeling and Data Assimilation Methods	3-4
CME 364A/364B	Convex Optimization I	3
CS 348A	Computer Graphics: Geometric Modeling	3-4
EE 368	Digital Image Processing	3
MATH 205A	Real Analysis	3
MATH 215A	Complex Analysis, Geometry, and Topology	3
MATH 217A	Differential Geometry	3
MATH 221A	Mathematical Methods of Imaging	3
MATH 221B	Mathematical Methods of Imaging	3
MATH 227	Partial Differential Equations and Diffusion Processes	3
MATH 236	Introduction to Stochastic Differential Equations	3
MATH 238	Mathematical Finance	3
ME 335A/335B/335C	Finite Element Analysis	3
ME 346B	Introduction to Molecular Simulations	3
ME 351A/351B	Fluid Mechanics	3
ME 361	Turbulence	3
ME 408	Spectral Methods in Computational Physics	3
ME 412	Engineering Functional Analysis and Finite Elements	3
ME 469	Computational Methods in Fluid Mechanics	3
MS&E 319	Approximation Algorithms	3
MS&E 336	Topics in Game Theory with Engineering Applications	3
STATS 305	Introduction to Statistical Modeling	2-4
STATS 306A/306B	Methods for Applied Statistics	2-4
STATS 318	Modern Markov Chains	3
STATS 366	Modern Statistics for Modern Biology	3

*Note:* All courses listed under "Requirement 3" under the "Master of Science in Computational and Mathematical Engineering" section can be used for fulfilling the general elective requirement.

## Financial Assistance

The department awards a limited number of fellowships, course assistantships, and research assistantships to incoming graduate students. Applying for such assistance is part of submitting the application for admission to the program. Students are appointed for half-time assistantships which provide a tuition scholarship at the 8, 9, 10 unit rate during the academic year and a monthly stipend. Half-time appointments generally require 20 hours of work per week. Most course assistantships and research assistantships are awarded to students in the doctoral program in ICME. If the number of Ph.D. students is not sufficient to staff all course

and research assistantship positions available, these positions may be open to master's students. However, master's students are not guaranteed financial assistance.

## Ph.D. Minor in Computational and Mathematical Engineering

For a minor in Computational and Mathematical Engineering (CME), a doctoral candidate must complete 20 units of approved graduate level courses. These should include three ICME core courses and three ICME graduate electives at the 300 level or above. All courses must be taken for a letter grade and passed with a grade of 'B' or better. Minor programs should be developed in close discussion between the student and the student's primary Ph.D. adviser.

*Emeriti: (Professor)* Joe Keller (Mathematics, Mechanical Engineering), (*Professor, Research*) Arogyaswami Paulraj (Electrical Engineering)

*Director:* Margot Gerritsen (Energy Resources Engineering)

*Professors:* Biondo Biondi (Geophysics), Stephen Boyd (Electrical Engineering), Emanuel Candes (Mathematics, Statistics), Gunnar Carlsson (Mathematics), Persi Diaconis (Mathematics, Statistics), David Donoho (Statistics), Charbel Farhat (Aeronautics and Astronautics, Mechanical Engineering), Peter Glynn (Management Science and Engineering), Leonidas Guibas (Computer Science), Pat Hanrahan (Computer Science, Electrical Engineering), Jerry Harris (Geophysics), Peter Kitanidis (Civil and Environmental Engineering), Tze Leung Lai (Statistics), Sanjiva Lele (Mechanical Engineering, Aeronautics and Astronautics), Parviz Moin (Mechanical Engineering), Brad Osgood (Electrical Engineering), George Papanicolaou (Mathematics), Peter Pinsky (Mechanical Engineering), Lenya Ryzhik (Mathematics), Eric Shaqfeh (Chemical Engineering, Mechanical Engineering), Andras Vasy (Mathematics), Lawrence Wein (Graduate School of Business), Wing Wong (Statistics), Yinyu Ye (Management Science and Engineering)

*Associate Professors:* Juan Alonso (Aeronautics and Astronautics), Eric Darve (Mechanical Engineering), Ronald Fedkiw (Computer Science), Oliver Fringer (Civil and Environmental Engineering), Margot Gerritsen (Energy Resources Engineering), Ashish Goel (Management Science and Engineering), Ramesh Johari (Management Science and Engineering), Adrian Lew (Mechanical Engineering), Amin Saberi (Management Science and Engineering), Hamdi Tchelepi (Energy Resources Engineering), Benjamin Van Roy (Management Science and Engineering, Electrical Engineering)

*Assistant Professors:* Eric Dunham (Geophysics), Gianluca Iaccarino (Mechanical Engineering), Andrew Spakowitz (Chemical Engineering)

*Professors (Research):* Antony Jameson (Aeronautics and Astronautics), Walter Murray (Management Science and Engineering), Michael A. Saunders (Management Science and Engineering)

*Senior Lecturer:* Vadim Khayms

*Consulting Professors:* Sepandar Kamvar (faculty at MIT Media Lab), Rob Schreiber (HP Labs)

Courses of interest to students in the department may include:

		Units
CEE 262A	Hydrodynamics	3-4
CEE 262B	Transport and Mixing in Surface Water Flows	3-4
CEE 263A	Air Pollution Modeling	3-4
CEE 263B	Numerical Weather Prediction	3-4
CEE 362	Numerical Modeling of Subsurface Processes	3-4
CEE 362G	Stochastic Inverse Modeling and Data Assimilation Methods	3-4
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3

CS 221	Artificial Intelligence: Principles and Techniques	3-4	MS&E 211	Linear and Nonlinear Optimization	3-4
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4	STATS 219	Stochastic Processes	3
CS 229	Machine Learning	3-4	STATS 250	Mathematical Finance	3
CS 232	Digital Image Processing	3	STATS 305	Introduction to Statistical Modeling	2-4
CS 261	Optimization and Algorithmic Paradigms	3	STATS 306A	Methods for Applied Statistics	2-4
CS 268	Geometric Algorithms	3	STATS 306B	Methods for Applied Statistics: Unsupervised Learning	2-3
CS 348A	Computer Graphics: Geometric Modeling	3-4	STATS 310A	Theory of Probability	2-4
EARTHSCI 311	Computational Geomodels	1	STATS 310B	Theory of Probability	2-3
EE 256	Numerical Electromagnetics	3	STATS 310C	Theory of Probability	2-4
EE 368	Digital Image Processing	3	STATS 318	Modern Markov Chains	3
EESS 221	Contaminant Hydrogeology	4	STATS 352	Spatial Statistics	3
EESS 244	Marine Ecosystem Modeling	3			
EESS 246B	Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation	3			
ENERGY 223	Reservoir Simulation	3-4			
ENERGY 224	Advanced Reservoir Simulation	3			
ENERGY 241	Seismic Reservoir Characterization	3-4			
ENERGY 252	Chemical Kinetics Modeling	3			
ENERGY 281	Applied Mathematics in Reservoir Engineering	3			
ENERGY 284	Optimization and Inverse Modeling	3			
ENERGY 290	Numerical Modeling of Fluid Flow in Heterogeneous Porous Media	3			
GEOPHYS 190	Near-Surface Geophysics	3			
GEOPHYS 200	Fluids and Flow in the Earth: Computational Methods	3			
GEOPHYS 202	Reservoir Geomechanics	3			
GEOPHYS 210	Basic Earth Imaging	3-4			
GEOPHYS 211	Environmental Soundings Image Estimation	3			
GEOPHYS 240	Borehole Seismic Modeling and Imaging	3			
GEOPHYS 257	Introduction to Computational Earth Sciences	2-4			
GEOPHYS 258	Applied Optimization Laboratory (Geophys 258)	3-4			
GEOPHYS 260	Rock Physics for Reservoir Characterization	3			
GEOPHYS 280	3-D Seismic Imaging	2-3			
GEOPHYS 281	Geophysical Inverse Problems	3			
GEOPHYS 287	Earthquake Seismology	3-5			
GEOPHYS 288A	Crustal Deformation	3-5			
GEOPHYS 288B	Crustal Deformation	3-5			
GEOPHYS 290	Tectonophysics	3			
GES 224	Modeling Transport and Transformations in the Environment	2-3			
GES 240	Geostatistics	2-3			
MATH 136	Stochastic Processes	3			
MATH 205A	Real Analysis	3			
MATH 215A	Complex Analysis, Geometry, and Topology	3			
MATH 217A	Differential Geometry	3			
MATH 236	Introduction to Stochastic Differential Equations	3			
MATH 238	Mathematical Finance	3			
ME 335A	Finite Element Analysis	3			
ME 335B	Finite Element Analysis	3			
ME 335C	Finite Element Analysis	3			
ME 346B	Introduction to Molecular Simulations	3			
ME 351A	Fluid Mechanics	3			
ME 351B	Fluid Mechanics	3			
ME 361	Turbulence	3			
ME 408	Spectral Methods in Computational Physics	3			
ME 469	Computational Methods in Fluid Mechanics	3			

# Management Science and Engineering

Courses offered by the Department of Management Science and Engineering are listed under the subject code MS&E on the *Stanford Bulletin's* ExploreCourses web site.

In December 1999, the Board of Trustees authorized the creation of the Department of Management Science and Engineering from the Department of Industrial Engineering and Engineering Management and the Department of Engineering-Economic Systems and Operations Research. Its main objective is to be the leader at the interface of engineering, business, and public policy. The department's mission is, through education and research, to advance the design, management, operation, and interaction of technological, economic, and social systems. The department's engineering research strength is integrated with its educational program at the undergraduate, master's, and doctoral levels: graduates of the program are trained as engineers and future leaders in technology, policy, and industry. Research and teaching activities are complemented by an outreach program that encourages the transfer of ideas to the environment of Silicon Valley and beyond.

Management Science and Engineering (MS&E) provides programs of education and research by integrating three basic strengths:

1. depth in conceptual and analytical foundations
2. comprehensive coverage of functional areas of application
3. interaction with other Stanford departments, Silicon Valley industry, and organizations throughout the world.

The analytical and conceptual foundations include decision and risk analysis, dynamic systems, economics, optimization, organizational science, and stochastic systems. The functional areas of application include entrepreneurship, finance, information, marketing, organizational behavior, policy, production, and strategy. Close associations with other engineering departments and with industry enrich the programs by providing opportunities to apply MS&E methods to important problems and by motivating new theoretical developments from practical experience. MS&E's programs also provide a basis for contributing to other areas such as biotechnology, defense policy, environmental policy, information systems, and telecommunications.

# Mission of the Undergraduate Program in Management Science and Engineering

The mission of the undergraduate program in Management Science and Engineering is to provide students with the fundamentals of engineering systems analysis so that they are able to plan, design, and implement complex economic and technical management systems. The program builds on the foundational courses for engineering including calculus, engineering fundamentals, and physics or chemistry as well as management science. Students may select courses in computer science, information, organizational theory, mathematical modeling, optimization, probability, statistics and finance or production. To allow for greater in-depth exploration in a particular area, students then choose a concentration area. The major prepares students for a variety of career paths, including facilities and process management, investment banking, management consulting or for graduate school in industrial engineering, operations research, economics, public policy, medicine, law, or business.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able:

1. to apply the knowledge of mathematics, science, and engineering;
2. to design and conduct experiments;
3. to design a system or components to meet desired needs;
4. to identify, formulate, and solve engineering problems;
5. to use techniques, skills, and modern engineering tools necessary for engineering practice;
6. to function on multidisciplinary teams;
7. to communicate effectively;
8. to recognize the need for and demonstrate an ability to engage in life-long learning;
9. to obtain the background necessary for admission to top professional graduate engineering or business programs;
10. to understand professional and ethical responsibility;
11. to obtain the broad education necessary to understand the impact of engineering solutions in a global and societal context; and
12. to obtain a knowledge of contemporary issues pertinent to the field of management science and engineering.

## Graduate Programs in Management Science and Engineering

MS&E, in collaboration with other departments of the University, offers programs leading to the degrees of Master of Science and Doctor of Philosophy. The department also offers a coterminal B.S./M.S. degree, and a dual master's degree in cooperation with each of the other departments in the School of Engineering.

For University coterminal degree program rules and University application forms, see the Registrar's coterminal degrees web site (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>).

Applicants for admission as graduate students in MS&E must submit the results of the verbal, quantitative, and analytical parts of the Graduate Record Examination. The deadline for application to the doctoral program is December 4, 2012, and the deadline for application to the master's program is January 15, 2013.

Except in unusual circumstances, admission is limited to the Autumn Quarter because courses are arranged sequentially with basic courses and prerequisites offered early in the academic year.

## Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a life-long career addressing critical technical and managerial needs in private and public decision-making. This is done through course work providing specialization in an area of the field as well as breadth across several of those areas. Specializations include decision and risk analysis, energy and environment, finance, information science and technology, operations research, operations management, policy/strategy, and organizations, technology and entrepreneurship. The master's degree may be a terminal degree program with a professional focus, or a preparation for a more advanced graduate program.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Management Science and Engineering and related fields.

## Assistantships and Fellowships

A limited number of fellowships and assistantships are awarded each year. Applicants admitted to the doctoral program, who have indicated on their application that they would like to be considered for financial aid, are automatically considered for these assistantships and fellowships.

Information about loan programs and need-based aid for U.S. citizens and permanent residents can be obtained from the Financial Aid Office.

## Careers in MS&E

MS&E helps students prepare for professional careers in business, government, industry, non-profit institutions, and universities. Graduates have pursued careers in consulting, enterprise management, financial analysis, government policy analysis, industrial research, line management, product development, project management, strategic planning, and university teaching and research. Some have founded companies specializing in financial services, high technology products, management and systems consulting, or software. Other graduates have helped establish new analytical capabilities in existing firms or government agencies.

Many graduates have become leaders in technology-based businesses, which have an increasing need for well-educated, analytically oriented people who understand both business and technology. The Department of MS&E is attractive to people with engineering, mathematical science, and physical science backgrounds as it complements their technical abilities with the conceptual frameworks needed to analyze problems of investment, management, marketing, operations, production, and strategic planning in a technical environment.

## Professional Education

The Stanford Center for Professional Development (SCPD) provides opportunities for employees of some local and remote companies to take courses at Stanford.



The Honors Cooperative Program (HCP) provides opportunities for employees of SCPD Member companies to earn an M.S. degree, over a longer period, by taking one or two courses per academic quarter. Some courses are only offered on campus; HCP students may attend those courses at Stanford to meet the degree requirements. It is possible to complete this program as a remote HCP student although the remote offerings are limited. Students must apply for a degree program through the standard application process, and must meet the standard application deadlines.

The non-degree option (NDO) allows employees of some local companies to take courses for credit from their company sites before being admitted to a degree program. Students apply to take NDO courses each quarter through the Stanford Center for Professional Development. Up to 18 units taken as an NDO student may be applied toward a degree program. For additional information about the NDO application process and deadlines, see <http://scpd.stanford.edu>, or contact SCPD at (650) 725-3000.

The department offers a certificate program within the framework of the NDO program. A certificate can be obtained by completing three MS&E core courses, plus one MS&E elective course for a total of four courses. For further information, see <http://scpd.stanford.edu/scpd/programs/certs/managementSci.htm>.

## Bachelor of Science in Management Science and Engineering

The program leading to the B.S. degree in Management Science and Engineering (MS&E) is outlined in the School of Engineering section of this bulletin; more information is contained in the School of Engineering's *Handbook for Undergraduate Engineering Programs*. Students are encouraged to plan their academic programs as early as possible, ideally in the freshman or sophomore year. Students should not wait until they are declaring a major to consult with the department's student services staff. This is particularly important for students who would like to study overseas or pursue another major or minor.

The undergraduate curriculum in Management Science and Engineering provides students training in the fundamentals of engineering systems analysis to prepare them to plan, design, and implement complex economic and technological management systems where a scientific or engineering background is necessary or desirable. Graduates are prepared for work in a variety of career paths, including facilities and process management, investment banking, management consulting, or graduate study in industrial engineering, operations research, economics, public policy, medicine, law, or business.

The educational objectives of the undergraduate degree program are:

- Principles and Skills—provide students with a basic understanding of management science and engineering principles, including analytical problem solving and communications skills.
- Preparation for Practice—prepare students for practice in a field that sees rapid changes in tools, problems, and opportunities.
- Preparation for Continued Growth—prepare students for graduate study and self development over an entire career.
- Preparation for Service—develop in students the awareness, background, and skills necessary to become responsible citizens, employees, and leaders.

See also the department's undergraduate Learning Outcomes (p. ) for additional learning objectives.

The program builds on the foundational courses for engineering, including calculus, engineering fundamentals, and physics or chemistry.

Students interested in a minor should see the Minor tab in this section.

MS&E also participates with the departments of Computer Science, Mathematics, and Statistics in a program leading to a B.S. in Mathematical

and Computational Science. See the "Mathematical and Computational Science (p. 473)" section of this bulletin.

## Core

The department core, taken for all concentrations, includes courses in computer science, deterministic optimization, information, organization theory, a senior project, and finance or production. Through the core, students in the program are exposed to the breadth of faculty interests, and are in a good position to choose a concentration during the junior year.

## Concentrations

The five concentrations are designed to allow a student to explore one area of the department in greater depth.

1. *Financial and Decision Engineering*: focuses on the design and analysis of financial and strategic plans. It features accounting, decision analysis, economics, finance, investment science, and stochastic models.
2. *Operations Research*: provides a more mathematical program, based on algorithms, theory, and applications in economics and operations.
3. *Organization, Technology, and Entrepreneurship*: focuses on understanding and design of organizations, particularly technology-based issues. It features courses on innovation, product development, entrepreneurship, work and manufacturing systems, information systems, and human-computer interaction.
4. *Production and Operations Management*: focuses on the design and analysis of manufacturing, production, and service systems.
5. *Policy and Strategy*: focuses on the design and analysis of public policies and corporate strategies, especially those with technology-based issues. It features a core in microeconomics and modeling approaches, and policy-focused courses in topics such as national security, energy and environment, and health care, and strategy-focused courses in topics such as entrepreneurship, innovation, and product development.

## Management Science and Engineering (MS&E)

Completion of the undergraduate program in Management Science and Engineering leads to the conferral of the Bachelor of Science in Management Science and Engineering.

## Requirements

### Mathematics (32-34)

Seven courses and 32 units minimum; see Basic Requirement 1<sup>1</sup>

MATH 41	Calculus	5
MATH 42	Calculus	5
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 53	Ordinary Differential Equations with Linear Algebra	5
MS&E 120	Probabilistic Analysis	5
MS&E 121	Introduction to Stochastic Modeling	4
STATS 110	Statistical Methods in Engineering and the Physical Sciences	3-5
or STATS 200	Introduction to Statistical Inference	

### Science (11-13)

Three courses and 11 units minimum; see Basic Requirement 2<sup>1</sup>

Select one of the following sequences: 8

CHEM 31B & CHEM 33	Chemical Principles II and Structure and Reactivity	
CHEM 31X & CHEM 33	Chemical Principles and Structure and Reactivity	
PHYSICS 21 & PHYSICS 22 & PHYSICS 23 & PHYSICS 24	Mechanics and Heat and Mechanics and Heat Laboratory and Electricity and Optics and Electricity and Optics Laboratory	
PHYSICS 41 & PHYSICS 43	Mechanics and Electricity and Magnetism	
Science Elective		3-5
<b>Technology in Society (3-5)</b>		
Select one of the following; see Basic Requirement 4		
COMM 120W	Digital Media in Society	
COMM 169	Computers and Interfaces	
CS 181	Computers, Ethics, and Public Policy	
MS&E 181	Issues in Technology and Work for a Postindustrial Economy	
MS&E 193	Technology and National Security (WIM)	
STS 110	Ethics and Public Policy (WIM)	
STS 115	Ethical Issues in Engineering	
<b>Engineering Fundamentals (11-15)</b>		
Three courses; see Basic Requirement 3		
CS 106A	Programming Methodology <sup>2</sup>	5
Select one of the following:		
ENGR 25B	Biotechnology	
or ENGR 25E	Energy: Chemical Transformations for Production, Storage, and Use	
ENGR 40	Introductory Electronics	
or ENGR 40N	Engineering Wireless Networks	
or ENGR 40P	Physics of Electrical Engineering	
ENGR 80	Introduction to Bioengineering	
Select one of the following (or E25, E40, or E80 if not used above):		
ENGR 10	Introduction to Engineering Analysis	3-5
ENGR 14	Intro to Solid Mechanics	
ENGR 15	Dynamics	
ENGR 20	Introduction to Chemical Engineering	
ENGR 30	Engineering Thermodynamics	
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	
or ENGR 50E	Introduction to Materials Science - Energy Emphasis	
or ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis	
ENGR 60	Engineering Economy	
ENGR 90	Environmental Science and Technology	
<b>Engineering Depth (core; six courses) (22-26)</b>		
MS&E 108	Senior Project	5
MS&E 111	Introduction to Optimization	4
MS&E 180	Organizations: Theory and Management	4
Select one of the following:		
CS 103	Mathematical Foundations of Computing	3-5
CS 106B	Programming Abstractions	
CS 106X	Programming Abstractions (Accelerated)	
Select one of the following:		

MS&E 130	Information Networks and Services	
MS&E 134	Organization Change and Information Systems <sup>3</sup>	
MS&E 233	Networked Markets	
Select one of the following:		3-4
MS&E 142	Introductory Financial Analysis <sup>4</sup>	
MS&E 260	Introduction to Operations Management <sup>4</sup>	
<b>Engineering Depth (concentration; seven or eight courses) (22-30)</b>		
Concentration: choose one of the following 5 concentrations: <sup>5</sup>		22-30
<b>Financial and Decision Engineering Concentration (25-30) <sup>4</sup></b>		
ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
MS&E 140	Accounting for Managers and Entrepreneurs	3-4
MS&E 152	Introduction to Decision Analysis (WIM)	3-4
Select one of the following:		3-4
MS&E 245G	Finance for Non-MBAs	
MS&E 247S	International Investments	
Select two of the following:		6-8
ENGR 145	Technology Entrepreneurship	
MS&E 107	Interactive Management Science	
MS&E 146	Corporate Financial Management	
MS&E 223	Simulation	
MS&E 247G	International Financial Management	
MS&E 250A	Engineering Risk Analysis	
MS&E 260	Introduction to Operations Management <sup>4</sup>	
<b>Operations Research Concentration (24-27) <sup>4</sup></b>		
MATH 113	Linear Algebra and Matrix Theory <sup>6</sup>	3
MATH 115	Functions of a Real Variable <sup>6</sup>	3
MS&E 112	Mathematical Programming and Combinatorial Optimization	3
MS&E 152	Introduction to Decision Analysis (WIM)	3-4
MS&E 241	Economic Analysis	3-4
MS&E 251	Stochastic Decision Models	3
STATS 202	Data Mining and Analysis <sup>6</sup>	3
Select one of the following:		3-4
MS&E 142	Introductory Financial Analysis <sup>4</sup>	
MS&E 260	Introduction to Operations Management <sup>4</sup>	
<b>Organization, Technology, and Entrepreneurship Concentration (22-30)</b>		
Select one of the following:		4-5
ECON 50	Economic Analysis I	
PSYCH 70	Introduction to Social Psychology	
SOC 114	Economic Sociology	
Select two of the following:		6-8
ENGR 145	Technology Entrepreneurship	
MS&E 175	Innovation, Creativity, and Change	
MS&E 181	Issues in Technology and Work for a Postindustrial Economy <sup>6</sup>	
Select at least four of the following courses (may also include E145, MS&E 175, or MS&E 181, if not used above):		12-17
CS 147	Introduction to Human-Computer Interaction Design	
ENGR 130	Science, Technology, and Contemporary Society <sup>6</sup>	
MS&E 134	Organization Change and Information Systems <sup>3</sup>	
MS&E 140	Accounting for Managers and Entrepreneurs	

MS&E 178	The Spirit of Entrepreneurship	
MS&E 185	Global Work	
MS&E 189	Social Networks - Theory, Methods, and Applications	
MS&E 266	Management of New Product Development	

**Policy and Strategy Concentration (25-30)**

ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
MS&E 190	Methods and Models for Policy and Strategy Analysis	3

At least four of the following courses, including at least one course in 12-17 policy and at least one course in strategy:

Policy:		
MS&E 193	Technology and National Security (WIM) <sup>6</sup>	
MS&E 197	Ethics and Public Policy (WIM) <sup>6</sup>	
MS&E 243	Energy and Environmental Policy Analysis	
MS&E 248	Economics of Natural Resources	
MS&E 292	Health Policy Modeling	
Strategy:		
ENGR 145	Technology Entrepreneurship	
MS&E 175	Innovation, Creativity, and Change	
MS&E 266	Management of New Product Development	

**Production and Operations Management Concentration (25-29) <sup>4</sup>**

ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
MS&E 140	Accounting for Managers and Entrepreneurs	3-4
MS&E 152	Introduction to Decision Analysis (WIM)	3-4

Select three of the following: 9-11

MS&E 142	Introductory Financial Analysis <sup>4</sup>	
MS&E 245G	Finance for Non-MBAs	
MS&E 262	Supply Chain Management	
MS&E 264	Sustainable Product Development and Manufacturing	
MS&E 266	Management of New Product Development	
MS&E 268	Operations Strategy	

- Math and Science must total a minimum of 45 units. Electives must come from the School of Engineering approved list, or, PHYSICS 25 Modern Physics, PHYSICS 26 Modern Physics Laboratory; PSYCH 55 Introduction to Cognition and the Brain, PSYCH 70 Introduction to Social Psychology. AP credit for Chemistry, Mathematics, and Physics may be used.
- Students may petition to place out of CS 106A Programming Methodology.
- Students may not count 134 for both core and the Organization, Technology, and Entrepreneurship concentration.
- Students may not count 142 or 260 for both core and concentration. Students doing the Financial and Decision Engineering concentration must take 142 for core, and may also take 260 as a concentration elective. Students doing the Operations Research concentration must take both 142 and 260 (one for core, and one for concentration). Students doing the Production and Operations Management concentration must take 260 for core, and may also take 142 as a concentration elective.
- Engineering fundamentals, engineering depth (core), and engineering depth (concentration) must total a minimum of 60 units.
- Courses used to satisfy the Math, Science, Technology in Society, or Engineering Fundamental requirement may not also be used to satisfy an engineering depth requirement.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/managementscienceandengineering/http://ughb.stanford.edu>).

## Management Science and Engineering (MS&E) Minor

The following courses are required to fulfill the minor requirements:

		Units
<b>Background requirements (10)</b>		
CS 106A	Programming Methodology	5
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
<b>Minor requirements (26-29)</b>		
MS&E 111	Introduction to Optimization	4
MS&E 120	Probabilistic Analysis	5
MS&E 121	Introduction to Stochastic Modeling	4
MS&E 180	Organizations: Theory and Management	4
Select one of the following:		3-4
MS&E 130	Information Networks and Services	
MS&E 134	Organization Change and Information Systems	
MS&E 233	Networked Markets	
Select one of the following:		3-4
MS&E 142	Introductory Financial Analysis	
MS&E 260	Introduction to Operations Management	
Elective (select any 100- or 200-level MS&E course)		3-4

## Master of Science in Management Science and Engineering

The M.S. degree programs require a minimum of 45 units beyond the equivalent of a B.S. degree at Stanford. All programs represent substantial progress in the major field beyond the bachelor's degree.

University requirements for the master's degree are described in the "Graduate Degrees" section of this bulletin.

The M.S. program in Management Science and Engineering (MS&E) prepares individuals for a lifelong career addressing critical technical and managerial needs in private and public decision making. Department requirements for the M.S. degree provide breadth across some of the areas of the department, and flexibility for meeting individual objectives of depth in a particular area of concentration. The master's degree may be a terminal degree program with a professional focus, or a preparation for a more advanced graduate program. The M.S. degree can normally be earned in one academic year (three academic quarters) of full-time work, although students may choose to continue their education by taking additional MS&E courses beyond that year. Background requirements, taken in addition to degree requirements, must be met by students who have had insufficient course work in mathematical sciences, computer science, engineering and/or natural sciences.

Students must take a minimum of 45 course units as follows:

- At least five core courses
- At least three other courses in an area of concentration of their choice
- A course in probability, unless a college-level course in probability has already been passed

4. A project course requirement
5. The remaining units in elective courses.

## Background Requirements

Students must have had or must take the following (or equivalent) courses before the M.S. degree is conferred: MATH 41, 42, 51, Calculus, 15 units; CS 106A, Programming Methodology, 5 units, and an additional 15 units of engineering, mathematical sciences, or natural sciences. These courses do not count toward the 45 units of the M.S. degree. Courses taken to meet MS&E background requirements may be at either the undergraduate or graduate level, and may be taken as credit/no credit. These additional background requirements would typically be met by students who have a bachelor's degree in engineering, or mathematical or natural sciences.

## Core (Breadth) Courses

	Units
M.S. students must take five courses out of the following eleven areas. 15-20 No more than one course may be taken from each of the eleven areas.	
Dynamic Systems or Stochastic Decision Models	3-4
MS&E 201    Dynamic Systems	
MS&E 251    Stochastic Decision Models	
Optimization	3-4
MS&E 211    Linear and Nonlinear Optimization	
Probability	3-4
MS&E 220    Probabilistic Analysis	
Stochastic Modeling or Simulation	3
MS&E 221    Stochastic Modeling	
MS&E 223    Simulation	
Financial Analysis	3-4
MS&E 240    Accounting for Managers and Entrepreneurs	
MS&E 242    Investment Science	
MS&E 242H   Investment Science Honors	
MS&E 242S   Investment Science	
Economic Analysis	3-4
MS&E 241    Economic Analysis	
Decision Analysis	3-4
MS&E 252    Decision Analysis I: Foundations of Decision Analysis	
Operations Management	3-4
MS&E 261    Inventory Control and Production Systems	
Strategy	3-4
MS&E 270    Strategy in Technology-Based Companies	
Marketing	3-4
MS&E 271    Global Entrepreneurial Marketing	
Organizational Behavior	3-4
MS&E 280    Organizational Behavior: Evidence in Action	

Students may not waive core courses. They may, however, petition to substitute an approved, more advanced MS&E course in the same area. Courses used to satisfy the core requirement must be taken for a letter grade, must be taken for a minimum of three units each, and may not also be used to satisfy the concentration requirement.

## Courses in an Area of Concentration (Depth)

Students must complete a departmentally approved set of three or more letter-graded courses taken for a minimum of three units each, in an area of concentration of one of the following types:

1. An area of concentration in the MS&E department

2. An area of concentration in one of the seven other departments of the School of Engineering
3. In exceptional cases, a coherent area of concentration designed by the student. Petitions for student-designed concentrations must list the three proposed courses (taken for three units or more and at the 200-level or above) and include a brief justification. The petition must be submitted to student services no later than the fifth week of the quarter prior to graduation.

## Decision and Risk Analysis Pre-Approved Concentration Courses:

MS&E 250A	Engineering Risk Analysis *	3
MS&E 250B	Project Course in Engineering Risk Analysis	3
MS&E 251	Stochastic Decision Models *	3
MS&E 252	Decision Analysis I: Foundations of Decision Analysis *	3-4
MS&E 254	The Ethical Analyst	3
MS&E 255	Decision Systems I	2-3
MS&E 256	Technology Assessment and Regulation of Medical Devices	3
MS&E 351	Dynamic Programming and Stochastic Control	3
MS&E 352	Decision Analysis II: Professional Decision Analysis	3-4
MS&E 353	Decision Analysis III: Frontiers of Decision Analysis	3
MS&E 355	Influence Diagrams and Probabilistic Networks	3
MS&E 452	Decision Analysis Projects: Helping Real Leaders Make Real Decisions	3

## Economics and Finance Pre-Approved Concentration Courses:

MS&E 241	Economic Analysis *	3-4
MS&E 242	Investment Science *	3
MS&E 242H	Investment Science Honors *	3
MS&E 242S	Investment Science *	3
MS&E 243	Energy and Environmental Policy Analysis	3
MS&E 245G	Finance for Non-MBAs	3-5
MS&E 247G	International Financial Management	4
MS&E 247S	International Investments	3
MS&E 248	Economics of Natural Resources	3-4
MS&E 249	Economic Growth and Development	3
MS&E 342	Advanced Investment Science	3
MS&E 347	Credit Risk: Modeling and Management	3
MS&E 348	Optimization of Uncertainty and Applications in Finance	3
MS&E 349	Capital Deployment	3
MS&E 444	Investment Practice	3-4
MS&E 445	Projects in Wealth Management	3-4

## Energy and Environment Pre-Approved Concentration Courses:

MS&E 243	Energy and Environmental Policy Analysis	3
MS&E 248	Economics of Natural Resources	3-4
MS&E 264	Sustainable Product Development and Manufacturing	3-4
MS&E 294	Climate Policy Analysis	3
MS&E 295	Energy Policy Analysis	3
MS&E 491	Clean Energy Development	3
CEE 207A	Energy Resources	4-5
EARTHYSYS 247	Controlling Climate Change in the 21st Century	3
EARTHYSYS 275	California Coast: Science, Policy, and Law	3-4
EE 293A	Fundamentals of Energy Processes	3-4
EE 293B	Fundamentals of Energy Processes	3
LAW 603	Environmental Law and Policy	3
MATSCI 302	Solar Cells	3
ME 260	Fuel Cell Science and Technology	3
ME 370A	Energy Systems I: Thermodynamics	3
ME 370B	Energy Systems II: Modeling and Advanced Concepts	4

## Information Science and Technology Pre-Approved Concentration Courses:

MS&E 234	Organization Change and Information Systems	3
MS&E 236	Game Theory with Engineering Applications	3
MS&E 236H	Game Theory with Engineering Applications	3
MS&E 237	The Social Data Revolution: Data Mining and Electronic Business	3
MS&E 238	Leading Trends in Information Technology	3
MS&E 239	Computational Advertising	3
MS&E 332	Security and Risk in Computer Networks	3
MS&E 335	Queueing and Scheduling in Processing Networks	3
MS&E 336	Topics in Game Theory with Engineering Applications	3
MS&E 337	Information Networks	3
MS&E 338	Advanced Topics in Information Science and Technology	3
CS 364A	Algorithmic Game Theory	3
EE 284	Introduction to Computer Networks	3
EE 384S	Performance Engineering of Computer Systems & Networks	3

## Operations Research Pre-Approved Concentration Courses:

MS&E 211	Linear and Nonlinear Optimization *	3-4
MS&E 212	Mathematical Programming and Combinatorial Optimization	3
MS&E 221	Stochastic Modeling *	3
MS&E 223	Simulation *	3
MS&E 236	Game Theory with Engineering Applications	3
MS&E 236H	Game Theory with Engineering Applications	3

MS&E 251	Stochastic Decision Models *	3
MS&E 310	Linear Programming	3
MS&E 311	Optimization	3
MS&E 312	Advanced Methods in Numerical Optimization	3
MS&E 313	Vector Space Optimization	3
MS&E 314	Linear and Conic Optimization with Applications	3
MS&E 315	Numerical Optimization	3
MS&E 316	Discrete Mathematics and Algorithms	3
MS&E 317	Algorithms for Modern Data Models	3
MS&E 318	Large-Scale Numerical Optimization	3
MS&E 319	Approximation Algorithms	3
MS&E 321	Stochastic Systems	3
MS&E 322	Stochastic Calculus and Control	3
MS&E 323	Stochastic Simulation	3
MS&E 332	Security and Risk in Computer Networks	3
MS&E 335	Queueing and Scheduling in Processing Networks	3
MS&E 336	Topics in Game Theory with Engineering Applications	3
MS&E 337	Information Networks	3
MS&E 338	Advanced Topics in Information Science and Technology	3
MS&E 348	Optimization of Uncertainty and Applications in Finance	3
MS&E 351	Dynamic Programming and Stochastic Control	3
MS&E 355	Influence Diagrams and Probabilistic Networks	3
EE 384S	Performance Engineering of Computer Systems & Networks	3

## Organization, Technology, and Entrepreneurship Pre-Approved Concentration Courses:

MS&E 271	Global Entrepreneurial Marketing *	3-4
MS&E 273	Technology Venture Formation	3-4
MS&E 274	Dynamic Entrepreneurial Strategy	3
MS&E 276	Entrepreneurial Management and Finance	3
MS&E 277	Creativity and Innovation	4
MS&E 280	Organizational Behavior: Evidence in Action *	3-4
MS&E 283	Scaling up Excellence in Organizations	4
MS&E 289	Designing for Sustainable Abundance	3-4
MS&E 464	Global Project Coordination	3-4

## Policy and Strategy Pre-Approved Concentration Courses:

MS&E 271	Global Entrepreneurial Marketing *	3-4
MS&E 273	Technology Venture Formation	3-4
MS&E 274	Dynamic Entrepreneurial Strategy	3
MS&E 276	Entrepreneurial Management and Finance	3
MS&E 277	Creativity and Innovation	4
MS&E 292	Health Policy Modeling	3
MS&E 293	Technology and National Security	3
MS&E 294	Climate Policy Analysis	3
MS&E 295	Energy Policy Analysis	3
MS&E 299	Voluntary Social Systems	3
MS&E 464	Global Project Coordination	3-4

## Production and Operations Management Pre-Approved Concentration Courses:

MS&E 236	Game Theory with Engineering Applications	3
MS&E 236H	Game Theory with Engineering Applications	3
MS&E 260	Introduction to Operations Management	3-4
MS&E 261	Inventory Control and Production Systems *	3
MS&E 262	Supply Chain Management	3
MS&E 264	Sustainable Product Development and Manufacturing	3-4
MS&E 266	Management of New Product Development	3
MS&E 268	Operations Strategy	3
MS&E 464	Global Project Coordination	3-4

\* These courses are also listed as core courses. You may use them to satisfy *either* the core *or* the concentration requirement, but not both.

## Project Course Requirement

Students must take either a designated project course or two designated integrated project courses. The project course(s) must be taken for a letter grade, must be taken for a minimum of three units, and may also be used to satisfy the core or concentration requirement.

### Project Courses

MS&E 250B	Project Course in Engineering Risk Analysis	3
MS&E 348	Optimization of Uncertainty and Applications in Finance	3
MS&E 444	Investment Practice	3-4
MS&E 445	Projects in Wealth Management	3-4
MS&E 452	Decision Analysis Projects: Helping Real Leaders Make Real Decisions	3
MS&E 464	Global Project Coordination	3-4
MS&E 491	Clean Energy Development	3

### Integrated Project Courses

MS&E 201	Dynamic Systems	3-4
MS&E 206	Art of Mathematical Modeling	3
MS&E 211	Linear and Nonlinear Optimization	3-4
MS&E 212	Mathematical Programming and Combinatorial Optimization	3
MS&E 234	Organization Change and Information Systems	3
MS&E 242	Investment Science	3
MS&E 242H	Investment Science Honors	3
MS&E 243	Energy and Environmental Policy Analysis	3
MS&E 248	Economics of Natural Resources	3-4
MS&E 255	Decision Systems I	2-3
MS&E 256	Technology Assessment and Regulation of Medical Devices	1-3
MS&E 262	Supply Chain Management	3
MS&E 264	Sustainable Product Development and Manufacturing	3-4
MS&E 266	Management of New Product Development	3
MS&E 270	Strategy in Technology-Based Companies	3-4
MS&E 271	Global Entrepreneurial Marketing	3-4
MS&E 273	Technology Venture Formation	3-4
MS&E 274	Dynamic Entrepreneurial Strategy	3
MS&E 277	Creativity and Innovation	3-4
MS&E 280	Organizational Behavior: Evidence in Action	3-4

MS&E 294	Climate Policy Analysis	3
MS&E 295	Energy Policy Analysis	3
MS&E 311	Optimization	3
MS&E 315	Numerical Optimization	3
MS&E 337	Information Networks	3
MS&E 347	Credit Risk: Modeling and Management	3
MS&E 349	Capital Deployment	3
MS&E 355	Influence Diagrams and Probabilistics Networks	3

## Additional Requirements

1. At least 45 units must be in courses numbered 100 and above.
2. At least 27 units must be in courses numbered 200 and above in MS&E, taken for a letter grade and a minimum of two units each, and at least 36 letter-graded units must be in MS&E or closely related fields. Closely related fields include any department in the School of Engineering, mathematics, statistics, economics, sociology, psychology, or business.
3. The degree program must be completed with a grade point average (GPA) of 3.0 or higher.
4. A maximum of three units of language courses (numbered 100 and above).
5. A maximum of three units of 1-unit courses such as seminars, colloquia, workshops, in any department, and a maximum of one unit of MS&E 208A, B, or C, Curricular Practical Training.
6. A maximum of 18 non-degree option (NDO) units through the Stanford Center for Professional Development (SCPD).
7. Courses in athletics may not be applied toward the degree.

See the student services office or department web site for complete listing of approved concentrations.

## Energy and Environment Track

The Energy and Environment M.S. track is designed for students interested in energy and environmental issues from the perspectives of public policy, nongovernmental organizations, or corporations. This track includes: core courses that provide the conceptual background in economics, decisions, strategy, investment, and organizational behavior; courses in energy resources, natural resource economics, and energy/environmental policy analysis; and an individually designed concentration emphasizing policy, strategy, and/or technology. Seminars provide insights into current corporate strategy, public policy, and research community developments. Energy/environmental project courses give practice in applying methodologies and concepts. Students can complete the program in one year or may extend the program up to two years, taking additional courses for greater depth and breadth. For additional information, see <http://www.stanford.edu/dept/MSandE/academics/energyenvironment.html>.

## Dual Master's Degree Program

The dual degree program enables a small group of graduate students to obtain two master's degrees simultaneously. Students complete the course requirements for each department. A total of 90 units is required to complete the dual master's degree.

## Admission

For the dual degree, admission to two departments is required, but is coordinated by designated members of both admissions committees who make recommendations to the committees of their respective departments. Students may apply to only one department initially. After the first quarter at Stanford, students may apply to be admitted to the second department.

## Advising

Every student in the dual degree program has one adviser in each department.

## Joint MS&E and Law Degrees

The School of Law and the Department of Management Science and Engineering offer joint degree programs leading to a J.D. degree and an M.S. degree in MS&E, or to a J.D. and Ph.D. in MS&E. These programs are designed for students who wish to prepare themselves for careers in areas relating to both law and to the decision making, policy making, and problem solving knowledge and skills developed in the MS&E program. Students interested in either joint degree program must apply and gain admission separately to the School of Law and the Department of Management Science and Engineering and, as an additional step, must secure consent from both academic units to pursue degrees in those units as part of a joint degree program. Interest in either joint degree program should be noted on the student's admission applications and may be considered by the admission committee of each program. Alternatively, an enrolled student in either the Law School or MS&E may apply for admission to the other program and for joint degree status in both academic units after commencing study in either program.

Joint degree students may elect to begin their course of study in either the School of Law or MS&E. Students are assigned to a joint program committee composed of at least one faculty member from Law and one from MS&E. This committee plans the student's program jointly with the student. Students must be enrolled full time in the Law School for the first year of law studies, and it is recommended that students devote exclusively one Autumn Quarter to the MS&E M.S. program to initiate their MS&E work. After that time, enrollment may be in MS&E or Law, and students may choose courses from either program regardless of where enrolled. A candidate in the joint J.D./Ph.D. program should spend a substantial amount of full time residency in MS&E. Students must satisfy the requirements for both the J.D. and the M.S. or Ph.D. degrees as specified in this bulletin or by the School of Law. The Law School may approve courses from MS&E or courses in the student's MS&E program from outside of the Department of Management Science and Engineering that may count toward the J.D. degree, and MS&E may approve courses from the Law School that may count toward the M.S. or Ph.D. degree in MS&E. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program. The lists may differ depending on whether the student is pursuing an M.S. or a Ph.D. in MS&E.

In the case of a J.D./M.S. program, no more than 45 units of approved courses may be counted toward both degrees. In the case of a J.D./Ph.D. program, no more than 54 units of approved courses may be counted toward both degrees. In either case, no more than 36 units of courses that originate outside the Law School may count toward the law degree. To the extent that courses under this joint degree program originate outside the Law School but count toward the law degree, the law credits permitted under Section 17(1) of the Law School Regulations are reduced on a unit-per-unit basis, but not below zero. The maximum number of law school credits that may be counted toward the M.S. in MS&E is the greater of: (a) 18 units in the case of the M.S., or (b) the maximum number of hours from courses outside the department that an M.S. candidate in MS&E is permitted to count toward the applicable degree under general departmental guidelines or under departmental rules that apply in the case of a particular student.

Tuition and financial aid arrangements are normally through the school in which the student is then enrolled.

# Doctor of Philosophy in Management Science and Engineering

University requirements for the Ph.D. degree are described in the "Graduate Degrees" section of this bulletin.

The Ph.D. degree in MS&E is intended for students primarily interested in a career of research and teaching, or high-level technical work in universities, industry, or government. The program requires three years of full-time graduate study, at least two years of which must be at Stanford. Typically, however, students take about four to five years after entering the program to complete all Ph.D. requirements. The Ph.D. is generally organized around the requirement that the students acquire a breadth across some of the eight areas of the department, and depth in one of them. These fields of study are:

- Decision analysis and risk analysis
- Economics and finance
- Information science and technology
- Organization, technology, and entrepreneurship
- Policy and strategy
- Probability and stochastic systems
- Production and operations management
- Systems modeling and optimization

Each student admitted to the Ph.D. program must satisfy a breadth requirement and pass a qualification procedure. The purpose of the qualification procedure is to assess the student's command of the field and to evaluate his or her potential to complete a high-quality dissertation in a timely manner. The student must complete specified course work in one of the eight areas of the department, or the Systems Program which is a combination of several areas. The qualification decision is based on the student's grade point average (GPA), on the one or two preliminary papers prepared by the student, and on the student's performance in an area examination. Considering this evidence, the department faculty votes on advancing the student to candidacy in the department at large. The Ph.D. requires a minimum of 135 units, at least 54 of which must be in courses of 3 units or more. At least 48 course units in courses of 3 units or more must be taken for a letter grade. Finally, the student must pass a University oral examination and complete a Ph.D. dissertation. During the course of the Ph.D. program, students who do not have a master's degree are strongly encouraged to complete one, either in MS&E or in another Stanford department.

## Breadth Requirement

1. The breadth requirement is to be satisfied by a choice of four courses spanning four out of the above mentioned eight areas of the department.
2. The Ph.D. candidacy form must contain four courses that satisfy the breadth requirement.
3. Courses chosen to satisfy the breadth requirement must be taken for letter grades.
4. At least one of the four courses chosen to satisfy the breadth requirement must be at the 300 level.

## Courses Satisfying the Breadth Requirement:

Choose at least one course from four different areas. Courses used to satisfy the breadth requirement may also be used to satisfy the depth requirement.

Systems Modeling and Optimization:		
MS&E 201	Dynamic Systems	3-4
MS&E 211	Linear and Nonlinear Optimization	3-4
MS&E 212	Mathematical Programming and Combinatorial Optimization	3
MS&E 310	Linear Programming	3
MS&E 311	Optimization	3
MS&E 312	Advanced Methods in Numerical Optimization	3
MS&E 313	Vector Space Optimization	3
MS&E 314	Linear and Conic Optimization with Applications	3
MS&E 315	Numerical Optimization	3
MS&E 316	Discrete Mathematics and Algorithms	3
MS&E 317	Algorithms for Modern Data Models	3
MS&E 318	Large-Scale Numerical Optimization	3
MS&E 319	Approximation Algorithms	3
Probability and Stochastic Systems:		
MS&E 220	Probabilistic Analysis	3-4
MS&E 221	Stochastic Modeling	3
MS&E 223	Simulation	3
MS&E 321	Stochastic Systems	3
MS&E 322	Stochastic Calculus and Control	3
MS&E 323	Stochastic Simulation	3
MS&E 332	Security and Risk in Computer Networks	3
MS&E 335	Queueing and Scheduling in Processing Networks	3
MS&E 336	Topics in Game Theory with Engineering Applications	3
MS&E 337	Information Networks	3
MS&E 338	Advanced Topics in Information Science and Technology	3
Information Science and Technology:		
MS&E 237	The Social Data Revolution: Data Mining and Electronic Business	3
MS&E 239	Computational Advertising	3
MS&E 332	Security and Risk in Computer Networks	3
MS&E 335	Queueing and Scheduling in Processing Networks	3
MS&E 336	Topics in Game Theory with Engineering Applications	3
MS&E 337	Information Networks	3
MS&E 338	Advanced Topics in Information Science and Technology	3
Economics and Finance:		
MS&E 241	Economic Analysis	3-4
MS&E 242	Investment Science	3
MS&E 242H	Investment Science Honors	3
MS&E 242S	Investment Science	3
MS&E 248	Economics of Natural Resources	3-4
MS&E 342	Advanced Investment Science	3
MS&E 347	Credit Risk: Modeling and Management	3
MS&E 348	Optimization of Uncertainty and Applications in Finance	3
MS&E 349	Capital Deployment	3
Decision Analysis and Risk Analysis:		
MS&E 250A	Engineering Risk Analysis	3
MS&E 251	Stochastic Decision Models	3
MS&E 252	Decision Analysis I: Foundations of Decision Analysis	3-4
MS&E 351	Dynamic Programming and Stochastic Control	3

MS&E 352	Decision Analysis II: Professional Decision Analysis	3-4
MS&E 353	Decision Analysis III: Frontiers of Decision Analysis	3
MS&E 355	Influence Diagrams and Probabilistic Networks	3
Production and Operations Management:		
MS&E 260	Introduction to Operations Management	3-4
MS&E 261	Inventory Control and Production Systems	3
MS&E 262	Supply Chain Management	3
MS&E 264	Sustainable Product Development and Manufacturing	3-4
MS&E 266	Management of New Product Development	3
MS&E 268	Operations Strategy	3
MS&E 364	Multi-echelon Inventory Models	3
MS&E 365	Advanced Models in Operations Management	3
Organization, Technology, and Entrepreneurship:		
MS&E 280	Organizational Behavior: Evidence in Action	3-4
MS&E 380	Doctoral Research Seminar in Organizations	3
MS&E 381	Doctoral Research Seminar in Work, Technology, and Organization	2-3
MS&E 383	Doctoral Seminar on Ethnographic Research	3
MS&E 384	Groups and Teams	3
Policy and Strategy:		
MS&E 270	Strategy in Technology-Based Companies	3-4
MS&E 292	Health Policy Modeling	3
MS&E 293	Technology and National Security	3
MS&E 294	Climate Policy Analysis	3
MS&E 295	Energy Policy Analysis	3
MS&E 371	Innovation and Strategic Change	2-3
MS&E 372	Entrepreneurship Doctoral Research Seminar	1-3
MS&E 374	Dynamic Corporate Strategy	3
MS&E 375	Research on Entrepreneurship	3
MS&E 376	Strategy Doctoral Research Seminar	3
MS&E 389	Seminar on Organizational Theory	5
MS&E 390	Doctoral Research Seminar in Health Systems Modeling	1-3
MS&E 391	Doctoral Research Seminar in Energy-Environmental Systems Modeling and Analysis	1-3

## Qualification Procedure Requirements

The qualification procedure is based both on breadth across the department's disciplines and depth in an area of the student's choice. The qualification process must be completed by the end of the month of May of the student's second year of graduate study in the department. The performance of all doctoral students is reviewed every year at a department faculty meeting at the end of May or beginning of June. Ph.D. qualification decisions are made at that time and individual feedback is provided.

The Ph.D. qualification requirements comprise these elements:

1. *Grade Point Average*: A student must maintain a GPA of at least 3.4 in the four courses chosen to satisfy the breadth requirements, and a GPA of at least 3.4 in the set of all courses taken by the student within the department. In both cases, the GPA is computed on the basis of the nominal number of units for which each course is offered.
2. *Paper(s)*: A student may choose between two options, either of which is to be completed before the Spring Quarter of the student's second year. The first option involves one paper supervised by a primary faculty adviser and a faculty consultant. This paper should be written in two quarters.



- A. The second option involves two shorter sequential tutorials, with two different faculty advisers. Each tutorial should be completed in one quarter. In both options, the student chooses the faculty adviser(s)/consultant with the faculty members' consent.
- B. A student may register for up to 3 units per tutorial and up to 6 units for a paper. These paper or tutorial units do not count towards the 54 course units required for the Ph.D., and letter grades are not given.
3. *Area Qualification:* In addition, during the second year, a student must pass an examination in one of the eight areas of the MS&E department or the Systems Program, a combination of several areas, which is of the student's choice. This area examination is written, oral, or both, at the discretion of the area faculty administering the exam.
4. *Area Course Requirement:* Students must complete the depth requirements of one of the eight fields of study of the MS&E department or the Systems Program which is a combination of several areas. Courses used to satisfy depth requirements must be taken for a letter grade. The Ph.D. requirements for the eight areas of the MS&E department are available from the MS&E student services office.

## Ph.D. Minor in Management Science and Engineering

Students pursuing a Ph.D. in another department who wish to receive a Ph.D. minor in Management Science and Engineering should consult the MS&E student services office. A minor in MS&E may be obtained by completing 20 units of approved graduate-level MS&E courses, of which at least 6 units must be at the 300-level. Courses approved for the minor must form a coherent program, and must include one course from at least three of the eleven MS&E Master of Science core options. The program must include a minimum of 16 letter-graded units, and a minimum grade point average of 3.3 must be achieved in these courses.

*Emeriti: (Professors)* James L. Adams, Kenneth J. Arrow, Richard W. Cottle, Donald A. Dunn, B. Curtis Eaves, Frederick S. Hillier, Donald L. Iglehart, Michael M. May, William J. Perry, Henry E. Riggs, David A. Thompson, Arthur F. Veinott, Jr.

*Chair:* Peter W. Glynn

*Professors:* Nicholas Bambos, Stephen R. Barley, Margaret L. Brandeau, Kathleen M. Eisenhardt, Peter W. Glynn, Warren H. Hausman, Ronald A. Howard, David G. Luenberger, M. Elisabeth Paté-Cornell, Robert I. Sutton, James L. Sweeney, Benjamin Van Roy, Yinyu Ye

*Associate Professors:* Samuel S. Chiu, Kay Giesecke, Ashish Goel, Pamela J. Hinds, Ramesh Johari, Riitta Katila, Amin Saberi, Ross D. Shachter, Edison T. S. Tse

*Assistant Professors:* Charles E. Eesley, Feryal Erhun

*Professors (Research):* Siegfried S. Hecker, Walter Murray, Michael A. Saunders, John P. Weyant

*Professors (Teaching):* Thomas H. Byers, Robert E. McGinn

*Courtesy Professors:* Anat Admati, Stephen P. Boyd, Sylvia Plevritis, Walter Powell, Balaji Prabhakar, Tim Roughgarden

*Lecturers:* Jason Amaral, Daniel Barreto, Ravi Belani, Leticia Britos Cavagnaro, Shoshana Cohen, Toby Corey, Jon Feiber, Jack Fuchs, Clint Korver, Trevor Loy, Ann Miura-Ko, Mary Morrison, Donna Novitsky, Lena Ramfelt, Heidi Roizen, Tina Seelig, Rosanne Siino, Lynda Kate Smith

*Consulting Professors:* Peter Haas, Gerd Infanger, Thomas Kosnik, Burke Robinson, Sam L. Savage, Behnam Tabrizi

*Consulting Associate Professors:* Steve Blank, Hervé Kieffel, Michael Lyons, Audrey MacLean, Jan Pietzsch, Dariush Rafinejad, F. Victor Stanton, Peter Woehrmann

*Consulting Assistant Professors:* Blake E. Johnson, Arik Lifschitz

*Visiting Professor:* Olivier de La Grandville

*Visiting Associate Professors:* Charles Feinstein, Yee-Tien Fu

*Director of the Industrial Affiliates Program:* Yinyu Ye

## Materials Science and Engineering

Courses offered by the Department of Materials Science and Engineering are listed under the subject code MATSCI on the *Stanford Bulletin's* ExploreCourses web site.

The Department of Materials Science and Engineering is concerned with the relation between the structure and properties of materials, factors that control the internal structure of solids, and processes for altering their structure and properties, particularly at the nanoscale.

## Mission of the Undergraduate Program in Materials Science and Engineering

The mission of the undergraduate program in Materials Science and Engineering is to provide students with a strong foundation in materials science and engineering with emphasis on the fundamental scientific and engineering principles which underlie the knowledge and implementation of material structure, processing, properties, and performance of all classes of materials used in engineering systems. Courses in the program develop students' knowledge of modern materials science and engineering, teach them to apply this knowledge analytically to create effective and novel solutions to practical problems, and develop their communication skills and ability to work collaboratively. The program prepares students for careers in industry and for further study in graduate school.

The B.S. in Materials Science and Engineering provides training for the materials engineer and also preparatory training for graduate work in materials science. Capable undergraduates are encouraged to take at least one year of graduate study to extend their course work through the coterminal degree program which leads to an M.S. in Materials Science and Engineering. Coterminal degree programs are encouraged both for undergraduate majors in Materials Science and Engineering and for undergraduate majors in related disciplines.

## Graduate Programs in Materials Science Engineering

Graduate programs lead to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Graduate students can specialize in any of the areas of materials science and engineering.

# Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course and laboratory work in solid state fundamentals and materials engineering, and further course work in a technical depth area which may include a master's Research Report. Typical depth areas include nanocharacterization, electronic and photonic materials, energy materials, nano and biomaterials.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Materials Science and Engineering and related fields.

## Facilities

The department is based in the William F. Durand Building, with extensive facilities in the Jack A. McCullough building and the Gordon and Betty Moore Materials Research Building. These buildings house offices for the chair and most of the faculty, for the administrative and technical staff, and for most graduate students, along with lecture and seminar rooms. Facilities for teaching and research are also available, including equipment for electrical measurements; mechanical testing of bulk and thin film materials; fracture and fatigue of advanced materials; metallography; optical, scanning, transmission electron microscopy, and atomic force microscopy; UHV sputter deposition; vacuum annealing treatments; wet chemistry; and x-ray diffraction. The McCullough/Moore Complex is also the home for the Center for Magnetic Nanotechnology, with corresponding facilities for magnetic measurements, and to the Stanford Nanocharacterization Laboratory (SNL). The Rapid Prototyping Laboratory (RPL), housing material deposition and removal stations, is a joint facility with Mechanical Engineering, and is housed in Building 530. The department maintains a microcomputer cluster for its students, which is linked to the internet.

Depending on the needs of their programs, students and faculty also conduct research in a number of other departments and independent laboratories. Chief among these are the Stanford Nanofabrication Facility (SNF), the Geballe Laboratory for Advanced Materials (GLAM) (<http://stanford.edu/group/glam>), and the Stanford Synchrotron Radiation Laboratory.

The Stanford Nanofabrication Facility (SNF) is a laboratory joining government and industrially funded research on microelectronic materials, devices, and systems. It houses a 10,000 square foot, class 100 clean room for Si and GaAs integrated circuit fabrication; a large number of electronic test, materials analysis, and computer facilities; and office space for faculty, staff, and students. In addition, the Center for Integrated Systems (CIS) provides startup research funds and maintains a fellow-mentor program with industry.

# Bachelor of Science in Materials Science and Engineering

## Mission Statement

The mission of the Materials Science and Engineering Program is to provide students with a strong foundation in materials science and engineering. The program's curriculum places special emphasis on the fundamental scientific and engineering principles which underlie the knowledge and implementation of materials structure, processing, properties, and performance of all classes of materials used in engineering

systems. Courses in the program develop students' knowledge of modern materials science and engineering and teach them to apply this knowledge analytically to create effective and novel solutions to practical problems. The program prepares students for careers in industry or for further study in graduate school.

The undergraduate program provides training in solid state fundamentals and materials engineering. Students desiring to specialize in this field during their undergraduate period may do so by following the curriculum outlined in the "Undergraduate Degree in Materials Science and Engineering" section of this bulletin as well as the *School of Engineering Undergraduate Handbook*. The University's basic requirements for the bachelor's degree are discussed in the "Undergraduate Degrees and Programs" section of this bulletin. Electives are available so that students with broad interests can combine materials science and engineering with work in another science or engineering department.

Students interested in the minor should see the "Minor in Materials Science and Engineering" section of this bulletin.

# Materials Science and Engineering (MATSCI)

Completion of the undergraduate program in Materials Science and Engineering leads to the conferral of the Bachelor of Science in Materials Science and Engineering.

## Requirements

### Course List

	Units
<b>Mathematics (10)</b>	
20 units minimum; see Basic Requirement 1	
Select one of the following:	5
MATH 51    Linear Algebra and Differential Calculus of Several Variables	
CME 100/ ENGR 154    Vector Calculus for Engineers	
Select one of the following:	
MATH 52    Integral Calculus of Several Variables	
CME 104/ ENGR 155B    Linear Algebra and Partial Differential Equations for Engineers	
Select one of the following:	5
MATH 53    Ordinary Differential Equations with Linear Algebra	
CME 102/ ENGR 155A    Ordinary Differential Equations for Engineers	
<b>Science (20)</b>	
20 units minimum; see Basic Requirement 2	20
Must include a full year of physics or chemistry, with one quarter of study in the other subject	
<b>Technology in Society (3-5)</b>	
One course; see Basic Requirement 4	3-5
<b>Engineering Fundamentals (10-13)</b>	
Three courses minimum; see Basic Requirement 3	
Select one of the following:	4
ENGR 50    Introduction to Materials Science, Nanotechnology Emphasis <sup>1</sup>	
ENGR 50E    Introduction to Materials Science - Energy Emphasis <sup>1</sup>	
ENGR 50M    Introduction to Materials Science, Biomaterials Emphasis <sup>1</sup>	

At least two additional courses	6-9
<b>Materials Science and Engineering Depth (50)</b>	
Materials Science Fundamentals:	
MATSCI 153 Nanostructure and Characterization	4
MATSCI 154 Thermodynamics of Energy Conversions at the Nanoscale <sup>3</sup>	4
MATSCI 155 Nanomaterials Synthesis	4
MATSCI 157 Quantum Mechanics of Nanoscale Materials	4
Two of the following courses:	8
MATSCI 151 Microstructure and Mechanical Properties	
MATSCI 152 Electronic Materials Engineering	
MATSCI 156 Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	
MATSCI 190 Organic and Biological Materials	
MATSCI 192 Materials Chemistry	
MATSCI 193 Atomic Arrangements in Solids	
MATSCI 194 Thermodynamics and Phase Equilibria	
MATSCI 195 Waves and Diffraction in Solids	
MATSCI 196 Imperfections in Solids	
MATSCI 197 Rate Processes in Materials	
MATSCI 198 Mechanical Properties of Materials	
MATSCI 199 Electronic and Optical Properties of Solids	
Engineering Depth	16
One of the following courses:	
MATSCI 161 Nanocharacterization Laboratory	
MATSCI 164 Electronic and Photonic Materials and Devices Laboratory (WIM)	
Three of the following courses:	
MATSCI 160 Nanomaterials Laboratory	
MATSCI 162 X-Ray Diffraction Laboratory	
MATSCI 163 Mechanical Behavior Laboratory	
MATSCI 165 Nanoscale Materials Physics Computation Laboratory	
Focus Area Options <sup>2</sup>	10

## Footnotes

- <sup>1</sup> If both ENGR 50 Introduction to Materials Science, Nanotechnology Emphasis, ENGR 50E Introduction to Materials Science - Energy Emphasis, and/or ENGR 50M Introduction to Materials Science, Biomaterials Emphasis are taken, one may be used for the Materials Science Fundamentals requirement.
- <sup>2</sup> Focus Area Options; 10 units from one of the following areas below
- <sup>3</sup> ENGR 30 Engineering Thermodynamics may be substituted for MATSCI 154 Thermodynamics of Energy Conversions at the Nanoscale as long as the total MATSCI program units total 50 or more.

## Focus Area Options

## Course List

	Units
<b>Bioengineering (28)</b>	
BIOE 220 Introduction to Imaging and Image-based Human Anatomy	3
BIOE 281 Biomechanics of Movement	3
BIOE 284B Cardiovascular Bioengineering	3
BIOE 333 Interfacial Phenomena and Bionanotechnology	3
BIOE 381 Orthopaedic Bioengineering	3
MATSCI 190 Organic and Biological Materials	4

MATSCI 380 Nano-Biotechnology	3
MATSCI 381 Biomaterials in Regenerative Medicine	3
MATSCI 382 Bio-chips, Imaging and Nanomedicine	3

**Chemical Engineering (15)**

CHEM 171 Physical Chemistry	3
CHEMENG 130 Separation Processes	3
CHEMENG 140 Micro and Nanoscale Fabrication Engineering	3
CHEMENG 150 Biochemical Engineering	3
CHEMENG 160 Polymer Science and Engineering	3

**Chemistry (24)**

CHEM 151 Inorganic Chemistry I	3
CHEM 153 Inorganic Chemistry II	3
CHEM 171 Physical Chemistry	3
CHEM 173 Physical Chemistry	3
CHEM 175 Physical Chemistry	3
CHEM 181 Biochemistry I	3
CHEM 183 Biochemistry II	3
CHEM 185 Biochemistry III	3

**Electronics & Photonics (32)**

EE 101A Circuits I	4
EE 101B Circuits II	4
EE 102A Signal Processing and Linear Systems I	4
EE 102B Signal Processing and Linear Systems II	4
EE 116 Semiconductor Device Physics	3
EE 134 Introduction to Photonics	4
EE 136 Introduction to Nanophotonics and Nanostructures	3
EE 141 Engineering Electromagnetics	3
MATSCI 343 Organic Semiconductors for Electronics and Photonics	3

**Energy Technology (15-16)**

EE 293A Fundamentals of Energy Processes	3-4
EE 293B Fundamentals of Energy Processes	3
MATSCI 302 Solar Cells	3
MATSCI 303 Principles, Materials and Devices of Batteries	3
ME 260 Fuel Cell Science and Technology	3

**Materials Characterization Techniques (9)**

MATSCI 321 Transmission Electron Microscopy	3
MATSCI 323 Thin Film and Interface Microanalysis	3
MATSCI 325 X-Ray Diffraction	3
MATSCI 320 and 326 (not offered in 2012-2013) may also be counted towards this focus area.	

**Mechanical Behavior & Design (25)**

AA 240A Analysis of Structures	3
AA 240B Analysis of Structures	3
AA 256 Mechanics of Composites	3
MATSCI 198 Mechanical Properties of Materials	4
MATSCI 358 Fracture and Fatigue of Materials and Thin Film Structures	3
ME 80 Mechanics of Materials	4
or CEE 101A Mechanics of Materials	
ME 203 Design and Manufacturing	4
ME 294 Medical Device Design	1

**Nanoscience (21)**

BIOE 333 Interfacial Phenomena and Bionanotechnology	3
EE 136 Introduction to Nanophotonics and Nanostructures	3

ENGR 240	Introduction to Micro and Nano Electromechanical Systems	3
MATSCI 316	Nanoscale Science, Engineering, and Technology	3
MATSCI 346	Nanophotonics	3
MATSCI 347	Introduction to Magnetism and Magnetic Nanostructures	3
MATSCI 380	Nano-Biotechnology	3
MATSCI 320 (not offered in 2012-2013) may also be counted towards this focus area.		
<b>Physics (39)</b>		
PHYSICS 70	Foundations of Modern Physics	4
PHYSICS 110	Advanced Mechanics	4
PHYSICS 120	Intermediate Electricity and Magnetism I	4
PHYSICS 121	Intermediate Electricity and Magnetism II	4
PHYSICS 130	Quantum Mechanics	4
PHYSICS 131	Quantum Mechanics II	4
PHYSICS 134	Advanced Topics in Quantum Mechanics	4
PHYSICS 170	Thermodynamics, Kinetic Theory, and Statistical Mechanics I	4
PHYSICS 171	Thermodynamics, Kinetic Theory, and Statistical Mechanics II	4
PHYSICS 172	Solid State Physics	3
<b>Self-Defined Option (10)</b>		

Petition for a self-defined cohesive program, minimum of 10 units. 10

These requirements are subject to change. The final requirements are published with sample programs in the Handbook for Undergraduate Engineering Programs.

## Coterminal B.S./M.S. Program in Materials Science and Engineering

Stanford undergraduates who wish to continue their studies for the Master of Science degree in Materials Science and Engineering through the coterminal program may apply for admission after they have earned 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. Applicants must submit their application no later than eight weeks before the start of the proposed admit quarter. The application must give evidence that the student possesses the potential for strong academic performance at the graduate level. Scores from the Graduate Record Exam (GRE) General Test must be reported before action can be taken on an application.

Materials science is a highly integrated and interdisciplinary subject, and so applications from students of any engineering or science undergraduate major are encouraged.

Information and other requirements pertaining to the coterminal program may be obtained from the department's student services office in Durand 115.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, also see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

## Materials Science and Engineering (MATSCI) Minor

A minor in Materials Science and Engineering allows interested students to explore the role of materials in modern technology and to gain an understanding of the fundamental processes that govern materials behavior.

The following courses fulfill the minor requirements:

		Units
<b>Engineering Fundamentals (4)</b>		
Select one of the following:		4
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	
ENGR 50E	Introduction to Materials Science - Energy Emphasis	
ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis	
<b>Materials Science Fundamentals and Engineering Depth (24)</b>		
Select six of the following:		24
MATSCI 151	Microstructure and Mechanical Properties	
MATSCI 152	Electronic Materials Engineering	
MATSCI 153	Nanostructure and Characterization	
MATSCI 154	Thermodynamics of Energy Conversions at the Nanoscale	
MATSCI 155	Nanomaterials Synthesis	
MATSCI 156	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution	
MATSCI 157	Quantum Mechanics of Nanoscale Materials	
MATSCI 160	Nanomaterials Laboratory	
MATSCI 161	Nanocharacterization Laboratory	
MATSCI 162	X-Ray Diffraction Laboratory	
MATSCI 163	Mechanical Behavior Laboratory	
MATSCI 164	Electronic and Photonic Materials and Devices Laboratory	
MATSCI 165	Nanoscale Materials Physics Computation Laboratory	
MATSCI 190	Organic and Biological Materials	
MATSCI 192	Materials Chemistry	
MATSCI 193	Atomic Arrangements in Solids	
MATSCI 194	Thermodynamics and Phase Equilibria	
MATSCI 195	Waves and Diffraction in Solids	
MATSCI 196	Imperfections in Solids	
MATSCI 197	Rate Processes in Materials	
MATSCI 198	Mechanical Properties of Materials	
MATSCI 199	Electronic and Optical Properties of Solids	
Total Units		28

## Master of Science in Materials Science Engineering

The University's basic requirements for the M.S. degree are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The following are specific departmental requirements.

The Department of Materials Science and Engineering requires a minimum of 45 units for a master's degree to be taken in residence at Stanford. Master's Program Proposal forms should be filled out, signed by the student's academic adviser, and submitted to the department's student services manager by the end of the student's first quarter of study. Final revisions to the master's program must be submitted no later than one academic quarter prior to the quarter of expected degree conferral. Stanford Materials Science undergraduates who are pursuing or who plan to pursue a Coterminal M.S. degree may have more flexibility in their programs and

should consult with their academic advisers regarding appropriate core course and elective choices.

Degree requirements are as follows:

1. A minimum of 30 units of Materials Science and Engineering (MATSCI) course work, including core and lab courses specified below, taken for a letter grade. Research units, one-unit seminars, MATSCI 299 and courses in other departments (i.e., where students cannot enroll in a class with a MATSCI subject code) cannot be counted for this requirement.
2. Of these 30 units Materials Science requirements, students must include a or b.
  - A. three classes from MATSCI 201-210 core courses and three MATSCI 171, 172, 173 laboratory courses. Student may fulfill one laboratory requirement from another engineering department.
  - B. four classes from MATSCI 201-210 core courses and any two MATSCI 171, 172, 173 laboratory courses. Student may fulfill one laboratory requirement from another engineering department.
3. 15 units of approved course electives that result in a technically coherent program. Of the 15 units of elective courses:
  - A. 12 of the 15 units must be taken for a letter grade (except for those submitting a M.S. report).
  - B. a maximum of three units may be seminars.
  - C. if writing a master's research report, a minimum of 6 and a maximum of 15 units of Materials Science research units (MATSCI 200) may be counted. M.S. research units may only be counted if writing a M.S. research report. See student services manager for details and approval.
  - D. a maximum of three units may be undergraduate units, but not courses below the 100 level offering.
  - E. a maximum of five units may be used for a foreign language course (not including any remedial English courses or courses in the student's native language if other than English).
  - F. the combination of seminar, undergraduate, and language units may not exceed six units total.
  - G. the combination of research, seminar, undergraduate, and language units may not exceed 15 units total.
  - H. activity units may not be counted toward M.S. degree.
4. A minimum grade point average (GPA) of 2.75 for degree course work.

All proposed degree programs are subject to approval by the department's student services manager and the Academic Degree Committee, which has responsibility for assuring that each proposal is a technically coherent program. The M.S. degree must be awarded within the University's candidacy period for completion of a master's degree.

## Master's Research Report

Students wishing to take this option must include 6-15 Materials Science research units on their program proposal and the name of the faculty member supervising the research. Students using 15 units of research toward the degree must participate in a more complex and demanding research project than those using fewer units.

The report must be approved by two faculty members of which one must be a faculty member from the department. One faculty member is the student's research adviser. The other faculty member must be approved by the department's student services manager. Three copies of the report (one copy for each approving faculty member and one for the department file), in final form and signed by the two faculty members must be submitted. The

report is not an official University thesis but is intended to demonstrate to department faculty an ability to conduct and report directed research.

As a general guide line, a 6-9 units of master's research is a normal load for most students. The report should reflect the number of units taken. For instance, 3-4 laboratory reports are required for a 3-unit laboratory course. Accordingly, the level expected for 9 units of research would be at least equivalent to three such courses.

Students are advised to submit their thesis draft to the readers by the end of fifth week of the quarter in which the units are to be assigned to allow time form comments and revisions. A copy of final draft should be submitted to faculty and student services manager by last day of classes. The appropriate grade for satisfactory progress in the research project prior to submission of the report is 'N' (continuing); the 'S' grade is given only when the report is fully approved by both faculty members.

In cases where students decide to pursue research after the initial program submission deadline, they should submit a revised M.S. Program Proposal at least two quarters before the degree is granted. The total combined units of Materials Science research units, seminars, language courses, and undergraduate courses cannot exceed 15. If a master's research report is not to be submitted, units of MATSCI 200 Master's Research cannot be applied to the department's requirement of 45 units for the master's degree.

## Honors Cooperative Program

Some of the department's graduate students participate in the Honors Cooperative Program (HCP), which makes it possible for academically qualified engineers and scientists in industry to be part-time graduate students in Materials Science while continuing professional employment. Prospective HCP students follow the same admissions process and must meet the same admissions requirements as full-time graduate students. For information regarding the Honors Cooperative Program, see Graduate Programs in the "School of Engineering (p. 134)" section of this bulletin.

## Petition Process for Transfer from M.S. to Ph.D. Degree Program

Students admitted to the graduate program are admitted specifically into either the M.S. or the Ph.D. program. A student admitted to the M.S. program should not assume admission to the Ph.D. program. Admission to the Ph.D. program is required for the student to be eligible to work towards the Ph.D. degree.

A student in the M.S. program may petition to be admitted to the Ph.D. program by filing an M.S. to Ph.D. Transfer Petition. This petition must be accompanied by a one-page statement of purpose stating the reasons why the student wishes to transfer to the Ph.D. program, an updated transcript, and two letters of recommendation from members of the Stanford faculty, including one from the student's prospective adviser and at least one from a Materials Science faculty member belonging to the Academic Council. The M.S. to Ph.D. Transfer Petition is due to the student services manager by the end of the second week of Spring Quarter during the student's first year in the M.S. program. Only students enrolled in the 200 series core course sequence are eligible to petition, and a grade point average (GPA) of 3.5 or better in the core courses is required.

Transferring to the Ph.D. program is a competitive process and only highly qualified M.S. students may be admitted. Faculty consider the student's original application to the graduate program as well as the material provided with the transfer petition.

## Engineer in Materials Science Engineering

The University's basic requirements for the degree of Engineer are outlined in the "Graduate Degrees" section of this bulletin.

A student wishing to enter the Engineer program must have completed the requirements of the M.S. in Materials Science and Engineering, and must file a petition requesting admission to the program, stating the type of research to be done and the proposed supervising professor. Once approved, the Application for Candidacy must be submitted to the department's student services manager by the end of the second quarter in the Engineer program. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to degree conferral.

The 90-unit program must include 9 units of graduate courses in Materials Science with a MATSCI subject code (exclusive of research units, seminars, colloquia, and MATSCI 400 Participation in Materials Science Teaching, Participation in Teaching) beyond the requirements for the M.S. degree, and additional research or other units to meet the 90-unit University minimum requirement. A grade point average (GPA) of 3.0 must be maintained for all degree course work taken at Stanford.

Completion of an acceptable thesis is required. The Engineer thesis must be approved by two Academic Council faculty members, one of whom must be a member of the department, and submitted in triplicate.

## Doctor of Philosophy in Materials Science Engineering

The University's basic requirements for the Ph.D. degree are outlined in the "Graduate Degrees (p. 38)" section of this bulletin.

The Ph.D. degree is awarded after the completion of a minimum of 135 units of graduate work as well as satisfactory completion of any additional University requirements. Degree requirements for the department are as follows:

	Units
<b>Core Courses (30)</b> <sup>1</sup>	
EE 222 Applied Quantum Mechanics I (MATSCI 201 or EE 223 may also meet this requirement)	3
MATSCI 202 Materials Chemistry	3
MATSCI 203 Atomic Arrangements in Solids	3
MATSCI 204 Thermodynamics and Phase Equilibria	3
MATSCI 205 Waves and Diffraction in Solids	3
MATSCI 206 Imperfections in Solids	3
MATSCI 207 Rate Processes in Materials	3
MATSCI 208 Mechanical Properties of Materials	3
MATSCI 209 Electronic and Optical Properties of Solids	3
MATSCI 210 Organic and Biological Materials	3
<b>Five Elective Graduate Technical Courses (15)</b> <sup>2</sup>	15
<b>Materials Science Colloquia (3)</b> <sup>3</sup>	
MATSCI 230 Materials Science Colloquium (Autumn 2012)	1
MATSCI 230 Materials Science Colloquium (Winter 2013)	1
MATSCI 230 Materials Science Colloquium (Spring 2013)	1
<b>Research &amp; Electives (87)</b>	
75 Units of MATSCI 300: Ph.D. Research	75
12 Units of Electives <sup>4</sup>	12

<sup>1</sup> At least six of these courses (including MATSCI 203 Atomic Arrangements in Solids, MATSCI 204 Thermodynamics and Phase Equilibria & MATSCI 207 Rate Processes in Materials) must be taken during the first year. All core courses must be completed for a letter grade, and taken during the first two years in the program.

<sup>2</sup> Courses must be directly relevant to Materials Science & Engineering, and may not include MATSCI 230 Materials Science Colloquium, MATSCI

299 Practical Training, MATSCI 300 Ph.D. Research or MATSCI 400 Participation in Materials Science Teaching. All courses must be completed for a letter grade.

<sup>3</sup> Materials Science & Engineering Ph.D. students are required to take MATSCI 230 Materials Science Colloquium during each quarter of their first year. Attendance is required, roll is taken, and more than two absences results in an automatic "NP" grade.

<sup>4</sup> May include other engineering courses, or MATSCI 400 Participation in Materials Science Teaching and a maximum of 3 units of MATSCI 299 Practical Training.

- Students must consult with their Academic Adviser on program planning. The program planning sheet must be submitted with the approval of the student's Academic and Dissertation Adviser on joining that research group, and no later than the end of spring quarter of the first year. For students with a non-MATSCI Dissertation Adviser, the MATSCI Academic/Co-Adviser must also approve the list of proposed courses. Any proposed deviations from the requirements can only be considered by petition.
- Ph.D. students are required to obtain their M.S. degrees in Materials Science & Engineering (normally by the end of their third year). A Graduate Program Authorization Petition and a M.S. Program Proposal must be submitted prior to taking the qualifying examination.
- A departmental oral qualifying examination must be passed by the end of January of the second year. A grade point average (GPA) of 3.5 from any core classes taken is required for admission to the Ph.D. qualifying examination. Students who have passed the Ph.D. qualifying exam are required to complete the Application for Candidacy to the Ph.D. degree by the end of the quarter in which they pass the examination. Final changes in the Application for Candidacy form must be submitted no later than one academic quarter prior to the TGR status.
- Maintain a cumulative GPA of 3.0 in all courses taken at Stanford.
- Students must present the results of the dissertation at the University Ph.D. oral examination.
- Current students subject to either this set of requirements or a prior set must obtain the approval of their adviser before filing a revised program sheet, and should as far as possible adhere to the intent of the new requirements.
- Students may reference the list of Advanced Specialty Courses and Cognate Courses provided below as guidance for their selection of technical units. As noted above, Academic Adviser approval is required.
- At least 90 units must be taken in residence at Stanford. Students entering with an M.S. degree in Materials Science from another university may request to transfer up to 45 units of equivalent work toward the total of 135 required units.
- Students may petition for exemption from required core courses. To petition, students must have background in the subject, prior consent from their academic adviser, and consent from the instructor of the core course. The course instructor will provide an oral or written examination that the petitioning student must pass. The petitioning student is required to complete approved elective or MATSCI courses to replace the units that would have been earned in the waived course.

## Advanced Specialty Courses

### Biomaterials

APPPHYS 292 (Not offered in 2012-2013)	
BIOPHYS 228	Computational Structural Biology
CHEMENG 260	Polymer Science and Engineering
CHEMENG 310	Microhydrodynamics

CHEMENG 355	Advanced Biochemical Engineering
ME 284A (Not offered in 2012-2013)	
ME 284B (Not offered in 2012-2013)	
ME 381	Orthopaedic Bioengineering
ME 385	Tissue Engineering Lab
ME 457	Fluid Flow in Microdevices
MATSCI 380	Nano-Biotechnology
MATSCI 381	Biomaterials in Regenerative Medicine
MATSCI 382	Bio-chips, Imaging and Nanomedicine
Electronic Materials Processing	
EE 212	Integrated Circuit Fabrication Processes
EE 216	Principles and Models of Semiconductor Devices
EE 311	Advanced Integrated Circuits Technology
EE 316	Advanced VLSI Devices
EE 410	Integrated Circuit Fabrication Laboratory
MATSCI 312	New Methods in Thin Film Synthesis
Materials Characterization	
APPPHYS 216	X-Ray and VUV Physics
CHEMENG 345	Fundamentals and Applications of Spectroscopy
EE 329 (Not offered in 2012-2013)	
MATSCI 312	New Methods in Thin Film Synthesis
MATSCI 320 (Not offered in 2012-2013)	
MATSCI 321	Transmission Electron Microscopy
MATSCI 322	Transmission Electron Microscopy Laboratory
MATSCI 323	Thin Film and Interface Microanalysis
MATSCI 325	X-Ray Diffraction
MATSCI 326 (Not offered in 2012-2013)	
Mechanical Behavior of Solids	
AA 252	Techniques of Failure Analysis
AA 256	Mechanics of Composites
MATSCI 251	Microstructure and Mechanical Properties
MATSCI 353	Mechanical Properties of Thin Films
MATSCI 358	Fracture and Fatigue of Materials and Thin Film Structures
ME 335A/335B/335C	Finite Element Analysis
ME 335B	Finite Element Analysis
ME 335C	Finite Element Analysis
ME 340	Theory and Applications of Elasticity
ME 340A (Not offered in 2012-2013)	
ME 340B (Not offered in 2012-2013)	
ME 345 (Not offered in 2012-2013)	
Physics of Solids and Computation	
APPPHYS 272	Solid State Physics
APPPHYS 273	Solid State Physics II
EE 222	Applied Quantum Mechanics I
EE 223	Applied Quantum Mechanics II
EE 228	Basic Physics for Solid State Electronics
EE 327	Properties of Semiconductor Materials
EE 328 (Not offered in 2012-2013)	
EE 329 (Not offered in 2012-2013)	
EE 335 (Not offered in 2012-2013)	

MATSCI 331	Atom-based computational methods for materials
MATSCI 343	Organic Semiconductors for Electronics and Photonics
MATSCI 347	Introduction to Magnetism and Magnetic Nanostructures
ME 344A (Not offered in 2012-2013)	
ME 344B (Not offered in 2012-2013)	
Soft Materials	
CHEMENG 260	Polymer Science and Engineering
CHEMENG 310	Microhydrodynamics
CHEMENG 460 (Not offered in 2012-2013)	
MATSCI 343	Organic Semiconductors for Electronics and Photonics
ME 455	Complex Fluids and Non-Newtonian Flows

## Ph.D. Minor in Materials Science and Engineering

The University's basic requirements for the Ph.D. minor are outlined in the "Graduate Degrees (p. 40)" section of this bulletin. A minor requires 20 units of graduate work of quality and depth at the 200-level or higher in the Materials Science & Engineering course offering. The list of courses to be approved by the advanced degree committee of the department. Individual programs must be submitted to the student services manager at least one quarter prior to degree conferral and approved as are other academic plans.

*Emeriti: (Professors)* Clayton W. Bates, John C. Bravman, Richard H. Bube, Theodore H. Geballe, Robert A. Huggins\*, William D. Nix \*, Oleg D. Sherby, John C. Shyne, William A. Tiller, Robert L. White\*, Robert S. Feigelson\* (*Professor, Research*)

*Chair:* Robert Sinclair

*Associate Chair:* Reinhold H. Dauskardt

*Professors:* David M. Barnett, Arthur I. Bienenstock, Bruce M. Clemens, Reinhold H. Dauskardt, Paul C. McIntyre, Friedrich B. Prinz, Robert Sinclair, Shan X. Wang

*Associate Professors:* Mark L. Brongersma, Yi Cui, Michael D. McGehee, Nicholas A. Melosh

*Assistant Professors:* William Chueh, Jennifer A. Dionne, Sarah C. Heilshorn, Aaron M. Lindenberg, Evan J. Reed, Alberto Salleo

*Courtesy Professors:* Stacey F. Bent, Curtis W. Frank, Sanjiv Gambhir, Geoffrey C. Gurtner, James S. Harris, Michael T. Longaker, Yoshio Nishi, James D. Plummer, Krishna Saraswat, Joachim Stohr

*Courtesy Associate Professor:* Wei Cai, Ian R. Fisher

*Lecturers:* Ann Marshall, Arturas Vailionis

*Consulting Professors:* Robert Fontana, Turgut Gur, Michael A. Kelly, Baylor Triplett, Robert M. White

*Consulting Associate Professors:* Geraud Dubois

\* Recalled to active duty.

## Cognate Courses

AA 252	Techniques of Failure Analysis	3
AA 256	Mechanics of Composites	3
APPPHYS 216	X-Ray and VUV Physics	3
APPPHYS 270	Magnetism and Long Range Order in Solids	3
APPPHYS 272	Solid State Physics	3

APPPHYS 273	Solid State Physics II	3
APPPHYS 292	(Not offered in 2012-2013)	
BIOPHYS 228	Computational Structural Biology	3
CHEMENG 260	Polymer Science and Engineering	3
CHEMENG 310	Microhydrodynamics	3
CHEMENG 345	Fundamentals and Applications of Spectroscopy	3
CHEMENG 355	Advanced Biochemical Engineering	3
CHEMENG 460	(Not offered in 2012-2013)	
EE 212	Integrated Circuit Fabrication Processes	3
EE 216	Principles and Models of Semiconductor Devices	3
EE 222	Applied Quantum Mechanics I	3
EE 223	Applied Quantum Mechanics II	3
EE 228	Basic Physics for Solid State Electronics	3
EE 311	Advanced Integrated Circuits Technology	3
EE 312	(Not offered in 2012-2013)	
EE 316	Advanced VLSI Devices	3
EE 327	Properties of Semiconductor Materials	3
EE 328	(Not offered in 2012-2013)	
EE 329	(Not offered in 2012-2013)	
EE 335	(Not offered in 2012-2013)	
EE 410	Integrated Circuit Fabrication Laboratory	3-4
ENGR 31	Chemical Principles with Application to Nanoscale Science and Technology	4
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	4
ENGR 50E	Introduction to Materials Science - Energy Emphasis	4
ENGR 50M	Introduction to Materials Science, Biomaterials Emphasis	4
ME 284A	(Not offered in 2012-2013)	
ME 284B	(Not offered in 2012-2013)	
ME 329	(Not offered in 2012-2013)	
ME 335A	Finite Element Analysis	3
ME 335B	Finite Element Analysis	3
ME 335C	Finite Element Analysis	3
ME 340A	(Not offered in 2012-2013)	
ME 340B	(Not offered in 2012-2013)	
ME 344A	(Not offered in 2012-2013)	
ME 344B	(Not offered in 2012-2013)	
ME 345	(Not offered in 2012-2013)	
ME 381	Orthopaedic Bioengineering	3
ME 385	Tissue Engineering Lab	1-2
ME 455	Complex Fluids and Non-Newtonian Flows	3
ME 457	Fluid Flow in Microdevices	3
PHYSICS 230	Quantum Mechanics	3
PHYSICS 231	Quantum Mechanics	3

# Mechanical Engineering

Courses offered by the Department of Mechanical Engineering are listed under the subject code ME on the *Stanford Bulletin's* ExploreCourses web site.

The programs in the Department of Mechanical Engineering (ME) emphasize a mix of applied mechanics, biomechanical engineering,

computer simulations, design, and energy science and technology. Since mechanical engineering is a broad discipline, the undergraduate program can be a springboard for graduate study in business, law, medicine, political science, and other professions where understanding technology is important. Both undergraduate and graduate programs provide technical background for work in biomechanical engineering, environmental pollution control, ocean engineering, transportation, and other multidisciplinary problems that concern society. In all programs, emphasis is placed on developing systematic procedures for analysis, communication of work and ideas, practical and aesthetic aspects in design, and responsible use of technology.

## Mission of the Undergraduate Program in Mechanical Engineering

The mission of the undergraduate program in Mechanical Engineering is to provide students with a balance of intellectual and practical experiences that enable them to address a variety of societal needs. The curriculum encompasses elements from a wide array of disciplines built around the themes of biomedicine, computational engineering, design, energy, and multiscale engineering. Course work may include mechatronics, computational simulation, solid and fluid dynamics, microelectromechanical systems, biomechanical engineering, energy science and technology, propulsion, sensing and control, nano- and micro-mechanics, and design. The program prepares students for entry-level work as mechanical engineers and for graduate studies in either an engineering discipline or another field where a broad engineering background is useful.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an ability to apply knowledge of mathematics, science, and engineering.
2. an ability to design and conduct experiments, as well as to analyze and interpret data.
3. an ability to design a system, component, or process to meet desired needs.
4. an ability to function on multidisciplinary teams.
5. an ability to identify, formulate, and solve engineering problems.
6. an understanding of professional and ethical responsibility.
7. an ability to communicate effectively.
8. the broad education necessary to understand the impact of engineering solutions in a global and societal context.
9. a recognition of the need for and an ability to engage in life-long learning.
10. a knowledge of contemporary issues.
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
12. the ability to apply advanced mathematics through multivariate calculus and differential equations.
13. the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.



# Learning Outcomes (Graduate)

The purpose of the master's program is to provide students with the knowledge and skills necessary for a professional career or doctoral studies. This is done through course work providing depth in one area of specialization and breadth in complementary areas. Areas of specialization range from automatic controls, energy systems, fluid mechanics, heat transfer, and solid mechanics to biomechanical engineering, MEMS, and design.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research. Through course work and guided research, the program prepares students to make original contributions in Mechanical Engineering and related fields.

## Graduate Programs in Mechanical Engineering

### Admission and Financial Assistance

To be eligible for admission to the department, a student must have a B.S. degree in engineering, physics, or a comparable science program. To apply for the Ph.D. degree, applicants must have already completed an M.S. degree. Applications for Ph.D. and HCP (Honors Co-op) programs are accepted throughout the year. M.S. applications for fellowship aid must be received by the first Tuesday in December. The department annually awards, on a competitive basis, a limited number of fellowships, teaching assistantships, and research assistantships to incoming graduate students. Research assistantships are used primarily for post-master's degree students and are awarded by individual faculty research supervisors, not by the department.

Mechanical engineering is a varied profession, ranging from primarily aesthetic aspects of design to highly technical scientific research. Disciplinary areas of interest to mechanical engineers include biomechanics, energy conversion, fluid mechanics, materials, nuclear reactor engineering, propulsion, rigid and elastic body mechanics, systems engineering, scientific computing, and thermodynamics, to name a few. No mechanical engineer is expected to have a mastery of the entire spectrum.

A master's degree program leading to the M.S. is offered in Mechanical Engineering, and a master's degree program leading to the M.S. is offered in Engineering with a choice of the following fields of study: Biomechanical Engineering, Product Design, and an individually designed major. Fields of study are declared on Axess.

### Post-Master's Degree Programs

The department offers two post-master's degrees: Engineer and Doctor of Philosophy. Post-master's research generally requires some evidence that a student has research potential before a faculty member agrees to supervision and a research assistantship appointment. It is most efficient to carry out preliminary research during the M.S. degree program, if interested in a post-master's degree.

### Departmental Groups

The department has five groups: Biomechanical Engineering; Design; Flow Physics and Computation; Mechanics and Computation; and Thermosciences. Each maintains its own labs, shops, and offices.

*The Biomechanical Engineering (BME) Group* has teaching and research activities which focus primarily on musculoskeletal biomechanics, neuromuscular biomechanics, cardiovascular biomechanics, and rehabilitation engineering. Research in other areas including hearing, ocean,

plant, and vision biomechanics exists in collaboration with associated faculty in biology, engineering, and medicine. The group has strong research interactions with the Mechanics and Computation and the Design groups, and the departments of Neurology, Radiology, and Surgery in the School of Medicine.

*The Design Group* is devoted to the imaginative application of science, technology, and art to the conception, visualization, creation, analysis and realization of useful devices, products, and objects. Courses and research focus on topics such as kinematics, applied finite elements, microprocessors, medical devices, fatigue and fracture mechanics, dynamics and simulation, micro-electromechanical systems (MEMS), rehabilitation, optimization, high-speed devices, product design, vehicle dynamics, experimental mechanics, robotics, creativity, idea visualization, computer-aided design, manufacturing, design analysis, and engineering education.

*The Flow Physics and Computational Engineering Group (FPCE)* The Flow Physics and Computational Engineering Group (FPCE) blends research on flow physics and modeling with algorithm development, scientific computing, and numerical database construction. FPCE is contributing new theories, models and computational tools for accurate engineering design analysis and control of complex flows (including multi phase flows, micro-fluidics, chemical reactions, acoustics, plasmas, interactions with electromagnetic waves and other phenomena) in aerodynamics, propulsion and power systems, materials processing, electronics cooling, environmental engineering, and other areas. A significant emphasis of research is on modeling and analysis of physical phenomena in engineering systems.

*The Mechanics and Computational Group* covers biomechanics, continuum mechanics, dynamics, experimental and computational mechanics, finite element analysis, fluid dynamics, fracture mechanics, micromechanics, nanotechnology, and simulation based design. Qualified students can work as research project assistants, engaging in thesis research in association with the faculty director and fellow students. Projects include analysis, synthesis, and control of systems; biomechanics; flow dynamics of liquids and gases; fracture and micro-mechanics, vibrations, and nonlinear dynamics; and original theoretical, computational, and experimental investigations in the strength and deformability of elastic and inelastic elements of machines and structures.

*The Thermosciences Group* conducts experimental and analytical research on both fundamental and applied topics in the general area of thermal and fluid systems. Research strengths include high Reynolds number flows, microfluidics, combustion and reacting flows, multiphase flow and combustion, plasma sciences, gas physics and chemistry, laser diagnostics, microscale heat transfer, convective heat transfer, and energy systems. Research motivation comes from applications including air-breathing and space propulsion, bioanalytical systems, pollution control, electronics fabrication and cooling, stationary and mobile energy systems, biomedical systems, and materials processing. Emphasis is on fundamental experiments leading towards advances in modeling, optimization, and control of complex systems.

### Facilities

The department groups maintain modern laboratories that support undergraduate and graduate instruction and graduate research work.

The Structures and Composites Laboratory, a joint activity with the Department of Aeronautics and Astronautics, studies structures made of fiber-reinforced composite materials. Equipment for fabricating structural elements includes autoclave, filament winder, and presses. X-ray, ultrasound, and an electron microscope are available for nondestructive testing. The lab also has environmental chambers, a high speed impactor, and mechanical testers. Lab projects include designing composite structures, developing novel manufacturing processes, and evaluating environmental effects on composites.

Experimental facilities are available through the interdepartmental Structures and Solid Mechanics Research Laboratory, which includes

an electrohydraulic materials testing system, a vehicle crash simulator, and a shake table for earthquake engineering and related studies, together with highly sophisticated auxiliary instrumentation. Facilities to study the micromechanics of fracture areas are available in the Micromechanics/Fracture Laboratory, and include a computer-controlled materials testing system, a long distance microscope, an atomic force microscope, and other instrumentation. Additional facilities for evaluation of materials are available through the Center for Materials Research, Center for Integrated Circuits, and the Ginzton Laboratory. Laboratories for biological experimentation are accessible through the School of Medicine. Individual accommodation is available for the work of each research student.

Major experimental and computational laboratories engaged in bioengineering work are located in the Biomechanical Engineering Group. Other Biomechanical Engineering Group activities and resources are associated with the Rehabilitation Research and Development Center of the Veterans Administration Palo Alto Health Care System. This major national research center has computational and prototyping facilities. In addition, the Rehabilitation Research and Development Center houses the Electrophysiology Laboratory, Experimental Mechanics Laboratory, Human Motor Control Laboratory, Rehabilitation Device Design Laboratory, and Skeletal Biomechanics Laboratory. These facilities support graduate course work as well as Ph.D. student research activities.

Computational and experimental work is also conducted in various facilities throughout the School of Engineering and the School of Medicine, particularly the Advanced Biomaterials Testing Laboratory of the Department of Materials Science and Engineering, the Orthopaedic Research Laboratory in the Department of Functional Restoration, and the Vascular Research Laboratory in the Department of Surgery. In collaboration with the School of Medicine, facilities throughout the Stanford Medical Center and the Veterans Administration Palo Alto Health Care System conduct biological and clinical work.

The Design Group has facilities for lab work in experimental mechanics and experimental stress analysis. Additional facilities, including MTS electrohydraulic materials test systems, are available in the Solid Mechanics Research Laboratory. Design Group students also have access to Center for Integrated Systems (CIS) and Ginzton Lab microfabrication facilities.

The group also maintains the Product Realization Laboratory (PRL), a teaching facility offering students integrated experiences in market definition, product design, and prototype manufacturing. The PRL provides coaching, design manufacturing tools, and networking opportunities to students interested in product development. The ME 310 Design Project Laboratory has facilities for CAD, assembly, and testing of original designs by master's students in the engineering design program. A Smart Product Design Laboratory supports microprocessor application projects. The Center for Design Research (CDR) has an excellent facility for concurrent engineering research, development, and engineering curriculum creation and assessment. Resources include a network of high-performance workstations. For worldwide web mediated concurrent engineering by virtual, non-located, design development teams, see the CDR web site at <http://cdr.stanford.edu>. In addition, CDR has several industrial robots for student projects and research. These and several NC machines are part of the CDR Manufacturing Sciences Lab. The Manufacturing Modeling Laboratory (MML) addresses various models and methods that lead to competitive manufacturing. MML links design for manufacturing (dfM) research at the Department of Mechanical Engineering with supply chain management activities at the Department of Management Science and Engineering. The Rapid Prototyping Laboratory consists of seven processing stations including cleaning, CNC milling, grit blasting, laser deposition, low temperature deposition, plasma deposition, and shot peening. Students gain experience by using ACIS and Pro Engineer on Hewlett Packard workstations for process software development. The Design Group also has a Product Design Loft in which students in the Joint Program in Design develop graduate thesis projects.

The Flow Physics and Computation Group has a 32 processor Origin 2000, 48-node and 85-node Linux cluster with high performance interconnection and an array of powerful workstations for graphics and data analysis.

Several software packages are available, including all the major commercial CFD codes. FPC is strongly allied with the Center for Turbulence Research (CTR), a research consortium between Stanford and NASA, and the Center for Integrated Turbulence Simulations (CITS), which is supported by the Department of Energy (DOE) under its Accelerated Strategic Computing Initiative (ASCI). The Center for Turbulence Research has direct access to major national computing facilities located at the nearby NASA-Ames Research Center, including massively parallel super computers. The Center for Integrated Turbulence Simulations has access to DOE's vast supercomputer resources. The intellectual atmosphere of the Flow Physics and Computation Group is greatly enhanced by the interactions among CTR's and CITS's postdoctoral researchers and distinguished visiting scientists.

The Mechanics and Computation Group has a Computational Mechanics Laboratory that provides an integrated computational environment for research and research-related education in computational mechanics and scientific computing. The laboratory houses Silicon Graphics, Sun, and HP workstations and servers, including an 8-processor SGI Origin2000 and a 16-processor networked cluster of Intel-architecture workstations for parallel and distributed computing solutions of computationally intensive problems. Software is available on the laboratory machines, including commercial packages for engineering analysis, parametric geometry and meshing, and computational mathematics. The laboratory supports basic research in computational mechanics as well as the development of related applications such as simulation-based design technology.

The Thermosciences Group has four major laboratory facilities. The Heat Transfer and Turbulence Mechanics Laboratory concentrates on fundamental research aimed at understanding and improved prediction of turbulent flows and high performance energy conversion systems. The laboratory includes two general-purpose wind tunnels, a pressurized high Reynolds number tunnel, two supersonic cascade flow facilities, three specialized boundary layer wind tunnels, and several other flow facilities. Extensive diagnostic equipment is available, including multiple particle-image velocimetry and laser-Doppler anemometry systems.

The High Temperature Gas Dynamics Laboratory includes research on sensors, plasma sciences, cool and biomass combustion and gas pollutant formation, and reactive and non-reactive gas dynamics. Research facilities include diagnostic devices for combustion gases, a spray combustion facility, laboratory combustors including a coal combustion facility and supersonic combustion facilities, several advanced laser systems, a variety of plasma facilities, a pulsed detonation facility, and four shock tubes and tunnels. The Thermosciences Group and the Design Group share the Microscale Thermal and Mechanical Characterization laboratory (MTMC). MTMC is dedicated to the measurement of thermal and mechanical properties in thin-film systems, including microfabricated sensors and actuators and integrated circuits, and features a nanosecond scanning laser thermometry facility, a laser interferometer, a near-field optical microscope, and an atomic force microscope. The activities at MTMC are closely linked to those at the Heat Transfer Teaching Laboratory (HTTL), where undergraduate and master's students use high-resolution probe stations to study thermal phenomena in integrated circuits and thermally-actuated microvalves. HTTL also provides macroscopic experiments in convection and radiative exchange.

The Energy Systems Laboratory is a teaching and research facility dedicated to the study of energy conversion systems. The lab includes three dynamometers for engine testing, a computer-controlled variable engine valve controller, a fuel-cell experimental station, a small rocket testing facility, and a small jet engine thrust stand.

The Guidance and Control Laboratory, a joint activity of the Department of Aeronautics and Astronautics and the Department of Mechanical Engineering, specializes in construction of electromechanical systems and instrumentation, particularly where high precision is a factor. Work ranges from robotics for manufacturing to feedback control of fuel injection systems for automotive emission control. The faculty and staff work in

close cooperation with both the Design and Thermosciences Groups on device development projects of mutual interest.

Many computation facilities are available to department students. Three of the department's labs are equipped with super-minicomputers. Numerous smaller minicomputers and microcomputers are used in the research and teaching laboratories.

Library facilities at Stanford beyond the general library include Engineering, Mathematics, and Physics department libraries.

## Bachelor of Science in Mechanical Engineering

Undergraduates seeking to major in Mechanical Engineering should see the curriculum outlined in the "Undergraduate Degree in Mechanical Engineering" section of this bulletin. The University's basic requirements for the bachelor's degree are discussed in the "Undergraduate Degrees" section of this bulletin. Courses taken for the departmental major (mathematics; science; science, technology, and society; engineering fundamentals; and engineering depth) must be taken for a letter grade if the instructor offers the option.

A Product Design program offered by the Design Group leads to the B.S. in Engineering (Product Design). A major in Biomechanical Engineering offered by the Biomechanical Engineering Group leads to the B.S. in Engineering (Biomechanical Engineering); this may be appropriate for students preparing for medical school or graduate bioengineering studies.

### Grade Requirements

To be recommended by the department for a B.S. in Mechanical Engineering, a student must achieve the minimum grade point average (GPA) set by the School of Engineering (2.0 in engineering fundamentals and mechanical engineering depth).

Students interested in the minor should see the "Minor in Mechanical Engineering" section of this bulletin.

## Mechanical Engineering (ME)

Completion of the undergraduate program in Mechanical Engineering leads to the conferral of the Bachelor of Science in Mechanical Engineering.

### Requirements

	Units
<b>Mathematics (8-10)</b>	
24 units minimum; see Basic Requirement 1 <sup>1</sup>	
CME 102/ENGR 155A	5
or MATH 53	5
Select one of the following:	
CME 106/ENGR 155C	3-5
STATS 110	3
STATS 116	3
<b>Science (4)</b>	
20 units minimum; see Basic Requirement 2 <sup>1</sup>	
CHEM 31X	4
or ENGR 31	4

### Technology in Society (0)

one course from approved ME list; see Basic Requirement 4<sup>2</sup>

### Engineering Fundamentals (11-15)

Three courses minimum; see Basic Requirement 3

ENGR 40	Introductory Electronics	5
ENGR 70A	Programming Methodology (same as CS 106A)	3-5
Fundamentals Elective <sup>3</sup>		3-5

### Engineering Depth (51-53)

Minimum of 68 Engineering Science and Design ABET units; see Basic Requirement 5

ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	3
ENGR 30	Engineering Thermodynamics	3
ENGR 102M	Technical/Professional Writing for Mechanical Engineers <sup>4</sup>	1
ME 70	Introductory Fluids Engineering	4
ME 80	Mechanics of Materials	4
ME 101	Visual Thinking	4
ME 103D	Engineering Drawing and Design <sup>4</sup>	1
ME 112	Mechanical Systems Design	4
ME 113	Mechanical Engineering Design	4
ME 131A	Heat Transfer	3-4
ME 131B	Fluid Mechanics: Compressible Flow and Turbomachinery	4
ME 140	Advanced Thermal Systems	5
ME 161	Dynamic Systems, Vibrations and Control	3-4
ME 203	Design and Manufacturing <sup>4</sup>	4

- Math and science must total 45 units. Math: 24 units required and must include a course in differential equations (CME 102 Ordinary Differential Equations for Engineers or MATH 53 Ordinary Differential Equations with Linear Algebra; one of these required) and Statistics (CME 106 Introduction to Probability and Statistics for Engineers or STATS 110 Statistical Methods in Engineering and the Physical Sciences or 116 is required (neither STATS 60 Introduction to Statistical Methods: Precalculus nor STATS 160 fulfill statistics requirement). Science: 20 units minimum and requires courses in calculus-based Physics and Chemistry, with at least a full year (3 courses) in one or the other. CHEM 31A Chemical Principles I/CHEM 31B Chemical Principles II are considered one course because they cover the same material as CHEM 31X Chemical Principles but at a slower pace. CHEM 31X Chemical Principles or ENGR 31 Chemical Principles with Application to Nanoscale Science and Technology are recommended.
- ME majors must choose their TIS course from the following list: ME 190 (recommended; offered every other year), STS 101 Science, Technology, and Contemporary Society, STS 110 Ethics and Public Policy, or STS 115 Ethical Issues in Engineering, or CS 181(prerequisite of CS 106B or X).
- ME Fundamental elective may not be a course counted for other requirements. Students may opt to use ENGR 14 Intro to Solid Mechanics, ENGR 15 Dynamics, or ENGR 30 Engineering Thermodynamics from the required depth courses as the third fundamental class. However, total units for Engineering Topics (Fundamentals + Depth) must be a minimum of 68 units; additional options courses may be required to meet unit requirements.
- All three courses (ENGR 102M Technical/Professional Writing for Mechanical Engineers, ME 103D Engineering Drawing and Design, ME 203 Design and Manufacturing) must be taken concurrently in order to fulfill the Writing in the Major (WIM) requirement.

Options to complete the ME depth sequence: see the list of options in the ME major section of the Handbook for Undergraduate Engineering Programs (<http://ughb.stanford.edu>).

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (<http://exploreddegrees.stanford.edu/schoolofengineering/mechanicalengineering/> <http://ughb.stanford.edu>).

## Honors Program

The Department of Mechanical Engineering offers a program leading to a B.S. in Mechanical Engineering with honors. This program offers a unique opportunity for qualified undergraduate engineering majors to conduct independent study and research at an advanced level with a faculty mentor.

Mechanical Engineering majors who have a grade point average (GPA) of 3.5 or higher in the major may apply for the honors program. Students who meet the eligibility requirement and wish to be considered for the honors program must submit a written application to the Mechanical Engineering student services office no later than the second week of Autumn Quarter in the senior year. The application to enter the program can be obtained from the ME student services office, and must contain a one-page statement describing the research topic and include an unofficial Stanford transcript. In addition, the application must be approved by a Mechanical Engineering faculty member who agrees to serve as the thesis adviser for the project. Thesis advisers must be members of Stanford's Academic Council.

In order to receive departmental honors, students admitted to the program must:

1. maintain the 3.5 GPA required for admission to the honors program.
2. submit a completed thesis draft to the adviser by April 25. Further revisions and final endorsement by the adviser are to be finished by May 15, when two bound copies are to be submitted to the Mechanical Engineering student services office.
3. present the thesis at the Mechanical Engineering Poster Session held in mid-April.

## Mechanical Engineering (ME) Minor

The following courses fulfill the minor requirements:

		Units
<b>General Minor (24-26) *</b>		
ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	3
ENGR 30	Engineering Thermodynamics	3
ME 70	Introductory Fluids Engineering	4
ME 101	Visual Thinking	4
Plus two of the following:		6-8
ME 80	Mechanics of Materials	
ME 131A	Heat Transfer	
ME 161	Dynamic Systems, Vibrations and Control	
ME 203	Design and Manufacturing	
<b>Thermosciences Minor (23-24) **</b>		
ENGR 14	Intro to Solid Mechanics	4
ENGR 30	Engineering Thermodynamics	3
ME 70	Introductory Fluids Engineering	4
ME 131A	Heat Transfer	3-4
ME 131B	Fluid Mechanics: Compressible Flow and Turbomachinery	4

ME 140	Advanced Thermal Systems	5
<b>Mechanical Design Minor (26-27) ***</b>		
ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	3
ME 80	Mechanics of Materials	4
ME 101	Visual Thinking	4
ME 112	Mechanical Systems Design	4
ME 203	Design and Manufacturing	4
Plus one of the following:		3-4
ME 113	Mechanical Engineering Design	
ME 210	Introduction to Mechatronics	
ME 220	Introduction to Sensors	
Total Units		73-77

\* This minor aims to expose students to the breadth of ME in terms of topics and analytic and design activities. Prerequisites: MATH 41 Calculus, MATH 42 Calculus, and PHYSICS 41 Mechanics.

\*\* Prerequisites: MATH 41 Calculus, MATH 42 Calculus, MATH 51 Linear Algebra and Differential Calculus of Several Variables (or CME 100 Vector Calculus for Engineers) and PHYSICS 41 Mechanics.

\*\*\* This minor aims to expose students to design activities supported by analysis. Prerequisites: MATH 41 Calculus, PHYSICS 42 Classical Mechanics Laboratory, and PHYSICS 41 Mechanics.

## Coterminal B.S./M.S. Program in Mechanical Engineering

Stanford undergraduates who wish to continue their studies for the Master of Science degree in the coterminal program must have earned a minimum of 120 units towards graduation. This includes allowable Advanced Placement (AP) and transfer credit. Applicants must submit their application no later than the quarter prior to the expected completion of their undergraduate degree. This is normally Winter Quarter (late January) prior to Spring Quarter graduation. The application must provide evidence of potential for strong academic performance as a graduate student. The Mechanical Engineering department graduate admissions committee makes decisions on each application. Typically, a GPA of at least 3.5 in engineering, science, and math is expected. Applicants must have completed two of ME 80 Mechanics of Materials, ME 112 Mechanical Systems Design, ME 131A Heat Transfer, and ME 131B Fluid Mechanics: Compressible Flow and Turbomachinery, and must take the Graduate Record Examination (GRE) before action is taken on the application. Coterminal information, applications deadlines, and forms can be obtained from the ME Student Services Office.

For University coterminal degree program rules and University application forms, see <http://registrar.stanford.edu/shared/publications.htm#Coterm>.

## Master of Science in Mechanical Engineering

The basic University requirements for the M.S. degree are discussed in the "Graduate Degrees" section of this bulletin.

The master's program consists of 45 units of course work taken at Stanford. No thesis is required, although many students become involved in research projects during the master's program, particularly to explore their interests in working towards a Ph.D. degree. Students whose undergraduate backgrounds are entirely devoid of some of the major subject disciplines

of engineering (for example, applied mechanics, applied thermodynamics, fluid mechanics, ordinary differential equations) may need to take some undergraduate courses to fill obvious gaps and prepare themselves to take graduate courses in these areas. Such students may require more than three quarters to fulfill the master's degree requirements, as the makeup courses may only be used as unrestricted electives (see item 4 below) in the M.S. degree program. However, it is not the policy to require fulfillment of mechanical engineering B.S. degree requirements to obtain an M.S. degree.

## Mechanical Engineering

The master's degree program requires 45 units of course work taken as a graduate student at Stanford. No thesis is required. However, students who want some research experience during the master's program may participate in research through ME 391 Engineering Problems and ME 392 Experimental Investigation of Engineering Problems.

Students are encouraged to refer to the most recent *Mechanical Engineering Graduate Student Handbook* provided by the student services office. The department's requirements for the M.S. in Mechanical Engineering are as follows:

1. *Mathematical Fundamentals*: two mathematics courses for a total of at least 6 units from the following list are required: ME 300A, 300B, 300C; CME 302; MATH 106, 109; CS 205A or B; EE 261, 263; STATS 110, 141; ENGR 155C. Other MATH and CME courses with catalog numbers of 200 and above also fulfill the mathematics requirement. Mathematics courses must be taken for a letter grade.
2. *Depth in Mechanical Engineering*: a set of graduate-level courses in Mechanical Engineering to provide depth in one area. The faculty have approved these sets as providing depth in specific areas as well as a significant component of applications of the material in the context of engineering synthesis. These sets are outlined in the *Mechanical Engineering Graduate Student Handbook*. Depth courses must be taken for a letter grade.
3. *Breadth in Mechanical Engineering*: two additional graduate level courses (outside the depth) from the depth/breadth charts listed in the *Mechanical Engineering Graduate Handbook*. Breadth courses must be taken for a letter grade.
4. *Sufficient Mechanical Engineering Course Work*: students must take a minimum of 24 units of course work in mechanical engineering topics. For the purposes of determining mechanical engineering topics, any course on approved lists for the mathematics, depth, and breadth requirements counts towards these units. In addition, any graduate-level course with an ME course number is considered a mechanical engineering topic.
5. *Approved Electives* (to bring the total number of units to at least 39): electives must be approved by an adviser. Graduate engineering, mathematics, and science courses are normally approved. Approved electives must be taken for a letter grade. No more than 6 of the 39 units may come from ME 391/392 (or other independent study/research courses), and no more than 3 may come from seminars. Students planning a Ph.D. should discuss with their advisers the option of taking 391 or 392 during the master's program. ME 391/392 (and other independent study courses) may only be taken on a credit/no credit basis.
6. *Unrestricted electives* (to bring the total number of units submitted for the M.S. degree to 45): students are encouraged to take these units outside engineering, mathematics, or the sciences. Students should consult their advisers on course loads and on ways to use the unrestricted electives to make a manageable program. Unrestricted electives may be taken CR/NC.
7. Within the courses satisfying the requirements above, there must be at least one graduate-level course with a laboratory component. Courses which satisfy this requirement are:

ENGR 206      Control System Design

Units  
0

ENGR 341	Micro/Nano Systems Design and Fabrication	0
ME 203	Design and Manufacturing	4
ME 210	Introduction to Mechatronics	4
ME 220	Introduction to Sensors	3-4
ME 218A	Smart Product Design Fundamentals	4-5
ME 218B	Smart Product Design Applications	4-5
ME 218C	Smart Product Design Practice	4-5
ME 218D	Smart Product Design: Projects	3-4
ME 250	Internal Combustion Engines	3-5
ME 310A	Project-Based Engineering Design, Innovation, and Development	4
ME 310B	Project-Based Engineering Design, Innovation, and Development	4
ME 310C	Project-Based Engineering Design, Innovation, and Development	4
ME 317A	Design Methods: Product Definition	4
ME 317B	Design Methods: Quality By Design	4
ME 318	Computer-Aided Product Creation	4
ME 323	Modeling and Identification of Mechanical Systems for Control	0
ME 324	Precision Engineering	4
ME 348	Experimental Stress Analysis	3
ME 354	Experimental Methods in Fluid Mechanics	4
ME 367	Optical Diagnostics and Spectroscopy Laboratory	4
ME 382A	Biomedical Engineering in Research and Development	4
ME 382B	Medical Device Design	4
ME 385	Tissue Engineering Lab	0
ME 391/392	Engineering Problems	1-10

Or other independent study courses may satisfy this requirement if 3 units are taken for work involving laboratory experiments

Candidates for the M.S. in Mechanical Engineering are expected to have the approval of the faculty; they must maintain a minimum grade point average (GPA) of 2.75 in the 45 units presented for fulfillment of degree requirements (exclusive of independent study courses). All courses used to fulfill mathematics, depth, breadth, approved electives, and lab studies must be taken for a letter grade (excluding seminars, independent study, and courses for which a letter grade is not an option for any student).

Students falling below a GPA of 2.5 at the end of 20 units may be disqualified from further registration. Students failing to meet the complete degree requirements at the end of 60 units of graduate registration are disqualified from further registration. Courses used to fulfill deficiencies arising from inadequate undergraduate preparation for mechanical engineering graduate work may not be applied to the 45 units required for completion of the MS degree.

## Engineering

As described in the "School of Engineering" section of this bulletin, each department in the school may sponsor students in a more general degree, the M.S. in Engineering. Sponsorship by the Department of Mechanical Engineering (ME) requires (1) filing a petition for admission to the program by no later than the day before instruction begins, and (2) that the center of gravity of the proposed program lies in ME. No more than 18 units used for the proposed program may have been previously completed. The program must include at least 9 units of graduate-level work in the department other than ME 300A,B,C, seminars, and independent study. The petition must be accompanied by a statement explaining the program objectives and how it is coherent, contains depth, and fulfills a well-defined career objective. The grade requirements are the same as for the M.S. in Mechanical Engineering.

# Master of Science in Engineering, Biomechanical Engineering

The Master of Science in Engineering: Biomechanical Engineering (MSE:BME) promotes the integration of engineering mechanics and design with the life sciences. Applicants are expected to have an additional exposure to biology and/or bioengineering in their undergraduate studies. Students planning for subsequent medical school studies are advised to contact Stanford's Premedical Advising Office in Sweet Hall.

Students wishing to pursue this program must complete the Graduate Program Authorization form and get approval from the Student Services Office. This form serves to officially add the field to the student's record. This form must be filled out electronically on Axess.

## Degree Requirements

1. Mathematical competence (minimum 6 units) in two of the following areas: partial differential equations, linear algebra, complex variables, or numerical analysis, as demonstrated by completion of two appropriate courses from the following list: ME300A,B,C; MATH106, 109, 113, 131M/P, 132; STATS110, or ENGR155C; CME108, 302. Students who have completed comparable graduate-level courses as an undergraduate, and who can demonstrate their competence to the satisfaction of the instructors of the Stanford courses, may be waived via petition from this requirement by their adviser and the Student Services Office. The approved equivalent courses should be placed in the approved electives category of the program proposal.

2. Graduate Level Engineering Courses (minimum 21 units), consisting of:

- A. Biomechanical engineering restricted electives (9 units) to be chosen from:

		Units
ME 280	Skeletal Development and Evolution	3
ME 281	Biomechanics of Movement	3
ME 337	Mechanics of Growth	3
ME 381	Orthopaedic Bioengineering	3-4
ME 382A	Biomedical Engineering in Research and Development	4
ME 385	Tissue Engineering Lab	1-2
ME 387	Soft Tissue Mechanics	3

- B. Specialty in engineering (9-12 units): A set of three or four graduate level courses in engineering mechanics, materials, controls, or design (excluding bioengineering courses) selected to provide depth in one area. Such sets are approved by the Mechanical Engineering Faculty. Comparable specialty sets composed of graduate engineering courses outside the Mechanical Engineering Department can be used with the approval of the student's adviser. Examples can be obtained from the Biomechanical Engineering Group Office (Durand 223).

- C. Graduate engineering electives (to bring the total number of graduate level engineering units to at least 21). These electives must contribute to a cohesive degree program, and be approved by the student's adviser. No units may come from bioengineering courses, mathematics courses, or seminars.

3. Life science approved electives (minimum 6 units): Undergraduate or graduate biological/medical science/chemistry courses which contribute to a cohesive program.
4. Biomechanical engineering seminar ME 389 Biomechanical Research Symposium.

5. General approved electives (to bring the total number of units to 39): These courses must be approved by the student's adviser. Graduate level engineering, math, and physical science courses and upper division undergraduate or graduate life science courses are normally approved.
6. Unrestricted electives (to bring the total number of units to 45): Students without undergraduate biology are encouraged to use some of these unrestricted units to strengthen their biology background. Students should consult their adviser for recommendations on course loads and on ways to use the unrestricted electives to create a manageable program.

All courses except unrestricted electives must be taken for a letter grade unless letter grades are not an option.

# Master of Science in Engineering, Product Design

The Joint Program in Design focuses on the synthesis of technology with human needs and values to create innovative products, services, and experience designs. This program is offered jointly by the departments of Mechanical Engineering and Art and Art History. It provides a design education that integrates technical, human, aesthetic, and business concerns. Students entering the program from the engineering side earn a Master of Science in Engineering degree with a concentration in Product Design, and those from the art side a Master of Fine Arts. Students complete the core product design courses in their first year of graduate study at Stanford before undertaking the master's project in their second year.

## Degree Requirements

Students must complete the following courses. Students making unsatisfactory degree progress by the end of the first year may not advance to the thesis year per the faculty's discretion. A minimum cumulative GPA of 2.75 is required for degree conferral.

		Units
ME 203	Design and Manufacturing	4
ME 216A	Advanced Product Design: Needfinding	3-4
ME 312	Advanced Product Design: Formgiving	3
ME 313	Human Values and Innovation in Design	3
ME 316A/316B/316C	Product Design Master's Project *	2-6
ARTSTUDI 160	Design I : Fundamental Visual Language	3-4
ARTSTUDI 360A/360B/360C	Master's Project: Design *	2-4
Approved Electives **		18

\* ME 316A Product Design Master's Project,B,C and ARTSTUDI 360A Master's Project: Design,B,C are taken concurrently for three quarters during the second year.

\*\* Students may choose classes (at the 200 level or higher) from any of the schools at the University to fulfill their elective requirement. However, electives that are not already pre-approved must be approved by the student's adviser via petition prior to enrollment. Electives should be chosen to fulfill career objectives; students may focus their energy in engineering, entrepreneurship and business, psychology, or other areas relevant to design. Taking a coherent sequence of electives focused on a subject area is recommended. For example, the patent, negotiation, and licensing classes (ME 207 , ME 208 Patent Law and Strategy for Innovators and Entrepreneurs, ME 265 Technology Licencing and Commercialization) constitute a sequence most relevant to potential inventors. The classes in the Graduate School of Business (STRAMGT S353 , 356/366) and MS&E 273 Technology Venture Formation constitute a coherent sequence in entrepreneurship and new venture formation. Students interested in social entrepreneurship should apply to the d.school course ME 206A Entrepreneurial Design for Extreme Affordability,B, Extreme Affordability.

Note: All required and approved electives must be taken for a letter grade unless prior approval is granted to take a class CR/NC.

## Pre-approved electives list

The following courses are pre-approved for fulfilling the 18-unit elective requirement for the master's degree in Engineering/Product Design. Electives taken that are not on this list must be approved via petition prior to enrollment. These must be taken for a letter grade unless prior approval is obtained.

		Units
ME 208	Patent Law and Strategy for Innovators and Entrepreneurs	2-3
ME 212	Calibrating the Instrument	1
ME 265	Technology Licencing and Commercialization	3
ME 297	Forecasting for Innovators:Technology, Tools & Social Change	3
ME 315	The Designer in Society	3
MS&E 273	Technology Venture Formation	3-4
STRAMGT 353	Entrepreneurship: Formation of New Ventures	4
STRAMGT 356/366	The Startup Garage: Design	4

## Additional requirements

As part of their master's degree program, students are required to take at least one course offered by the Hasso Plattner Institute of Design (the d.School). All d.School courses require applications submitted the quarter prior to the start of class. These classes are considered pre-approved electives that fulfill part of the 18 units elective requirement.

		Units
ME 206A/206B	Entrepreneurial Design for Extreme Affordability	4
MS&E 485	Cross-Cultural Design	3
ENGR 280	From Play to Innovation	2-4
ENGR 281	d.media 4.0 - Designing Media that Matters	2

## Engineer in Mechanical Engineering

The basic University requirements for the degree of Engineer are discussed in the "Graduate Degrees" section of this bulletin.

This degree requires an additional year of study beyond the M.S. degree and includes a research thesis. The program is designed for students who wish to do professional engineering work upon graduation and who want to engage in more specialized study than is afforded by the master's degree alone.

Admission standards are substantially the same as indicated under the master's degree. However, since thesis supervision is required and the availability of thesis supervisors is limited, admission is not granted until the student has personally engaged a faculty member to supervise a research project. This most often involves a paid research assistantship awarded by individual faculty members (usually from the funds of sponsored research projects under their direction). Thus, individual arrangement between student and faculty is necessary. Students studying for the M.S. degree at Stanford who wish to continue to the Engineer degree ordinarily make such arrangements during the M.S. degree program. Students holding master's degrees from other universities are invited to apply and may be admitted providing they are sufficiently well qualified and have made thesis supervision and financial aid arrangements.

Department requirements for the degree include a thesis; up to 18 units of credit are allowed for thesis work (ME 400 Thesis). In addition to the thesis, 27 units of approved advanced course work in mathematics, science, and engineering are expected beyond the requirements for the M.S. degree; the choice of courses is subject to approval of the adviser. Students who have not fulfilled the Stanford M.S. degree requirements are required to do so, with allowance for approximate equivalence of courses taken elsewhere; up to 45 units may be transferable. A total of 90 units is required for degree conferral.

Candidates for the degree must have faculty approval and have a minimum grade point average (GPA) of 3.0 for all courses (exclusive of thesis credit and other independent study courses) taken beyond those required for the master's degree.

## Doctor of Philosophy in Mechanical Engineering

The basic University requirements for the Ph.D. degree are discussed in the "Graduate Degree" section of this bulletin. The Ph.D. degree is intended primarily for students who desire a career in research, advanced development, or teaching; for this type of work, a broad background in mathematics and the engineering sciences, together with intensive study and research experience in a specialized area, are the necessary requisites.

Ph.D. students must have a master's degree from another institution, or must fulfill the requirements for the Stanford M.S. degree in Mechanical Engineering or another discipline.

In special situations dictated by compelling academic reasons, Academic Council members who are not members of the department's faculty may serve as the principal dissertation adviser when approved by the department. In such cases, a member of the department faculty must serve as program adviser and as a member of the reading committee, and agree to accept responsibility that department procedures are followed and standards maintained.

Admission involves much the same consideration described under the Engineer degree. Since thesis supervision is required, admission is not granted until the student has personally engaged a member of the faculty to supervise a research project. Once a student has obtained a research supervisor, this supervisor becomes thereafter the student's academic adviser. Research supervisors may require that the student pass the departmental qualifying examination before starting research and before receiving a paid research assistantship. Note that research assistantships are awarded by faculty research supervisors and not by the department.

Prior to being formally admitted to candidacy for the Ph.D. degree, the student must demonstrate knowledge of engineering fundamentals by passing a qualifying examination. The academic level and subject matter of

the examination correspond approximately to the M.S. program described above. Typically, the exam is taken shortly after the student completes the M.S. degree requirements. The student is required to have a minimum graduate Stanford GPA of 3.5 to be eligible for the exam (grades from independent study courses are not included in the GPA calculation). Once the student's faculty sponsor has agreed that the exam should be scheduled, the student must submit an application folder containing several items including a curriculum vitae, research project abstract, and preliminary dissertation proposal. Information, examination dates, and deadlines may be obtained from the department's student services office.

Ph.D. candidates must complete a minimum of 27 units (taken for a letter grade) of approved formal course work (excluding research, directed study, and seminars) in advanced study beyond the M.S. degree. The courses should consist primarily of graduate courses in engineering and sciences, although the candidate's adviser may approve a limited number of upper-level undergraduate courses and courses outside of engineering and sciences, as long as such courses contribute to a strong and coherent program. In addition to this 27-unit requirement, all Ph.D. candidates must participate each quarter in one of the following (or equivalent) seminars:

		Units
ME 389	Biomechanical Research Symposium	1
ME 390	Thermosciences Research Project Seminar	1
ME 395	Seminar in Solid Mechanics	1
ME 396	Design and Manufacturing Forum	1
ME 397	Design Theory and Methodology Seminar	1-3
AA 297	Seminar in Guidance, Navigation, and Control	1
ENGR 298	Seminar in Fluid Mechanics	1
ENGR 311A/311B	Women's Perspectives	1

The department has a breadth requirement for the Ph.D. degree. This may be satisfied either by a formal minor in another department (generally 20 units) or by at least 9 units of course work (outside of the primary research topic) which are approved by the principal dissertation adviser. If a minor is taken, 9 units from the minor requirements can be counted towards the depth requirement.

The Ph.D. thesis normally represents at least one full year of research work and must be a substantial contribution to the field. Students may register for course credit for thesis work (ME 500) to help fulfill University academic unit requirements, but there is no minimum limit on registered dissertation units, as long as students are registered in at least 8 units per quarter prior to TGR. Candidates should note that only completed course units are counted toward the requirement, so ungraded courses or courses with an "N" grade must be cleared before going TGR. Questions should be directed to the department student services office.

The final University oral examination (dissertation defense) is conducted by a committee consisting of a chair from another department and four faculty members of the department or departments with related interests. Usually, the committee includes the candidate's adviser, reading committee members, plus two more faculty. The examination consists of two parts. The first is open to the public and is scheduled as a seminar talk, usually for one of the regular meetings of a seminar series. The second is conducted in private and covers subjects closely related to the dissertation topic.

## Ph.D. Minor in Mechanical Engineering

Students who wish a Ph.D. minor in ME should consult with the ME student services office. A minor in ME may be obtained by completing 20 units of approved graduate-level ME courses. Courses approved for the minor must form a coherent program and must be chosen from those satisfying requirement 2 for the M.S. in Mechanical Engineering.

See the *Mechanical Engineering Graduate Student Handbook* produced by the Mechanical Engineering student services office for more information.

## Mechanical Engineering Course Catalog Numbering System

The department uses the following course numbering system:

Number	Level
010-099	Freshman and Sophomore
100-199	Junior and Senior
200-299	Advanced Undergraduate and Beginning Graduate
300-399	Graduate
400-499	Advanced Graduate
500	Ph.D. Thesis

*Emeriti:* (Professors) James L. Adams, Peter Bradshaw\*, Daniel B. DeBra, Robert H. Eustis, Thomas J. R. Hughes, James P. Johnston, Thomas R. Kane, William M. Kays, Joseph B. Keller, Charles H. Kruger, Robert H. McKim, Robert J. Moffat,\* M. Godfrey Mungal\*, J. David Powell, Charles R. Steele,\* Douglass J. Wilde;\* (*Professors, Research*) Richard M. Christensen, Sidney A. Self, Kenneth J. Waldron, Felix E. Zajac

*Chair:* Friedrich B. Prinz

*Vice Chair:* Kenneth E. Goodson

*Group Chairs:* Mark R. Cutkosky (Design), Scott L. Delp (Biomechanical Engineering), Parviz Moin (Flow Physics and Computational Engineering), Peter M. Pinsky (Mechanics and Computation), Mark A. Cappelli (Thermosciences)

*Professors:* Thomas P. Andriacchi, David M. Barnett, Craig T. Bowman, Brian J. Cantwell, Mark A. Cappelli, Dennis R. Carter, Mark R. Cutkosky, Scott L. Delp, John K. Eaton, Christopher F. Edwards, Charbel Farhat, Kenneth E. Goodson, Ronald K. Hanson, David M. Kelley, Thomas W. Kenny, Larry J. Leifer, Sanjiva K. Lele, Reginald E. Mitchell, Parviz Moin, Drew V. Nelson, Peter M. Pinsky, Friedrich B. Prinz, Bernard Roth, Juan G. Santiago, Eric S. G. Shaqfeh, Sheri D. Sheppard

*Associate Professors:* Wei Cai, Eric F. Darve, J. Christian Gerdes, Ellen Kuhl, Marc E. Levenston, Adrian J. Lew, Allison M. Okamura, Beth L. Pruitt

*Assistant Professors:* Gianluca Iaccarino, David Lentink, Ali Mani, Sindy K.-Y. Tang, Xiaolin Zheng

*Professor (Teaching):* David W. Beach

*Associate Professor (Research):* Heinz G. Pitsch

*Associate Professor (Teaching):* Shilajeet S. Banerjee

*Courtesy Professors:* Fu-Kuo Chang, Reinhold Dauskardt, Ralph S. Greco, Oussama Khatib, Paul Yock

*Courtesy Associate Professor:* Margot G. Gerritsen, Nicholas Giori, Charles A. Taylor

*Courtesy Professors (Research):* J. Kenneth Salisbury, R. Lane Smith

*Courtesy Professor (Teaching):* Shelley V. Goldman

*Senior Lecturers:* Vadim Khayms, J. Craig Milroy

*Acting Associate Professor:* Kurt A. Beiter

*Consulting Professors:* Gary S. Beaupre, J. Edward Carryer, Shuichi Fukuda, David M. Golden, Barry M. Katz, Paul Mitiguy, Johannes Schoonman, George Toye, Stephen P. Walch, Edith Wilson, Albert Yu

*Consulting Associate Professors:* Mehdi Asheghi, Gary D. Lichtenstein, William Moggridge, R. Matthew Ohline, Sunil Puria, Paul Saffo, Lester K. Su, Marc F. Theeuwes

*Consulting Assistant Professors:* Michael Barry, Brendan J. Boyle, William R. Burnett, Dev Patnaik

\* Recalled to active duty.



## Cognate Courses

CS 106A	Programming Methodology	3-5
ENGR 14	Intro to Solid Mechanics	4
ENGR 15	Dynamics	4
ENGR 30	Engineering Thermodynamics	3
ENGR 31	Chemical Principles with Application to Nanoscale Science and Technology	4
ENGR 40	Introductory Electronics	5
ENGR 70A	Programming Methodology	3-5
ENGR 102M	Technical/Professional Writing for Mechanical Engineers	1
ENGR 105	Feedback Control Design	3
ENGR 205	Introduction to Control Design Techniques	3
CS 223A	Introduction to Robotics	3
CS 327A	Advanced Robotic Manipulation	3
ENGR 209A	Analysis and Control of Nonlinear Systems	3
ENGR 240	Introduction to Micro and Nano Electromechanical Systems	3
ENGR 341	Micro/Nano Systems Design and Fabrication	3-5

### Units

OSPCPTWN 45	Energy and Africa	5
OSPFLOR 89	Body as Machine: Roots of Modern Biomechanics in Tuscany	3-5

# School of Humanities and Sciences

The School of Humanities and Sciences, with over 40 departments and interdepartmental degree programs, is the primary locus for the liberal arts education offered by Stanford University. Through exposure to the humanities and arts, undergraduates study the ethical, aesthetic, and intellectual dimensions of the human experience, past and present, and are thereby prepared to make thoughtful and imaginative contributions to the culture of the future. Through the study of social, political, and economic events, they acquire theories and techniques for the analysis of specific societal issues, as well as general cross-cultural perspectives on the human condition. And through exposure to the methods and discoveries of mathematics and the sciences, they become well-informed participants and leaders in today's increasingly technological societies.

The research environment within the school offers both undergraduate and graduate students the intellectual adventure of working on their own research projects side by side with the school's distinguished faculty. While a few of the school's graduate programs offer professional degrees such as the Master of Fine Arts, most are academic and research programs leading to the Ph.D. Doctoral programs emphasize original scholarly work by the graduate students, often at the frontiers of knowledge, and normally require the students to participate in the supervised teaching of undergraduates. Indeed, in the school, as in the University more broadly, graduate students are of central importance in developing a community of scholars.

The fact that so many different disciplines lie within the same organization is one reason why the school has had great success in promoting interdisciplinary teaching and research programs. Whether engaged in studies as wide ranging as ethics, policy, and technological issues, or by applying contemporary social and philosophical theories to classical literature, the school's undergraduates, graduate students, and faculty are challenging the barriers among scholarly disciplines. The school continues to strive for a balance between teaching and research, the academy and society.

## Organization

The School of Humanities and Sciences includes the departments of Anthropology, Applied Physics, Art and Art History, Biology (and the Hopkins Marine Station), Chemistry, Classics, Communication, Division of Literatures, Cultures, and Languages, East Asian Languages and Cultures, Economics, English, History, Linguistics, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Religious Studies, Sociology, Statistics, and Theater and Performance Studies (formerly Drama).

The school also includes 21 interdepartmental degree programs: African and African American Studies; African Studies; American Studies; Archaeology; Biophysics; Comparative Studies in Race and Ethnicity; East Asian Studies; Feminist Studies; Financial Mathematics; Human Biology; International Policy Studies; International Relations; Latin American Studies; Mathematical and Computational Science; Modern Thought and Literature; Public Policy; Russian, East European and Eurasian Studies; Science, Technology, and Society; Symbolic Systems; and Urban Studies.

In addition, the school sponsors programs that do not currently grant degrees: Astronomy; Black Performing Arts; Buddhist Studies; Creative Writing; Ethics in Society; History and Philosophy of Science; the Institute for Gender Research; the Institute for Social Science Research; Islamic Studies; Jewish Studies; and Medieval Studies.

Faculty and academic staff of the School of Humanities are listed under their respective departments or programs.

## Degrees Offered

Candidates for the degree of Bachelor of Arts, Bachelor of Science, Bachelor of Arts and Sciences, Master of Arts, Master of Fine Arts, Master of Public Policy, Master of Science, Doctor of Musical Arts, or Doctor of Philosophy should consult the department or program in which they intend to specialize.

*Dean:* Richard P. Saller

*Senior Associate Deans:* Ralph L. Cohen, Stephen D. Krasner, Debra M. Satz

*Senior Associate Dean for Finance and Administration:* Adam R. Daniel

*Associate Dean for Faculty Affairs:* Tina Kass

*Associate Dean for Graduate and Undergraduate Studies:* Susan J. Weersing

*Assistant Dean for Diversity Programs, Data and Technology:* Ayodele Thomas

*Assistant Dean for Curricular and Academic Support:* Beth McKeown

*Graduate Diversity Recruitment Officer:* Joseph L. Brown

*Department Chairs:* R. Lanier Anderson (Philosophy), Jennifer Brody (Theater and Performance Studies), James Ferguson (Anthropology), James Fishkin (Communication), Hester Gelber (Religious Studies), Ian Gotlib (Psychology), Mark Granovetter (Sociology), Gavin Jones (English), Steven Kahn (Physics), Steven Kerckhoff (Mathematics), Jonathan Levin (Economics), Hideo Mabuchi (Applied Physics), W.E. Moerner (Chemistry), Josiah Ober (Political Science), Steven Palumbi (Hopkins Marine Station), Gabriella Safran (Division of Literature, Cultures, and Languages), Stephen Sano (Music), Walter Scheidel (Classics), Robert Simoni (Biology), Nancy Troy (Art and Art History), Guenther Walther (Statistics), Ban Wang (East Asian Languages and Cultures), Tom Wasow (Linguistics), Karen Wigen (History)

*Lecturer:* Ayodele Thomas

## African and African American Studies

### Undergraduate Program in African and African American Studies

The Program in African and African American Studies (AAAS), established in 1968, was the first ethnic studies program developed at Stanford University and the first African and African American Studies program at a private institution in the U.S. The AAAS program provides an interdisciplinary introduction to the study of peoples of African descent as a central component of American culture, offering a course of study that promotes research across disciplinary and departmental boundaries as well as providing research training and community service learning opportunities for undergraduates. It has developed an extensive network of Stanford scholars who work in race studies specific to AAAS and in concert with the Center for Comparative Studies in Race and Ethnicity.

AAAS encourages an interdisciplinary program of study drawn from fields including anthropology, art, art history, economics, education, drama, history, languages, linguistics, literature, music, philosophy, political

science, psychology, religion, and sociology. The program emphasizes rigorous and creative scholarship and research, and fosters close academic advising with a faculty adviser, the AAAS Associate Director, and the Director.

AAAS is an interdisciplinary program (IDP) affiliated with the Center for Comparative Studies in Race and Ethnicity (p. 340) (CCSRE) and offers a major independent of it. CCSRE offers additional majors in Asian American Studies, Chicana/o Studies, Comparative Studies in Race and Ethnicity, and Native American Studies.

## Mission Statement for the Undergraduate Program in African and African American Studies

The mission of the undergraduate program in African and African American Studies is to provide students with an interdisciplinary introduction to the study of people of African descent as a central component of American culture. Courses in the major promote research across disciplinary and departmental boundaries as well as provide students with research training and community service learning opportunities. Courses of study are drawn from anthropology, art, art history, economics, education, drama, history, languages, linguistics, literature, music, philosophy, political science, psychology, religion, and sociology among others. The program provides an intellectual background for students considering graduate school or professional careers.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an interdisciplinary understanding of scholarship related to the African diaspora and Africa, drawing on interdisciplinary course work and each student's individualized concentration.
2. the ability to identify and critically assess different disciplinary, methodological, and interpretive approaches to the study of the African Americans, Africans, and/or people of the African diaspora.
3. an understanding of comparative approaches to race
4. skills in disciplinary methods necessary for their study.
5. the ability to express their interpretive and analytical arguments in clear, effective prose.

## Bachelor of Arts in African and African American Studies

Majors must complete a total of 60 units, consisting of the following:

1. AFRICAAM 105 Introduction to African and African American Studies or AFRICAAM 143 (not offered this year) (5 units)
2. One Social Science course from AAAS approved core course list (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Acore&collapse=>) (5 units)

3. One Humanities course from AAAS approved core course list. (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Acore&collapse=>) (5 units)
4. One course in African Studies. (5 units)
5. AFRICAAM 200X Honors Thesis and Senior Thesis Seminar - WIM. (5 units)
6. 35 units of AAAS Core (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Acore&collapse=>) and Related (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Arelated&collapse=>) courses
  - At least 10 of the 35 units must be core courses (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Acore&collapse=>), which are defined as courses that are primarily focused on Africa (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aafrica&collapse=>), African American Studies ([https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aafrican\\_american&collapse=](https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aafrican_american&collapse=)), the Caribbean (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Acaribbean+&collapse=>), or the African Diaspora. (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Adiaspora&collapse=>)

Students also work closely with a faculty adviser, the AAAS associate director, and the AAAS director in developing a coherent thematic emphasis within their major that reflects their scholarly interests in the field.

## Thematic Emphasis

AAAS majors select a thematic emphasis, devoting at least 25 units in their major program of study toward their emphasis. Selecting an emphasis allows students to customize their curriculum and synthesize course work taken across various departments and programs into a coherent focus.

Emphases offered include:

- Africa (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aafrica&collapse=>)
- African Americans ([https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aafrican\\_american&collapse=](https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aafrican_american&collapse=))
- Class (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aclass&collapse=>)
- Diaspora (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Adiaspora&collapse=>)
- Education (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aeducation&collapse=>)
- Gender (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Agender&collapse=>)

- Historical Period ([https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Ahistorical\\_period&collapse=](https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Ahistorical_period&collapse=))
- Identities, Diversity, and Aesthetics (IDA) (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Aida&collapse=>)
- Language (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Alanguage&collapse=>)
- Mixed Race ([https://explorecourses.stanford.edu/search?page=0&q=aaas%3a%3Amixed\\_race&catalog=71&filter-coursestatus-Active=on&view=catalog&collapse=](https://explorecourses.stanford.edu/search?page=0&q=aaas%3a%3Amixed_race&catalog=71&filter-coursestatus-Active=on&view=catalog&collapse=))
- Theory (<https://explorecourses.stanford.edu/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=71&q=aaas%3A%3Atheory&collapse=>)

All emphases (those listed as well as proposed alternatives) must be approved by the director and a course plan developed and approved by the director, associate director, and faculty adviser within the first year of declaring the major.

## Core Courses

		Units
AFRICAAM 16N	African Americans and Social Movements	3
AFRICAAM 30	The Egyptians	3-5
AFRICAAM 40SI	We Are Never Radical Enough. The Personal Philosophy and Politics of Radical Thought	1-2
AFRICAAM 43	Introduction to African American Literature	3-5
AFRICAAM 47	History of South Africa	3
AFRICAAM 48Q	South Africa: Contested Transitions	3
AFRICAAM 50B	19th Century America	3
AFRICAAM 54N	African American Women's Lives	3-4
AFRICAAM 64C	From Freedom to Freedom Now!: African American History, 1865-1965	3
AFRICAAM 75E	Black Cinema	2
AFRICAAM 105	Introduction to African and African American Studies	5
AFRICAAM 123	Great Works of the African American Tradition	5
AFRICAAM 147	History of South Africa	5
AFRICAAM 152G	Global Harlem Renaissance	5
AFRICAAM 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
AFRICAAM 190	Directed Reading	1-5
AFRICAAM 199	Honors Project	1-5
AFRICAAM 200X	Honors Thesis and Senior Thesis Seminar	5
AFRICAAM 262D	African American Poetics	5
AFRICAST 112	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AFRICAST 212	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AMELANG 100C	First-Year Amharic, Third Quarter	4

EDUC 216X	Education, Race, and Inequality in African American History, 1880-1990	3-5
ENGLISH 43	Introduction to African American Literature	3-5
ENGLISH 143	Introduction to African American Literature	3-5
HISTORY 45B	Africa in the Twentieth Century	3
HISTORY 47	History of South Africa	3
HISTORY 48N	African History through Literature and Film	3-4
HISTORY 48Q	South Africa: Contested Transitions	3
HISTORY 54N	African American Women's Lives	3-4
HISTORY 145B	Africa in the 20th Century	5
HISTORY 164C	From Freedom to Freedom Now: African American History, 1865-1965	5
HISTORY 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
HISTORY 245G	Law and Colonialism in Africa	3-5
HISTORY 246C	Islam and Christianity in Africa	4-5
MUSIC 147	The Soul Tradition in African American Music	3-4
MUSIC 247	The Soul Tradition in African American Music	3-4
POLISCI 246P	The Dynamics of Change in Africa	4-5
SOC 16N	African Americans and Social Movements	3
SOC 149	The Urban Underclass	5

## Honors Program

AAAS offers a special program leading to honors in African and African American Studies. Students accepted to this program must complete an honors thesis on an approved topic, on which work normally begins in the junior year and they will fulfill their Writing in the Major (WIM) requirement in this course completed by mid-May of the senior year. The honors thesis is intended to enable students to synthesize skills to produce a document or project demonstrating a measure of competence in their specialty.

The honors program begins with advising from the faculty adviser and a petition for honors, approved no later than the Spring Quarter of the junior year. Students must enroll in AFRICAAM 200X Honors Thesis and Senior Thesis Seminar (WIM), during Autumn Quarter of the senior year and may take up to an additional 10 units of honors work to be distributed across Winter and Spring quarters of senior year. Senior Research units are taken in addition to the required courses for the major. In May of the senior year, honors students share their research findings in a public presentation to which faculty and students are invited.

Majors who have maintained a grade point average (GPA) of at least 3.5 in the major may apply for the honors program. Forms are available in the AAAS office.

## Minor in African and African American Studies

Students who minor in AAAS complete a minimum of 30 units from the list of AAAS courses. These courses must include:

	Units
AFRICAAM 105 Introduction to African and African American Studies	5
One course from the Social Sciences list	
One course from the Humanities list	

See the "Bachelor of Arts in African and African American Studies (p. 250)" section of this bulletin to view the humanities and social sciences lists.

Students should seek to develop a coherent theme in their course selections in consultation with the program director or associate director. An appointment should be made to discuss the rationale for the minor theme preceding submission of the declaration forms.

*Acting Director:* Arnetha Ball (Education)

*Associate Director:* Cheryl Brown

*Advisory Committee:* H. Samy Alim (Education), Jan Barker-Alexander (Director, Black Community Services Center), James Campbell (History), Clayborne Carson (History), Linda Darling-Hammond (Education), Harry Elam (Drama), Michele Elam (English), Shelley Fisher Fishkin (English), Allyson Hobbs (History), Vaughn Rasberry (English), John R. Rickford (Linguistics), Joel Samoff (African Studies)

*Affiliated Faculty:* David Abernethy (Political Science, emeritus), Samy Alim (Education), R. Lanier Anderson (Philosophy), Anthony Antonio (Education), Arnetha Ball (Education), Richard Banks (Law), Lucius Barker (Political Science, emeritus), Don Barr (Sociology), Shasad Bashir (Religious Studies), Carl Bielefeldt (Religious Studies), Jennifer Brody (Drama), Bryan Brown (Education), Cheryl Brown (Associate Director, Program in African and African American Studies), Albert Camarillo (History), James Campbell (History), Clayborne Carson (History), Prudence Carter (Education), Gordon Chang (History), Wanda Corn (Art and Art History, emerita), Linda Darling-Hammond (Education), David Degusta (Anthropology), Sandra Drake (English, emerita), Jennifer Eberhardt (Psychology), Paulla Ebron (Anthropology), Harry Elam (Vice Provost), Michele Elam (English), Corey Fields (Sociology), James Ferguson (Anthropology), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), Sean Hanretta (History), Aleta Hayes (Drama), Gina Hernandez (Director, Identity Diversity, and Aesthetics), Allyson Hobbs (History), Gavin Jones (English), Terry Karl (Political Science), Anthony Kramer (Drama), Teresa LaFromboise (Education), Brian Lowery (Graduate School of Business), Lisa Malkki (Anthropology), Hazel Markus (Psychology), Barbaro Martinez-Ruiz (Art and Art History), Monica McDermott (Sociology), Tania Mitchell (Director, Service Learning in Comparative Studies in Race and Ethnicity), Robert Moses (Drama), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Comparative Literature), Susan Olzak (Sociology), David Palumbo-Liu (Comparative Literature), Arnold Rampersad (English), Vaughn Rasberry (English), John R. Rickford (Linguistics), Richard Roberts (History), Sonia Rocha (Sociology), Michael Rosenfeld (Sociology), José Saldívar (English) Ramón Saldívar (English), Joel Samoff (African Studies), Gary Segura (Director, Comparative Studies in Race and Ethnicity), Paul Sniderman (Political Science), C. Matthew Snipp (Sociology), Ewart Thomas (Psychology), Jeane Tsai (Psychology), Elizabeth Whal (Executive Director, Center for Comparative Studies in Race and Ethnicity), Jeremy Weinstein (Political Science), Bryan Wolf (American Art and Culture), Yvonne Yarbo-Bejarno (Spanish and Portuguese)

## Identities, Diversity, and Aesthetics (IDA)

	Units
AFRICAAM 75E Black Cinema	2
AFRICAAM 103 Dance, Text, Gesture: Performance and Composition	1
AFRICAAM 121X Hip Hop, Youth Identities, and the Politics of Language	3-4
AFRICAAM 190 Directed Reading	1-5
AFRICAAM 199 Honors Project	1-5
AFRICAAM 200X Honors Thesis and Senior Thesis Seminar	5
AFRICAAM 262D African American Poetics	5

CSRE 127A Can't Stop Won't Stop: A History Of The Hip-Hop Arts	4
DANCE 30 The Chocolate Heads Movement Band and Performance	1
DANCE 45 Dance Improvisation Techniques and Strategies Lab: From Hip Hop to Contact	1
DANCE 103 Dance, Text, Gesture: Performance and Composition	1
EDUC 121X Hip Hop, Youth Identities, and the Politics of Language	3-4
HISTORY 48N African History through Literature and Film	3-4
HISTORY 145B Africa in the 20th Century	5
MUSIC 18A Jazz History: Ragtime to Bebop, 1900-1940	3
MUSIC 18B Jazz History: Bebop to Present, 1940-Present	3
MUSIC 147 The Soul Tradition in African American Music	3-4
MUSIC 247 The Soul Tradition in African American Music	3-4
TAPS 303 Race and Performance: Art, Atrocity and Activism	5

## Related Courses

	Units
AFRICAAM 103 Dance, Text, Gesture: Performance and Composition	1
AFRICAAM 106 Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices	3-5
AFRICAAM 107C The Black Mediterranean: Greece, Rome and Antiquity	4-5
AFRICAAM 112 Urban Education	3-4
AFRICAAM 121X Hip Hop, Youth Identities, and the Politics of Language	3-4
AFRICAAM 130 Discourse of Liberation and Equity in Communities and Classrooms	3-5
AFRICAAM 145A Poetics and Politics of Caribbean Women's Literature	5
AFRICAAM 150B 19th-Century America	5
AFRICAAM 200X Honors Thesis and Senior Thesis Seminar	5
AFRICAAM 204F The Modern Tradition of Non-Violent Resistance	5
AFRICAAM 233A Counseling Theories and Interventions from a Multicultural Perspective	3-5
AFRICAAM 245 Understanding Racial and Ethnic Identity Development	3-5
AFRICAAM 255 Racial Identity in the American Imagination	4-5
AFRICAST 72SI Conflict in the Congo	1-2
AFRICAST 124 Memory and Heritage In South Africa Syllabus	1
AFRICAST 151 AIDS in Africa	3
AFRICAST 199 Independent Study or Directed Reading	1-5
AFRICAST 200 The HIV/AIDS Epidemic in Tanzania: A Pre-Field Seminar	1
AFRICAST 224 Memory and Heritage In South Africa Syllabus	1
AMELANG 100A Beginning Amharic, First Quarter	4
AMELANG 103A First-Year Hausa, First Quarter	4
AMELANG 106A First-Year Swahili, First Quarter	5
AMELANG 106B First-Year Swahili, Second Quarter	5

AMELANG 107A	Second-Year Swahili, First Quarter	5
AMELANG 108A	Third-Year Swahili, First Quarter	5
AMELANG 153A	First-Year Twi, First Quarter	4
AMELANG 156A	First-Year Zulu, First Quarter	4
AMELANG 187A	First-Year Yoruba, First Quarter	4
CSRE 127A	Can't Stop Won't Stop: A History Of The Hip-Hop Arts	4
DANCE 30	The Chocolate Heads Movement Band and Performance	1
DANCE 45	Dance Improvisation Techniques and Strategies Lab: From Hip Hop to Contact	1
DANCE 103	Dance, Text, Gesture: Performance and Composition	1
EDUC 103B	Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices	3-5
EDUC 110	Sociology of Education: The Social Organization of Schools	4
EDUC 112X	Urban Education	3-4
EDUC 121X	Hip Hop, Youth Identities, and the Politics of Language	3-4
EDUC 165	History of Higher Education in the U.S.	3-5
EDUC 201	History of Education in the United States	3-5
EDUC 212X	Urban Education	3-4
EDUC 322	Discourse of Liberation and Equity in Communities and Classrooms	3-5
ENGLISH 50N	The Literature of Inequality: Have and Have-Nots from the Gilded Age to the Occupy Era	3
ENGLISH 68N	Mark Twain and American Culture	4
HISTORY 50B	19th Century America	3
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 150B	19th-Century America	5
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 158B	History of Education in the United States	3-5
HISTORY 204F	The Modern Tradition of Non-Violent Resistance	5
HISTORY 255D	Racial Identity in the American Imagination	4-5
HISTORY 255E	Education, Race, and Inequality in African American History, 1880-1990	3-5
HISTORY 258D	School: What Is It Good For?	3-4
HISTORY 299M	Undergraduate Directed Research: Martin Luther King, Jr., Research and Education Institute	1-4
HUMBIO 121E	Ethnicity and Medicine	1-3
HUMBIO 122S	Social Class, Race, Ethnicity, and Health	4
MUSIC 18A	Jazz History: Ragtime to Bebop, 1900-1940	3
MUSIC 18B	Jazz History: Bebop to Present, 1940-Present	3
POLISCI 28N	The Changing Nature of Racial Identity in American Politics	5
POLISCI 121L	Racial-Ethnic Politics in US	5
POLISCI 226	Race and Racism in American Politics	5
PSYCH 183	Mind, Culture, and Society Research Core	2-3
PSYCH 217	Topics and Methods Related to Culture and Emotion	1-3
SOC 14N	Inequality in American Society	3
SOC 15N	The Transformation of Socialist Societies	3

SOC 45Q	Understanding Race and Ethnicity in American Society	5
SOC 118	Social Movements and Collective Action	5
SOC 119	Understanding Large-Scale Societal Change: The Case of the 1960s	5
SOC 132	Sociology of Education: The Social Organization of Schools	4
SOC 135	Poverty, Inequality, and Social Policy in the United States	5
SOC 142	Sociology of Gender	5
SOC 145	Race and Ethnic Relations in the USA	5
SOC 148	Comparative Ethnic Conflict	5
SOC 155	The Changing American Family	5
TAPS 303	Race and Performance: Art, Atrocity and Activism	5
URBANST 112	The Urban Underclass	5

## Overseas Studies Courses in African and African American Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanandafricanamericanstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanandafricanamericanstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanandafricanamericanstudies/http://bosp.stanford.edu>).

		Units
OSPCPTWN 18	Xhosa Language and Culture	2
OSPCPTWN 22	Preparation for Community-Based Research in Community Health and Development	3
OSPCPTWN 24A	Targeted Research Project in Community Health and Development	3
OSPCPTWN 24B	Targeted Research Project in Community Health and Development	5
OSPCPTWN 31	Theory and Politics of Foreign Aid	3
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPCPTWN 36	The Archaeology of Southern African Hunter Gatherers	4
OSPCPTWN 38	Genocide: The African Experience	3-5
OSPCPTWN 68	Cities in the 21st Century: Urbanization, Globalization and Security	4
OSPPARIS 186F	Contemporary African Literature in French	4

# African Studies

Courses offered by the Center for African Studies are listed under the subject code AFRICAST on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AFRICAST&filter-catalognumber-AFRICAST=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AFRICAST&filter-catalognumber-AFRICAST=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AFRICAST&filter-catalognumber-AFRICAST=on>).

The Center for African Studies coordinates an interdisciplinary program in African Studies for undergraduates and graduate students. The program seeks to enrich understanding of the interactions among the social, economic, cultural, historical, linguistic, genetic, geopolitical, ecological, and biomedical factors that shape and have shaped African societies. By arrangement with the Stanford/Berkeley Joint Center for African Studies, graduate students may incorporate courses from both institutions into their programs. Contact the center for information regarding courses offered at the University of California, Berkeley.

Courses in African Studies are offered by departments and programs throughout the University. Each year the center sponsors a seminar to demonstrate to advanced undergraduates and graduate students how topics of current interest in African Studies are approached from different disciplinary perspectives.

Course offerings in African languages are also coordinated by the Center for African Studies. Along with regular courses in several levels of Arabic, Swahili, Xhosa, and Zulu, the center arranges with the African and Middle Eastern Languages and Literatures Program in the Stanford Language Center to offer instruction in other African languages; in recent years, it has offered courses in Amharic, Bambara, Chichewa, Ewe, Fulani, Hausa, Igbo, Shona, Twi, Wolof, and Yoruba.

The Center for African Studies offers a master of arts degree for graduate students. Undergraduates and graduate students not pursuing the master's degree can specialize in African Studies under the arrangements listed below.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in African Studies and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

## Undergraduate Programs in African Studies

Undergraduates may choose an African Studies focus from:

1. A minor in African Studies offers students the ability to combine a focus on Africa with their major in any other discipline. This offers the students a strong regional specialization. For requirements see the "Minor in African Studies (p. 254)" section of this bulletin.

2. A major in a traditionally defined academic department such as Anthropology (p. 262), History (p. 422), or Political Science (p. 511). These departments afford ample opportunity to enroll in courses outside the major, leaving the student free to pursue the interdisciplinary study of Africa.
3. Interdepartmental majors, such as African and African American Studies (p. 249) or International Relations (p. 453), which offer coordinated and comprehensive interdisciplinary course sequences, permitting a concentration in African Studies.

## Certificate in African Studies

Students may apply for a certificate in African Studies. Requirements for the certificate are the same as for the minor; however, students may double-count courses applied toward their major or graduate studies. The certificate in African Studies is issued by the Program in African Studies and will not appear on any University record, including the student's transcript. For more information and an application, contact the center.

## Minor in African Studies

The Center for African Studies awards a minor in African Studies. Students majoring in any field qualify for this minor by meeting the following requirements:

1. A minimum of 25 units of Africa-related courses. Students may not double-count courses for completing major and minor requirements.
2. At least one quarter's exposure to a sub-Saharan African language. The Center for African Studies and the Special Languages Program may arrange instruction in any of several languages spoken in West, East, Central, and Southern Africa.
3. One introductory course that deals with more than one region of Africa.
4. A minimum 25-page research paper, with a focus on Africa. This paper may be an extension of a previous paper written for an African Studies course.
5. A designated focus of study, either disciplinary or regional, through a three-course concentration.

Upon completion of requirements, final certification of the minor is made by the Center for African Studies and appears on the student's transcript.

## Graduate Study in African Studies

For those who wish to specialize in Africa at the graduate level, African Studies can be designated a field of concentration within the master's and doctoral programs of some academic departments. Students in such departments as Anthropology (p. 261), History (p. 421), Political Science (p. 511), and Sociology (p. 550), and in the School of Education (p. 130), may declare African Studies as the area of specialization for their master's and Ph.D. thesis work. Some other departments, programs, and institutes such as the International Comparative Education Program also permit students to specialize in African Studies.

Stanford graduate students who are U.S. citizens or permanent residents may request an academic year application for a Foreign Language and Area Studies (FLAS) Fellowship. Students need not be enrolled at Stanford to apply for the summer fellowship. The deadline for both is January 8. For more information or an application, contact the Center.

## Financial Aid

The Center for African Studies offers a limited number of Foreign Language and Area Studies (FLAS) fellowships to U.S. citizens and permanent residents who undertake full-time study of an African language as part of their graduate training.

## Coterminal Bachelor's and Master of Arts in African Studies

The one-year master's program in African Studies is designed for students who have experience working, living, or studying in Africa, and little prior course work on the region.

Undergraduates at Stanford may apply for admission to the coterminal master's program in African Studies. Coterminal degree applications will only be accepted from students in their fourth year, meaning that the program must be completed in the fifth year. An exception can only be made for students who completed an honors thesis in their third year. For University coterminal degree program rules and application forms, see the Registrar (<http://registrar.stanford.edu/shared/publications.htm#Coterm>) web site. Requirements for the master's degree are summarized below.

The annual deadline for all applications, including coterminal and master's, is January 8. All applicants must submit an online application, including a 500-word statement of purpose, resume, 15-20 page double-spaced academic writing sample, three letters of recommendation, official transcripts, and Graduate Record Examination scores. TOEFL scores are required of applicants for whom English is not their first language or who did not attend an undergraduate institution where English is the language of instruction. To apply online and for information on graduate admissions, see the Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanstudies/> <http://gradadmissions.stanford.edu>) web site.

## Degree Requirements

University requirements for the master's degree are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The program requires completion of a minimum of 45 graduate units. Upon entering, each student is assigned a faculty adviser who works with the student to develop a customized program of study.

To receive the M.A. degree in African Studies, students must complete:

### 1. Core Courses (15 units)

Students must complete the core African Studies M.A. course, AFRICAST 301A The Dynamics of Change in Africa, in Autumn Quarter. Students elect two additional graduate courses taught by African Studies academic council members and drawn from a list of approved courses. Students must also complete, AFRICAST 302 Research Workshop, in Spring Quarter, in which they present and discuss their research and research interests.

### 2. Cognate Courses (10 units)

A minimum of 10 units of graduate-level credit in two cognate courses from the following thematic clusters not chosen as the student's concentration field:

- A. culture and society
- B. health, well-being, and the environment
- C. political economy and security.

### 3. Concentration Field (12-15 units)

Students choose one area of specialization:

- A. culture and society

- B. health, well-being, and the environment
- C. political economy and security

- Students also choose a group of three related elective courses for graduate credit from the cognate course listings or elsewhere in the Stanford curriculum in consultation with the student's adviser and with the approval of the CAS director. With approval, introductory courses may be substituted in fields such as advanced undergraduate biology for those interested in epidemic diseases or public health. The academic adviser, in agreement with faculty in the chosen field, guarantees that each set of courses forms part of a coherent program.

### 4. Language Requirement

Students take one year of training in an African language, usually at least 3 units per quarter, resulting in intermediate-level proficiency as measured by the American Council on the Teaching of Foreign Languages (ACTFL) or comparable language acquisition standards. Students who have advanced proficiency in an African language must fulfill this requirement by taking another European language spoken in Africa, such as French or Portuguese, by taking another African language to the intermediate-level, or by taking a year-long sequence in Arabic. Students with competency in one or more African languages and one or more other languages widely spoken in Africa, may substitute a program of methodological training including, for example, a sequence of courses in statistics or GIS survey techniques.

### 5. Seminar Requirement

Students enroll each quarter in AFRICAST 300 Contemporary Issues in African Studies, 1 unit, in which guest scholars present lectures on African themes and topics.

### 6. Thesis Option

Students may elect to write a master's thesis; they may register for up to 10 units of thesis research under the guidance of an Academic Council member. Thesis units may be counted toward the electives within the concentration field unit requirements.

### 7. Grade Requirements

Courses to be counted toward the degree, except for AFRICAST 300 Contemporary Issues in African Studies, must be taken for a letter grade and receive a grade of 'B' or higher.

In addition to AFRICAST courses, the following courses are examples of those offered in other departments that may be used to fulfill optional requirements. To meet requirements for the master's degree, students must take courses at the graduate level which are typically at least at the 200 level.

		Units
AFRICAST 112	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AFRICAST 124	Memory and Heritage In South Africa Syllabus	1
AFRICAST 199	Independent Study or Directed Reading	1-5
AFRICAST 200	The HIV/AIDS Epidemic in Tanzania: A Pre-Field Seminar	1
AFRICAST 212	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AFRICAST 224	Memory and Heritage In South Africa Syllabus	1
AFRICAST 301A	The Dynamics of Change in Africa	4-5
ANTHRO 247	Nature, Culture, Heritage	5
ARTHIST 490	Curatorial Activism in the Arts of Africa	5



BIO 209B	The Human Genome and Disease: Genetic Diversity and Personalized Medicine	3
BIOC 209B	The Human Genome and Disease: Genetic Diversity and Personalized Medicine	3
CEE 277G	Health and Development at the Food-Water Nexus	1
EESS 277G	Health and Development at the Food-Water Nexus	1
FILMSTUD 316	International Documentary	4
FINANCE 381	Private Equity in Frontier Markets: Creating a New Investible Asset Class	4
HISTORY 203E	Global Catholicism	5
HISTORY 245G	Law and Colonialism in Africa	3-5
HISTORY 246C	Islam and Christianity in Africa	4-5
HISTORY 289	The Indian Ocean World: Winds, Merchants & Empires	4-5
IPS 213	International Mediation and Civil Wars	3-5
POLISCI 246P	The Dynamics of Change in Africa	4-5

*Emeriti:* David B. Abernethy, John Baugh, Joan Bresnan, Susan Cashion, Sandra E. Drake, Peter Egbert, James L. Gibbs, Jr., William B. Gould, Bruce F. Johnston, William R. Leben, Bruce Lusignan, Hans N. Weiler, Sylvia Wynter

*Director:* Jeremy Weinstein

*Professors:* Jean-Marie Apostolidès (French, Drama), Ellen Jo Baron (Pathology), Michele Barry (Medicine), Joel Beinin (History), John Boothroyd (Microbiology and Immunology), Elisabeth Mudimbe-Boyi (French and Italian, Comparative Literature), James T. Campbell (History), Martin Carnoy (Education), Harry Elam (Drama), James Fearon (Political Science), James Ferguson (Anthropology), Terry Lynn Karl (Political Science), Richard Klein (Anthropology), David Laitin (Political Science), Michael McFaul (Political Science), Yvonne Maldonado (Pediatrics, Infectious Diseases), Lynn Meskell (Anthropology), Julie Parsonnet (Infectious Diseases), Mary L. Polan (Obstetrics and Gynecology), John Rickford (Linguistics), Richard Roberts (History)

*Associate Professors:* Prudence L. Carter (Education), Paulla A. Ebron (Anthropology), Liisa Malkki (Anthropology), Hugh Brent Solvason (Psychiatry and Behavioral Sciences)

*Assistant Professors:* Jenna Davis (Civil and Environmental Engineering), David DeGusta (Anthropology), Oliver Fringer (Civil and Environmental Engineering), Sean A. Hanretta (History), Barbaro Martinez-Ruiz (Art History), Kathryn Miller (History), Grant Parker (Classics), Jeremy Weinstein (Political Science)

*Professor (Research):* David Katzenstein (School of Medicine)

*Associate Professor (Teaching):* Robert Siegel (Microbiology and Immunology)

*Assistant Professor (Clinical):* Brian Blackburn (Infectious Diseases)

*Senior Lecturers:* Khalil Barhoum (African and Middle Eastern Languages), Helen Stacy (Law)

*Lecturers:* Byron Bland (Stanford Center on Conflict and Negotiation), Jonathan Greenberg (Law), Ramzi Salti (African and Middle Eastern Languages), Galen Sibanda (African and Middle Eastern Languages), Timothy Stanton (Bing Overseas Studies)

*Consulting Professors:* Anne Firth-Murray (Human Biology), Joel Samoff (Center for African Studies)

*Curators:* Karen Fung (African Collection Curator, Green Library), Thomas Seligman (Director, Cantor Arts Center, and Lecturer, Art and Art History), Barbara Thompson (Phyllis Wattis Curator of the Arts of Africa and the Americas, Cantor Arts Center)

*Senior Research Fellows:* Coit Blacker (Freeman Spogli Institute), Larry Diamond (Hoover Institution), Stephen Stedman (Freeman Spogli Institute, Center for International Security and Cooperation)

## Overseas Studies Courses in African Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/africanstudies/http://bosp.stanford.edu>).

		Units
OSPCPTWN 18	Xhosa Language and Culture	2
OSPCPTWN 22	Preparation for Community-Based Research in Community Health and Development	3
OSPCPTWN 24A	Targeted Research Project in Community Health and Development	3
OSPCPTWN 24B	Targeted Research Project in Community Health and Development	5
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPCPTWN 36	The Archaeology of Southern African Hunter Gatherers	4
OSPCPTWN 38	Genocide: The African Experience	3-5

## American Studies

Courses offered by American Studies Program are listed under the subject code AMSTUD on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AMSTUD&filter-catalognumber-AMSTUD=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AMSTUD&filter-catalognumber-AMSTUD=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AMSTUD&filter-catalognumber-AMSTUD=on>).

## Mission of the Undergraduate Program in American Studies

The mission of the undergraduate program in American Studies is to provide students with a broad understanding of American culture and society. Building on a foundation of courses in history and institutions, literature and the arts, and race and ethnicity, students learn to analyze and interpret America's past and present, forging fresh and creative syntheses

along the way. The program is an interdisciplinary major and, beyond the core requirements of the major, students may define and pursue their own interests from fields such as history, literature, art, communication, theater, African American studies, feminist studies, economics, anthropology, religious studies, Chicana/o studies, law, sociology, education, Native American studies, music, and film. The program is designed to provide students majoring in American Studies with excellent preparation for further study in graduate or professional schools as well as careers in government, business, or other specialized fields.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. higher order, interdisciplinary, historically informed understanding of how to think about American culture and society, drawing on course work in: history and institutions; literature, art, and culture; comparative race and ethnicity; and each student's individualized thematic focus.
2. ability to identify and critically to assess different disciplinary, methodological, and interpretive approaches to the study of Americans and their past.
3. ability to produce their own persuasive, nuanced, fact-based interpretations reflecting a close critical reading and analysis of relevant primary or secondary sources.
4. ability to express their interpretive and analytical arguments in clear, effective prose.
5. ability to listen actively and to contribute to productive intellectual discussion in class.

## Bachelor of Arts in American Studies

The core requirements illustrate how different disciplines approach the study and interpretation of American life and include three courses in each of two main areas: history and institutions; and literature, culture, and the arts. One additional course in comparative race and ethnicity is also required. The required gateway seminar, AMSTUD 160 Perspectives on American Identity, explores the tensions between commonality and difference from a variety of disciplinary perspectives.

Beyond the core requirements of the major, American Studies expects students to define and pursue their own interests in interpreting important dimensions of American life. Accordingly, each student designs a thematic concentration of at least five courses drawn from fields such as history, literature, art, communication, theater, political science, African American studies, feminist studies, economics, anthropology, religious studies, Chicana/o studies, law, sociology, education, Native American studies, music, and film. At least one of the five courses in a student's thematic concentration should be a small group seminar or a colloquium. With program approval, students may conclude the major with a capstone honors research project during their senior year.

Whether defined broadly or narrowly, the thematic focus or concentration should examine its subject from the vantage of multiple disciplines. Examples of concentrations include: race and the law in America; gender in American culture and society; technology in American life and thought; health policy in America; art and culture in 19th-century America; education in America; nature and the environment in American culture; politics and the media; religion in American life; borders and boundaries

in American culture; the artist in American society; and civil rights in America.

Completion of the major thus normally requires 13 courses (totaling at least 60 units), all of which must be taken for a letter grade. Not all courses are offered each year; students should consult ExploreCourses (<http://explorecourses.stanford.edu>) for scheduling information for the current academic year.

## Degree Requirements

### 1. Gateway Seminar

	<b>Units</b>
AMSTUD 160 Perspectives on American Identity (WIM course for American Studies)	5

### 3. History and Institutions

Majors are required to complete three courses in American History and Institutions. Specific requirements are:

	<b>Units</b>
AMSTUD/ HISTORY 150A Colonial and Revolutionary America	5
AMSTUD/ HISTORY 150B 19th-Century America	5
Select one of the following:	3-5
AMSTUD/ COMM 1B Media, Culture, and Society	
AMSTUD/ POLISCI 2 Introduction to American National Government and Politics	
AMSTUD/ HISTORY 107 Introduction to Feminist Studies	
AMSTUD/ ECON 116 American Economic History	
AMSTUD/ COMM 137 The Dialogue of Democracy	
AMSTUD/ HISTORY 150C The United States in the Twentieth Century	
AMSTUD/ HISTORY 152 U.S. Society and Politics since 1945	
AMSTUD 156H Women and Medicine in US History: Women as Patients, Healers and Doctors	
AMSTUD/ HISTORY 161 Women in Modern America	
AMSTUD/ EDUC 165 History of Higher Education in the U.S.	
AMSTUD/ HISTORY 166 Introduction to African American History: The Modern African American Freedom Struggle	
AMSTUD 179/ POLISCI 122 Introduction to American Law	
AMSTUD/ HISTORY 201 History of Education in the United States	

AMSTUD/ HISTORY 251C	The American Enlightenment
AMSTUD/ HISTORY 255D	Racial Identity in the American Imagination
AMSTUD/ HISTORY 256	U.S.-China Relations: From the Opium War to Tiananmen
AMSTUD/ HISTORY 258	Topics in the History of Sexuality: Sexual Violence
AMSTUD/ HISTORY 265	Writing Asian American History
AMSTUD	Religion in Twentieth Century American Life 267
EDUC 216X	Education, Race, and Inequality in African American History, 1880-1990
HISTORY 254	Popular Culture and American Nature
HISTORY 169	The Environmental History of North America
RELIGST 105	Religion and War in America
SOC 155	The Changing American Family
THINK 4	Can the People Rule?

5. **Literature, Culture, and the Arts**

Majors are required to take a minimum of three courses in literature, culture, and the arts, broadly understood. Specific requirements are:

6. Units

At least one course focusing on the period before the Civil War, normally:

AMSTUD 150/ ENGLISH 123	American Literature and Culture to 1855	5
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Select two of the following: <sup>1</sup> 6-10

AMSTUD/ ENGLISH 50N	The Literature of Inequality: Have and Have-Nots from the Gilded Age to the Occupy Era
AMSTUD/ ENGLISH 68N	Mark Twain and American Culture
AMSTUD/ COMM 120	Digital Media in Society
AMSTUD 140	Stand Up Comedy and the "Great American Joke" Since 1945
AMSTUD/ COMPLIT 142	The Literature of the Americas
AMSTUD/ ENGLISH 143	Introduction to African American Literature
AMSTUD/ COMPLIT 146	Asian American Culture and Community
AMSTUD/ MUSIC 147	The Soul Tradition in African American Music

AMSTUD/ ENGLISH 152A	"Mutually Assured Destruction": American Culture and the Cold War
AMSTUD 159X/ ARTHIST 159	American Photographs, 1839-1971: A Cultural History
AMSTUD/ ENGLISH 186A	American Hauntings
AMSTUD/ ARTHIST 244	The Visual Culture of the American Home Front, 1941-1945
AMSTUD/ ENGLISH 261F	Gender and Sexuality in Asian American Literature
AMSTUD/ ENGLISH 262F	Transnational American Studies
EDUC 132N	Religion, Music and Identity
JAPANGEN 221	Translating Japan, Translating the West
RELIGST 105	Religion and War in America
RELIGST 245	Religion, Reason, and Romanticism
THINK 31	Reimagining America: Cultural Memory and Identity Since the Civil War

<sup>1</sup> Including at least one course outside of literature that emphasizes art, drama, film, music, translation studies, or culture from a different disciplinary or interpretive perspective.

7. **Comparative Race and Ethnicity**

Majors are required to take one course that focuses on the comparative study of race and ethnicity rather than a single racial or ethnic group, generally from the offerings listed by Comparative Studies in Race and Ethnicity (CSRE).

8. Units

Choose one from the following list: 3-5

AMSTUD/ COMPLIT 51N	Comparative Fictions of Ethnicity
AMSTUD 114N	Visions of the 1960s
AMSTUD/ EDUC 121X	Hip Hop, Youth Identities, and the Politics of Language
AMSTUD/ COMPLIT 142	The Literature of the Americas
AMSTUD/ CSRE 183	Border Crossings and American Identities
AMSTUD 214	The American 1960s: Thought, Protest, and Culture
AMSTUD/ POLISCI 226	Race and Racism in American Politics
AMSTUD/ HISTORY 255D	Racial Identity in the American Imagination

AMSTUD/ ENGLISH 261B	East Goes West: Transnational Asia/Pacific Spatial Geographies
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity
EDUC 216X	Education, Race, and Inequality in African American History, 1880-1990
SOC 149	The Urban Underclass

## 9. Concentration and Capstone Seminar

Students must design a thematic concentration of at least five courses, with the help of faculty advisers. The courses, taken together, must give the student in-depth knowledge and understanding of a coherent topic in American cultures, history, and institutions. Thematic concentrations should be approved by the end of the registration period of the Autumn Quarter of the junior year, if at all possible. Sample thematic concentrations and courses that allow a student to explore them are available in the American Studies Office in Building 460.

At least one of the courses in the concentration must be designated as the capstone seminar and must require a substantial research paper on a topic related to the thematic concentration. This paper must be filed in the program office prior to degree conferral. The program office has a list of courses that satisfy the capstone requirement, but students are encouraged to propose others that may fit better with their concentrations. An honors project, or an independent study course with a faculty member culminating in a research paper, may also fulfill this requirement with the Director's approval. Students may choose courses for their thematic concentrations from the following list:

		Units
AFRICAAM 16N	African Americans and Social Movements	3
AFRICAAM 75E	Black Cinema	2
AFRICAAM 105	Introduction to African and African American Studies	5
AMSTUD 105Q	Law and Popular Culture	3
AMSTUD 101	American Fiction into Film: How Hollywood Scripts and Projects Black and White Relations	3-5
ANTHRO 82	Medical Anthropology	5
ARTHIST 145	Culture Wars: Art and Social Conflict in the USA, 1890-1950	4
ARTHIST 156	American and European Art, 1945-1968	4
ARTHIST 246A	California Dreaming: West Coast Art and Visual Culture, 1848 - present	5
ASNAMST 161	Asian American Immigration and Health	3-5
CHILATST 14N	Growing Up Bilingual	3
CHILATST 125S	Chicano/Latino Politics	5
CHILATST 200R	Directed Research	1-5
CHILATST 201B	From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era	5
COMM 1A	Media Technologies, People, and Society	4-5
COMM 116	Journalism Law	5

COMM 117	Digital Journalism	5
COMM 125	Perspectives on American Journalism	5
COMM 162	Campaigns, Voting, Media, and Elections	5
COMM 177G	Specialized Writing and Reporting: Covering Silicon Valley	5
CSRE 16N	African Americans and Social Movements	3
CSRE 45Q	Understanding Race and Ethnicity in American Society	5
CSRE 103B	Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices	3-5
CSRE 179G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
ECON 153	Economics of the Internet	5
ECON 155	Environmental Economics and Policy	5
ECON 157	Imperfect Competition	5
EDUC 102	Examining Social Structures, Power, and Educational Access	2-3
EDUC 112X	Urban Education	3-4
EDUC 231X	Knowing God: Learning Religion in Popular Culture (undergrads by permission of instructor)	4
EDUC 293X	Religion and Education (undergrads by permission of instructor)	4
EDUC 313X	The Education of American Jews (undergrads by permission of instructor)	4
ENGLISH 46N	The Hemingway Era	3
ENGLISH 71N	American Daughters: Hawthorne to Robinson	3
ENGLISH 88N	Graphic Novels Asian American Style	3
ENGLISH 143A	American Indian Mythology, Legend, and Lore	3-5
ENGLISH 145G	American Fiction since 1945	5
ENGLISH 151C	Wastelands	5
ENGLISH 151F	Angelheaded Hipsters: Beat Writers of San Francisco and New York	5
ENGLISH 156	Whitman and Dickinson	5
ENGLISH 158A	Literary Celebrity: Douglass, Hemingway, Plath	5
ENGLISH 175C	American Nature	5
FEMST 140D	LGBT/Queer Life in the United States	4-5
FILMSTUD 155	Comics and the City	4
HISTORY 41Q	Mad Women: Women and Mental Illness in U.S. History	3
HISTORY 54N	African American Women's Lives	3-4
HISTORY 103E	History of Nuclear Weapons	5
HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present	5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 175B	Transnational Latin American Migration to the United States	5
HISTORY 201	Introduction to Public History in the U.S., 19th Century to the Present	4-5

HISTORY 252K	America as a World Power: U.S. Foreign Relations, 1914 to Present	5	PUBLPOL 125	Law and Public Policy	5
HISTORY 260	California's Minority-Majority Cities	4-5	PUBLPOL 135	Regional Politics and Decision Making in Silicon Valley	3
HISTORY 262G	The Pivotal Decade in U.S. History: 1960's or 1970's?	4-5	PUBLPOL 154	Politics and Policy in California	5
HISTORY 263G	History Through a Life: The Allure of American Biography	4-5	PUBLPOL 194	Technology Policy	5
HISTORY 264G	The Social History of Mental Illness in the United States	5	SOC 119	Understanding Large-Scale Societal Change: The Case of the 1960s	5
HUMBIO 120	Health Care in America: An Introduction to U.S. Health Policy	4	SOC 135	Poverty, Inequality, and Social Policy in the United States	5
HUMBIO 120A	American Health Policy	3	SOC 138	American Indians in Comparative Historical Perspective	5
HUMBIO 121E	Ethnicity and Medicine	1-3	SOC 142	Sociology of Gender	5
HUMBIO 122S	Social Class, Race, Ethnicity, and Health	4	SOC 145	Race and Ethnic Relations in the USA	5
HUMBIO 123	Obesity in America: Clinical and Public Health Implications	3-4	TAPS 179	Chicano & Chicana Theater: Politics In Performance	3-5
HUMBIO 125	Current Controversies in Women's Health	2-3	TAPS 180Q	Noam Chomsky: The Drama of Resistance	4
HUMBIO 166	Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context	4	TAPS 248	Family Drama: American Plays about Families	5
HUMBIO 172B	Children, Youth, and the Law	5	URBANST 112	The Urban Underclass	5
HUMBIO 175	Health Care as Seen Through Medical History, Literature, and the Arts	3	URBANST 160	Environmental Policy and the City in U.S. History	5
INTNLREL 140C	The U.S., U.N. Peacekeeping, and Humanitarian War	5	URBANST 166	East Palo Alto: Reading Urban Change	5
MUSIC 8A	Rock, Sex, and Rebellion	3			
MUSIC 11Q	Art in the Metropolis	2			
MUSIC 17Q	Perspectives in North American Taiko	4			
MUSIC 18A	Jazz History: Ragtime to Bebop, 1900-1940	3			
MUSIC 18B	Jazz History: Bebop to Present, 1940-Present	3			
MUSIC 34N	Performing America: The Broadway Musical from "Little Johnny Jones" to "The Book of Mormon"	3			
MUSIC 36N	Humor in Music	3			
MUSIC 147A	Music Ethnography of the Bay Area	3-5			
NATIVEAM 109A	Federal Indian Law	5			
NATIVEAM 109B	Indian Country Economic Development	5			
NATIVEAM 240	Psychology and American Indian Mental Health	3-5			
POLISCI 110X	America and the World Economy	5			
POLISCI 118P	U.S. Relations in Iran	5			
POLISCI 120B	Campaigns, Voting, Media, and Elections	5			
POLISCI 120C	American Political Institutions: Congress, the Executive Branch, and the Courts	5			
POLISCI 121L	Racial-Ethnic Politics in US	5			
POLISCI 124R	The Federal System: Judicial Politics and Constitutional Law	5			
POLISCI 124S	Civil Liberties: Judicial Politics and Constitutional Law	5			
POLISCI 213S	A Post American Century? American Foreign Policy in a Multi-unipolar World	5			
POLISCI 214R	Challenges and Dilemmas in American Foreign Policy	5			
POLISCI 127P	Economic Inequality and Political Dysfunction	5			
POLISCI 224L	The Psychology of Communication About Politics in America	4			
PUBLPOL 101	Politics and Public Policy	5			

<sup>1</sup> Including at least one course outside of literature that emphasizes art, drama, film, music, translation studies, or culture from a different disciplinary or interpretive perspective.

## Honors Program

To graduate with honors, American Studies majors must complete a senior thesis and have an overall grade point average of 3.5 in the major, or demonstrated academic competence. Students must apply to enter the honors program no later than the end of registration period in Autumn Quarter of their senior year, and must enroll in 10-15 units of AMSTUD 250 Senior Research, during the senior year. These units are in addition to the units required for the major. The application to enter the program must contain a one-page statement of the topic of the senior thesis, and must be signed by at least one faculty member who agrees to be the student's honors adviser. (Students may have two honors advisers.) The thesis must be submitted for evaluation and possible revision to the adviser no later than four weeks before graduation.

Students are encouraged to choose an honors topic and adviser during the junior year. To assist students in this task, American Studies offers a pre-honors seminar (AMSTUD 240A Pre-Honors Seminar) in which students learn research skills, develop honors topics, and complete honors proposals. Students also may enroll in the American Studies Honors College during September before the senior year. American Studies also provides students the opportunity to work as paid research assistants for faculty members during the summer between their junior and senior year. More information about American Studies honors is available from the program office.

## Minor in American Studies

To earn a minor in American Studies, students must complete at least 28 units of course work in the program. Because students may not count courses for both a major and a minor, the specific courses that are used for an American Studies minor depend on the courses that are used to satisfy the major requirement.

A student must take the following:

		Units
AMSTUD 160	Perspectives on American Identity (The gateway seminar)	5

at least 2 courses from category 2 (History and Institutions)	6-10
at least 2 courses from category 3 (Literature, Culture and the Arts)	6-10
at least 1 course from category 4 (Comparative Race and Ethnicity)	3-5

If the units for these requirements do not total 28, the student must take additional coursework, appropriate to American Studies and approved by the Director or one of the Program Coordinators, to meet the minimum unit requirement. Courses used to satisfy all units taken for the minor must be taken for a letter grade.

*Director:* Shelley Fisher Fishkin

*Program Coordinators:* Richard Gillam, Judith Richardson

*Committee in Charge:* Shelley Fisher Fishkin (English, Chair), Barton J. Bernstein (History, emeritus), Jennifer DeVere Brody (Drama), Scott Bukatman (Art and Art History), James T. Campbell (History, on leave), Gordon H. Chang (History), Michele B. Elam (English), James Fishkin (Communication, and by courtesy, Political Science), Estelle Freedman (History), Richard Gillam (American Studies), Leah Gordon (Education, on leave winter quarter), Allyson Hobbs (History), Ari Kelman (Education), Doug McAdam (Sociology), Clayton Nall (Political Science), Alexander Nemerov (Art and Art History), Hilton Obenzinger (English, American Studies), David Palumbo-Liu (Comparative Literature), Jack Rakove (History, Political Science), Vaughn Rasberry (English), Judith Richardson (English), Ramón Saldivar (English, Comparative Literature), Gary Segura (Political Science), Stephen Sohn (English), Fred Turner (Communication), Caroline Winterer (History), Bryan Wolf (Art and Art History, on leave), Gavin Wright (Economics)

## Anthropology

Courses offered by the Department of Anthropology are listed under the subject code ANTHRO on the *Stanford Bulletin's* ExploreCourses web site.

### Mission of the Department of Anthropology

The courses offered by the Department of Anthropology are designed to: provide undergraduates with instruction in anthropology; provide undergraduate majors in Anthropology with a program of work leading to the bachelor's degree; and prepare graduate candidates for advanced degrees in Anthropology. Anthropology is devoted to the study of human beings and human societies as they exist across time and space. It is distinct from other social sciences in that it gives central attention to the full time span of human history, and to the full range of human societies and cultures, including those located in historically marginalized parts of the world. It is therefore especially attuned to questions of social, cultural, and biological diversity, to issues of power, identity, and inequality, and to understanding the dynamic processes of social, historical, ecological, and biological change over time. Education in Anthropology provides excellent preparation for living in a multicultural and globally-interconnected world, and helps to equip students for careers in fields including law, medicine, business, public service, research, ecological sustainability, and resource management. Students may pursue degrees in Anthropology at the bachelor's, master's, and doctoral levels.

The Department of Anthropology offers a wide range of approaches to the topics and area studies within the field, including archaeology, ecology, environmental anthropology, evolution, linguistics, medical anthropology, political economy, science and technology studies, and sociocultural anthropology. Methodologies for the study of micro- and macro-social processes are taught through the use of qualitative and quantitative approaches. The department provides students with excellent training in theory and methods to enable them to pursue graduate study in any of the above mentioned subfields of Anthropology.

## Undergraduate Programs in Anthropology

- Bachelor of Arts (B.A.)
- Anthropology Minor

In addition to gaining an excellent foundation for graduate research and study, students majoring in Anthropology can pursue careers in government, international business, international development agencies, international education, law, mass media, nonprofit organizations, and public policy.

### Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the degree program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the Anthropology discipline.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the Anthropology discipline.

## Graduate Programs in Anthropology

Graduate training in Anthropology at Stanford is designed for students who seek the Doctoral (Ph.D.) degree, and for students who seek the Masters of Arts (M.A.) degree only.

### Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Anthropology and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses in the primary field, as well as related areas, and through experience with independent work, area specialization and field research.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Anthropology. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Anthropology and to interpret and present the results of such research.

## Field School and Research Opportunities in Anthropology

Students majoring in Anthropology are encouraged to develop field research projects under the supervision of a department faculty member. The department offers research grants to support individually-designed and other summer field research in Anthropology. The department research

grants may be used to support field research as a supplement to other field research grants such as the UAR research grants. The department also offers opportunities to participate in faculty-led research projects.

Please refer to <http://anthropology.stanford.edu> for information about the department's summer research opportunities, including the following: Beagle II Award, Tambopata, and Franz Boas summer scholars programs, the Georgia Sea Islands Cultural Heritage Preservation Project, and Michelle Z. Rosaldo Summer Field Research Grant program. The VPUE-funded departmental grants program supports students' participation in faculty-led research projects such as the Georgia Sea Islands Cultural Preservation Project. Other field school opportunities include the following: Catalhoyuk, El Presidio de San Francisco, Pueblo of Abo, and South Africa Heritage.

*Note:* Required courses for the Franz Boas summer scholars program and the Michelle Z. Rosaldo grant program include:

		Units
ANTHRO 93	Prefield Research Seminar	5
or ANTHRO 93B	Prefield Research Seminar: Non-Majors	
ANTHRO 94	Postfield Research Seminar	5

For more information about research opportunities and deadlines, see the department's web site.

## Bachelor of Arts in Anthropology

Undergraduate training in the Department of Anthropology is designed for students who seek the Bachelor of Arts (B.A.) degree, only. Students may declare a major in Anthropology and earn the B.A. degree by completing the requirements below. The Department also offers a minor in Anthropology. The Anthropology B.A. degree program usually requires at least five quarters of enrollment. Students interested in majoring in Anthropology are encouraged to declare by the beginning of their junior year and to work closely with a faculty adviser to develop a coherent plan of study. For additional information about the major see <http://anthropology.stanford.edu>.

To declare a major in Anthropology, apply in Axxess for the B.A. in Anthropology, contact the department's student peer adviser(s) or the undergraduate student services specialist to prepare the major checklist and planning form; submit the required forms to the undergraduate student services specialist; request a faculty adviser assignment and meet with the assigned faculty adviser for approval of the major checklist and planning form. Students must apply in Axxess for the major in Anthropology by the time junior status is achieved (85 units).

### Degree Requirements

The B.A. degree in Anthropology may be earned by fulfilling the following requirements:

1. A faculty adviser appointed in the Department of Anthropology. A faculty adviser will be assigned based on the students chosen emphasis. Undergraduate Anthropology (ANTHRO) majors should plan to meet with their faculty adviser at least once each quarter.
2. A program of 65 units, passed with an overall minimum grade point average of 'C':
  - of the 65 units, 50 units must be in courses with the ANTHRO subject code. 15 may be approved from related areas of study, overseas studies, and/or transfer units.
  - *Note:* Any related, overseas studies, or transfer units must be approved by the faculty adviser and by petition to the undergraduate committee.

- of the 65 units, at least 20 units with a minimum grade of 'C' must be in courses with the ANTHRO subject code numbered 100 or above and taught by Anthropology faculty.
  - no more than 10 units of directed reading-style course work may be counted towards the 50 units required for the major in the ANTHRO subject code.
  - no more than 10 units may be taken for a satisfactory/no credit grade: 5 units in ANTHRO courses, and 5 in related or transfer units.
3. A minimum grade of 'B' in an ANTHRO Writing in the Major (WIM) course from the chosen emphasis. This should be taken within a year of declaring the Major or before the end of the junior year.
  4. A minimum grade of 'B' in an ANTHRO theory course from the chosen emphasis. This should be taken within a year of declaring the major or before the end of the junior year.
  5. A minimum grade of 'B' in ANTHRO Methods course (ANTHRO 91 Method and Evidence in Anthropology). This should be taken within a year of declaring the major or before the end of the junior year.
  6. Students must enroll in the senior Capstone course, (ANTHRO 192 Capstone Course: Careers in Anthropology) during their senior year. Alternately, student majors may petition to enroll in ANTHRO 146 STS Senior Capstone instead, in fulfillment of the department's capstone course requirement.
  7. An approved plan of study which includes an emphasis chosen from the list below. Students must complete a minimum of 20 units in their chosen emphasis of which 10 units must be numbered 100 or above.
    - Culture and Society
    - Ecology, Environment, and Evolution
    - Medical Anthropology
    - Self-Designed Emphasis (with faculty adviser and undergraduate committee approval, only)
  8. Competence in a foreign language beyond the first-year level. Such competence is usually demonstrated by completing a 5 unit course at the second-year level with a minimum grade of 'B-'. The requirement may be met by special examination administered through the Language Center, or demonstration of superior placement scores.
    - *Note:* Students whose programs require non-English language study as part of a geographical or linguistics focus may ask their faculty adviser to approve up to 5 units from language courses toward the degree if such courses are at the second-year level and above, or are in a second non-English language.
  9. At least five quarters of enrollment in the major. Each candidate for the B.A. in Anthropology should declare a major by the first day of the first quarter of the third year of study.

Advising is an important component of the Anthropology major. Students are encouraged to work closely with their major adviser throughout their pursuit of the B.A. degree. Advising milestones for the major include the following:

1. In the quarter in which the major is declared, students meet with their assigned faculty adviser, create a rigorous plan of study based on topical breadth, obtain adviser approval of an Anthropology emphasis as part of the plan of study, and obtain the major adviser's signature on the Major Checklist form.
2. Undergraduate Anthropology majors should plan to meet with their Major faculty adviser at least once each quarter before the final study list deadline. Any revisions to the initial checklist must be approved by the faculty adviser.
3. Undergraduate Anthropology majors must submit an updated major checklist and planning form to the undergraduate student services specialist in the quarter before graduating.

## Required Courses

### 1. Writing in the Major courses

Undergraduate majors can fulfill the Writing in the major course requirement for the B.A. in Anthropology by taking the ANTHRO theory course designated from a chosen emphasis.

### 2. Theory courses

Enroll in one of the following according to the student's chosen emphasis:

	Units
<b>Culture and Society/Medical Anthropology: (5)</b>	
ANTHRO 90B Theory of Cultural and Social Anthropology	5
<b>Ecology, Environment, and Evolution: (5)</b>	
ANTHRO 90C Theory of Ecological and Environmental Anthropology	5

### 3. Methods courses

The following course fulfills the ANTHRO Major methods course requirement:

	Units
ANTHRO 91 Method and Evidence in Anthropology	5

Students choosing the Ecology, Environment and Evolution emphasis may substitute ANTHRO 91C which is not offered this year.

## Department Courses

Students should complete a minimum of 20 units from the courses listed below within their chosen emphases; 10 of these units must be numbered 100, or above. Departmental courses may fulfill the requirements for more than one emphasis. For example: with approval, an Archaeology course may fulfill a course needed to meet a course requirement in the Medical Anthropology emphasis. Undergraduates may also petition to the undergraduate committee for a self-designed emphasis in the Anthropology major.

	Units
<b>Archaeology Courses (58-70)</b>	
ANTHRO 3 Introduction to Prehistoric Archeology	3-5
ANTHRO 22 Archaeology of North America	3-5
ANTHRO 100A India's Forgotten Empire: The Rise and Fall of Indus Civilization	3
ANTHRO 100C Chavin de Huantar Research Seminar	2-5
ANTHRO 101 The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology	3-5
ANTHRO 101A Archaeology as a Profession	5
ANTHRO 105 Ancient Cities in the New World	3-5
ANTHRO 109 Archaeology: World Cultural Heritage	5
ANTHRO 110A Neandertals and Modern Humans: Origin, Evolution, Interactions	3
ANTHRO 111 Archaeology of Sex, Sexuality, and Gender	5
ANTHRO 113 Faunal Analysis: Animal Remains for the Archaeologist	5
ANTHRO 116 Data Analysis for Quantitative Research	5
ANTHRO 118 Heritage, Environment, and Sovereignty in Hawaii	4
ANTHRO 114 Prehistoric Stone Tools: Technology and Analysis	5
ANTHRO 140A Ethnographic Archaeologies	4-5
<b>Cultural &amp; Society Anthropology Courses (111-123)</b>	
ANTHRO 1 Introduction to Cultural and Social Anthropology	5
ANTHRO 4 Language and Culture	4-5

ANTHRO 12 Anthropology and Art	5
ANTHRO 19Q Hauntings, Visions, and Prophecy	1-3
ANTHRO 26N God and the Supernatural	3-5
ANTHRO 77 Japanese Society and Culture	5
ANTHRO 90B Theory of Cultural and Social Anthropology	5
ANTHRO 91 Method and Evidence in Anthropology	5
ANTHRO 119A Spirits, Selves, and the Social: Histories of Thinking about Religion	5
ANTHRO 121A Hip Hop, Youth Identities, and the Politics of Language	3-4
ANTHRO 123 Readings in Linguistic Anthropology	2
ANTHRO 124 Maya Mythology and the Popol Vuh	3-5
ANTHRO 125 Language and the Environment	3-4
ANTHRO 126 Urban Culture in Global Perspective	5
ANTHRO 127 City and Sounds	5
ANTHRO 127A Cities and the Future: Utopias, Dystopias, and Other Urbanisms to Come	3
ANTHRO 128 Visual Studies	5
ANTHRO 130B Introduction to GIS in Anthropology	5
ANTHRO 132 Religion and Politics in the Muslim World	5
ANTHRO 134 Object Lessons	5
ANTHRO 135 Cultural Studies	5
ANTHRO 135A The Anthropology of Security	3-5
ANTHRO 135I CSRE House Seminar: Race and Ethnicity at Stanford	1-2
ANTHRO 137 The Politics of Humanitarianism	5
ANTHRO 147 Nature, Culture, Heritage	5
ANTHRO 146A Anthropology of Youth	5
ANTHRO 149 South Asia: History, People, Politics	5
<b>Medical Anthropology Courses (44-56)</b>	
ANTHRO 6 Human Origins	5
ANTHRO 14 Introduction to Anthropological Genetics	3
ANTHRO 15 Sex and Gender	3
ANTHRO 82 Medical Anthropology	3-5
ANTHRO 175 Human Skeletal Anatomy	5
ANTHRO 178A Culture, Narrative, and Medicine	5
ANTHRO 179 Cultures of Disease: Cancer	5
ANTHRO 180 Science, Technology, and Gender	3-5
ANTHRO 181A Gender in the Middle East: Iran, Turkey, and Egypt	3-5
ANTHRO 182 An Anthropology of Annihilation: Tobacco at the Turn of the Millennium	3-5
ANTHRO 184 Spirituality and Healing	3-5
ANTHRO 185A Race and Biomedicine	3-5
<b>Ecology, Environment &amp; Evolution Anthropology Courses (74-88)</b>	
ANTHRO 31 Ecology, Evolution, and Human Health	3-5
ANTHRO 90C Theory of Ecological and Environmental Anthropology	5
ANTHRO 31 Ecology, Evolution, and Human Health	3-5
ANTHRO 121 Language and Prehistory	3-5
ANTHRO 130A Interpreting Space and Place: An Introduction to Mapmaking	5
ANTHRO 155 Research Methods in Ecological Anthropology	3-5
ANTHRO 153A Population and social trends in Japan	3-5
ANTHRO 163 Conservation and Evolutionary Ecology	5
ANTHRO 164B Anthropology of Tourism	5
ANTHRO 165 Parks and Peoples: The Benefits and Costs of Protected Area Conservation	5



ANTHRO 165A	People and Parks: Management of Protected Areas	5
ANTHRO 168	Everest: Expreme Anthropology	3
ANTHRO 168A	Risky Environments: The Nature of Disaster	5
ANTHRO 169	The Ecology of Cuisine: Food, Nutrition, and the Evolution of the Human Diet	3-5
ANTHRO 172	Seminar on Cultural Evolution and Coevolution	3-5
ANTHRO 173	Human Dimensions of Global Environmental Change: Resilence, Vulnerability, and Environmental Justice	3
ANTHRO 174	Beginnings of Social Complexity	5
ANTHRO 10SC	Darwin, Evolution, and Galapagos	2
ANTHRO 152A	Urban Poverty and Inequality in Contemporary China	5
<b>Senior Courses (4-13)</b>		
ANTHRO 95B	Directed Study in Honors and Senior Papers	1-10
ANTHRO 192	Capstone Course: Careers in Anthropology	3
<b>Senior Paper/Honors &amp; Research Courses (26-59)</b>		
ANTHRO 92A	Undergraduate Research Proposal Writing Workshop	2-3
ANTHRO 92B	Undergraduate Research Proposal Writing Workshop	2-3
ANTHRO 93	Prefield Research Seminar	5
ANTHRO 93B	Prefield Research Seminar: Non-Majors	5
ANTHRO 94	Postfield Research Seminar	5
ANTHRO 95	Research in Anthropology	1-10
ANTHRO 96	Directed Individual Study	1-10
ANTHRO 97	Internship in Anthropology	1-10
ANTHRO 98B	Digital Methods in Archaeology	3-5
ANTHRO 98F	Field School Training Workshop	1-3

## Plan of Study (example)

Please see the example Plan of Study grid below designed for an ANTHRO major beginning junior year (from 85 units). This sample course schedule details the courses needed to satisfy the requirements for the Culture & Society emphasis.

Junior	Units		
	Autumn	Winter	Spring
Language and Culture (ANTHRO 4)	4-5		
Medical Anthropology (ANTHRO 82)	3-5		
Method and Evidence in Anthropology (ANTHRO 91)	5		
Undergraduate Research Proposal Writing Workshop (ANTHRO 92A)	2-3		
Ancient Cities in the New World (ANTHRO 105)		3-5	
Object Lessons (ANTHRO 134)		5	
Cultural Studies (ANTHRO 135)		5	
Undergraduate Research Proposal Writing Workshop (ANTHRO 92B)		2-3	
The Politics of Humanitarianism (ANTHRO 137)			5
Prefield Research Seminar (ANTHRO 93)			5
Sex and Gender (ANTHRO 15)			3
Field School Training Workshop (ANTHRO 98F)			1-3
Year Total:	14-18	15-18	14-16

Senior	Units		
	Autumn	Winter	Spring
Ancient Civilizations: Complexity and Collapse (ANTHRO 102A)	3-5		
Prehistoric Stone Tools: Technology and Analysis (ANTHRO 114)	5		
Senior and Master's Paper Writing Workshop (ANTHRO 199)	1-2		
Postfield Research Seminar (ANTHRO 94)	5		
Hip Hop, Youth Identities, and the Politics of Language (ANTHRO 121A)		3-4	
Language and the Environment (ANTHRO 125)		3-4	
Object Lessons (ANTHRO 134)		5	
Directed Study in Honors and Senior Papers (ANTHRO 95B)			1-10
Capstone Course: Careers in Anthropology (ANTHRO 192)			3
Cultures of Disease: Cancer (ANTHRO 179)			5
Year Total:	14-17	11-13	9-18
<b>Total Units in Sequence:</b>			<b>77-100</b>

Courses may vary depending on the students chosen emphasis. The number of units needed to satisfy the ANTHRO major requirements may also vary depending on the student's current undergraduate status and units accomplished previous to declaration of the ANTHRO major.

## Research Courses

Courses listed are recommended for students writing a research paper in the major:

	Units	
ANTHRO 92A	Undergraduate Research Proposal Writing Workshop	2-3
ANTHRO 93B	Prefield Research Seminar: Non-Majors	5
ANTHRO 93	Prefield Research Seminar	5
ANTHRO 94	Postfield Research Seminar	5
ANTHRO 95	Research in Anthropology	1-10
Total Units		18-28

## Senior Courses

	Units	
ANTHRO 95B	Directed Study in Honors and Senior Papers	1-10
ANTHRO 192	Capstone Course: Careers in Anthropology	3

## Senior Paper

The senior paper program in Anthropology provides majors with the opportunity to conduct original research under the guidance of an Anthropology faculty member. All Anthropology majors are encouraged to write a senior paper. Interested Anthropology majors of junior standing may apply to the Senior Paper Program by submitting a senior paper application form, including a research topic/title of the proposed senior paper project, a two page abstract/proposal, and a letter of reference from their faculty adviser to the undergraduate student service specialist on or by February 15 in the junior year. Enrollment in ANTHRO 95 Research in Anthropology is recommended during Autumn and Winter quarters of the senior year. Students must enroll in ANTHRO 95B Directed Study in Honors and Senior Papers in the final quarter of the undergraduate degree program before graduating. The senior paper is submitted in the final quarter before

graduation. For more information, see the undergraduate student services specialist.

## Honors Program

The honors program in Anthropology provides eligible Anthropology majors with an opportunity to conduct original ethnographic, field, laboratory, or library-based research under the guidance of an Anthropology faculty member. All Anthropology majors are urged to consider applying to the Departmental Honors Program in Anthropology. Interested Anthropology majors of junior standing may apply for admission to the honors program by applying first in Axxess, submitting an honors program application form, including a research topic/title of the proposed honors project, a two page abstract/proposal, a transcript, and a letter of reference from the faculty or honors adviser, to the undergraduate student services specialist on or by February 15 in the junior year. Department majors are eligible to apply for honors candidacy with a 3.4 GPA in the major, a 3.0 GPA in overall course work, and with no more than one incomplete listed on the transcript at the time of application. Students must confirm honors eligibility status by the last day of the second week in May. If ineligible, students must withdraw their application to the honors program. Students interested in the honors program are encouraged to apply for Summer Quarter research funding through the Department of Anthropology, Undergraduate Advising and Research, and area studies centers. This process requires advanced planning as the Spring Quarter research deadline falls before the honors application due date. In most cases, honors students apply for such funding early in the junior year.

## Minor in Anthropology

To declare a minor in Anthropology, apply in Axxess for the Minor in Anthropology; contact the department's student peer adviser(s) or the undergraduate student services specialist to prepare the minor checklist and the minor planning form; submit the required forms to the undergraduate student services specialist; request a faculty adviser assignment; and meet with the assigned faculty adviser for approval of the minor checklist and planning form. These forms are available at <http://anthropology.stanford.edu>. Students must apply in Axxess for the B.A. Minor in Anthropology by the last day of the quarter at least two quarters before degree conferral.

Requirements for the minor in Anthropology include the following:

1. A faculty adviser appointed in the Department of Anthropology.
2. A program of 30 units, with a minimum grade of 'C':
  - Of the 30 units, 10 units may be approved from related areas of study, overseas studies, and transfer units.
    - *Note:* Any related, overseas studies, or transfer units must be approved by the faculty adviser and by petition to the Undergraduate Committee.
  - Of the 30 units, a minimum of 15 units must be ANTHRO courses numbered 100 or above.
  - No more than 5 units of directed reading-style course work may be counted towards the minor and may only be included among the 10 related units permitted for the minor.
  - No more than 5 units may be taken for a satisfactory/no credit grade.
3. A self-designed course of study chosen from an Anthropology emphasis listed below and approved by the faculty adviser:
  - Culture and Society
  - Ecology, Environment and Evolution
  - Medical Anthropology

4. A minimum grade of 'C' in two ANTHRO courses listed at the 100 level or higher and taught by Anthropology faculty.
5. At least two quarters of enrollment in the minor. Each candidate for the B.A. Minor in Anthropology should declare by the last day of the quarter at least two quarters before the quarter of degree conferral.

Advising milestones for the minor include the following:

1. In the quarter in which the minor is declared, the student must meet with his or her assigned adviser, create a rigorous course of study based on topical breadth, and obtain adviser approval for the checklist.
2. Any revisions to the initial checklist must be approved by the faculty adviser.
3. Undergraduate Anthropology minors must submit an updated minor checklist and planning form to the undergraduate student services specialist in the quarter before graduating.

## Coterminal Bachelor's and Master's Degrees in Anthropology

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

The University minimum requirements for the coterminal Bachelor's/Master's program include 180 units for the Bachelor's degree plus 45 (or higher departmental requirement, as determined by each graduate department) unduplicated units for the master's degree. The requirements for the coterminal program with dual undergraduate degrees include 225 units for the two Bachelor's degrees, and 45 units for the M.A. degree. For the 45-unit University minimum for the Master's degree, all courses must be at or above the 100 level and 50 percent must be courses designated primarily for graduate students (typically at least at the 200 level). Units for a given course may not be counted to meet the requirements for more than one degree, that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the M.A. degree.

Graduate enrollment at Stanford University for three consecutive quarters of full tuition for at least 45 units is required of all candidates for the coterminal M.A. degree. M.A. students in Anthropology must take a minimum of 45 units of Anthropology course work beyond the Undergraduate degree with an overall minimum grade point average of 3.0. 45 units constitute the University minimum for the M.A. degree, and courses must be at or above the 100 level.

The M.A. program usually requires more than one year of study. However, full-time students entering the program with appropriate background should complete the M.A. degree program within three consecutive calendar quarters after the student's first quarter of master's-level enrollment. The University allows no transfer units into the master's program. To provide a meaningful Master's program within one year, advance planning of course work with a faculty adviser is required. Requirements for the coterminal M.A. program must be completed within three years.

It is highly suggested by this department that a student, who accepts an offer of admission to the ANTHRO Coterminal Master's program, defers their Undergraduate B.A. conferral until the Graduate M.A. degree requirements have been completed. The student can then request to graduate in both the B.A. and M.A. simultaneously. Please see the Student Services Specialist for details.

For further information about the Department's coterminal M.A. degree program requirements, please consult the Department webpages .

## Admission to the Coterminal Master's Degree Program

The deadline for graduate applications to the coterminal M.A. degree program in Anthropology is December 11, 2012. Stanford University Undergraduate Majors are eligible to apply for the coterminal M.A. degree program if they have a 3.5 GPA in their Department Major, a 3.0 GPA in overall course work, and have no more than one incomplete listed on the transcript at the time of application. Successful applicants to the M.A. program may enter only in the following Autumn Quarter. Coterminal M.A. degree applicants are not required to submit their Graduate Record Examination scores. Additional coterminal M.A. degree program application procedures required by the Department. Please consult the Department webpages.

For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

## Degree Options

Students may pursue one of three possible department tracks in the Anthropology M.A. degree program. The tracks are:

- Archaeology
- Culture and Society
- Ecology and Environment

The tracks are not declarable in Axess.

## Master of Arts in Anthropology

University requirements for the terminal M.A. are described in the "Graduate Degrees" section of this bulletin.

The Department of Anthropology offers the terminal M.A. degree to the following:

1. Graduate applicants who apply from outside the University for admission to the terminal M.A. program in Anthropology.
2. Stanford graduate students, taking advanced degrees in other departments or schools at Stanford, who are admitted to the terminal M.A. program in Anthropology.
3. Anthropology Ph.D. students at Stanford University who fulfill the M.A. degree requirements on the way to the Ph.D. degree.

Graduate applicants who apply from outside the University and whose ultimate goal is the Ph.D. degree should apply directly to the Ph.D. degree program. Applicants who are offered admission to the terminal Masters degree program may not transfer to the Ph.D. degree program; they must reapply on the same basis as other Ph.D. applicants and in competition with the Ph.D. applicants.

Graduate applicants taking an advanced degree in other departments or schools at Stanford and who apply for admission to the M.A. in Anthropology should apply via the University Registrar Office of Graduate Admission Electronic Application.

Anthropology Ph.D. students choosing to take the M.A. in Anthropology on the way to the Ph.D. are also governed by separate requirements described in the Ph.D. Degree Program.

Graduate enrollment at Stanford University for three consecutive quarters of full tuition for at least 45 units is required of all candidates for the terminal master's degree. M.A. students in Anthropology must take a minimum of 45 units of Anthropology course work beyond the undergraduate degree with an overall grade point average of 3.0 or higher. 45 units constitute the

University minimum for the M.A. degree, and courses must be at or above the 100 level.

The M.A. program may require more than one year of study. However, full-time students entering the program with appropriate background should complete the M.A. degree program within three consecutive calendar quarters after the student's first quarter of master's-level enrollment. The University allows no transfer units into the master's program. To provide a meaningful master's program within one year, advance planning of course work with an adviser is required. Requirements for the terminal master's program must be completed within three years.

For further information about the Department's M.A. degree program requirements, please consult the Department webpages.

## Admission to the Master's Degree Program

The deadline for graduate applications to the M.A. degree program in Anthropology is December 11, 2012. Successful applicants to the M.A. program may enter only in the following Autumn Quarter. M.A. degree applicants must file a report of their Graduate Record Examination score electronically. Additional terminal M.A. degree program application procedures required by the Department. Please consult the Department webpages.

No financial support is available to students enrolled for the M.A. degree.

## Degree Options

Students may pursue one of three possible department tracks in the Anthropology M.A. degree program. The tracks are:

- Archaeology
- Culture and Society
- Ecology and Environment

The tracks are not declarable in Axess.

## Degree Requirements

Requirements for the coterminal and terminal master's degree program include the following:

1. A faculty adviser appointed in the Department of Anthropology.
2. A program of 45 units, taken at the 100 level or higher with a minimum grade of 'B'. *Note:* At least 23 of the 45 units must be taken at the 200/300 level.
  - of the 45 units, no more than 15 units may be approved from related areas of study or overseas studies.
  - of the 45 units, no more than 10 units of directed reading-style course work may be counted towards the degree.
  - of the 45 units, no more than 5 units may be taken for a satisfactory/no credit grade.
3. A minimum grade of 'B' in an ANTHRO theory course from the chosen track.
4. A minimum grade of 'B' in an ANTHRO methods course from the chosen track. During 2012-2013, ANTHRO 306. Anthropological Research Methods is not given. Student's seeking to fulfill the Department's requirement for methods training may petition the graduate committee for an alternate way (ie other course or training) to fulfill the Department methods requirement.
5. A minimum grade of 'B' in four ANTHRO review courses from the chosen track that are listed at the 200 level or higher, and taught by Anthropology faculty, and taken as a five unit course.
6. A self-designed plan of study chosen from the Anthropology tracks listed below:
  - Archaeology

- Culture and Society
- Ecology and Environment

7. Submission of a *graduate report of degree progress form* and a field research, laboratory research or library-based paper proposal approved by the faculty adviser by the last day of the first quarter of the Master's degree program.
8. Submission of a University *master's degree program proposal form* approved by the faculty adviser by the last day of the first quarter of the Master's degree program.
9. Presentation of the Master's research project at the Department's Master's (Honors) presentation event in Spring Quarter - optional.
10. Submission of the Master's paper reviewed by two faculty members (advisor and reader). For the Culture and Society track, the thesis can be a field research or library-based research paper. For the Archaeology and the Ecology and Environment tracks, the thesis can also be a laboratory research paper.

## Required Courses

		Units
<b>Archaeology Track (10)</b>		
Four departmental review courses which must include:		
ANTHRO 303	Introduction to Archaeological Theory	5
One additional theory course		
ANTHRO 307	Archaeological Methods and Research Design (or comparable, approved 200 level course)	5
<b>Culture and Society Track (15)</b>		
Four departmental review courses which must include:		
ANTHRO 301	History of Anthropological Theory, Culture and Society	5
ANTHRO 300	Reading Theory Through Ethnography	5
ANTHRO 306	Anthropological Research Methods	5
<b>Ecology and Environment Track (10)</b>		
Four departmental review courses which must include:		
ANTHRO 302	History of Anthropological Theory, Ecology and Environment (or comparable, approved 200 level course)	5
ANTHRO 305	Research Methods in Ecological Anthropology (or comparable, approved 200 level course)	5

## Recommended Courses

For all tracks, attendance at the Departmental colloquium each quarter is recommended for all Master's students. Students may enroll in the following course for additional units.

ANTHRO 444	Anthropology Colloquium: Graduate Seminar	1
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## Doctor of Philosophy in Anthropology

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

### Admission

The deadline for graduate application to the Ph.D. degree program is December 11, 2012. Successful applicants for the Ph.D. program may enter only in Autumn Quarter. It is Department of Anthropology policy not to defer graduate admission. Additional Ph.D. application procedures required by the Department. Please consult the Department webpages.

## Financial Support

The Department endeavors to provide needed financial support (through fellowships, teaching and research assistantships, and tuition grants) to all students admitted to the Ph.D. who maintain satisfactory degree progress in years one through five of the Ph.D. San Francisco Bay Area residency during each Autumn, Winter and Spring quarter in academic cohort years one through five is required for approval of Department funding in each of these quarters.

First-year students who have not obtained a graduate degree previous to entering the Ph.D., and who have not obtained extramural funding previous to entering the Ph.D., are required to submit one extramural funding application in support of graduate doctoral training (for example, funding support for training during the first three years of the Ph.D. degree program) by the first day of finals week in the Autumn Quarter of the first year. First year students must submit the Department's graduate report of degree progress form on or by May 15th. First-year students who have not secured funding for the Summer Quarter in support of pre-dissertation field research, are required to make at least two pre-dissertation field research funding applications to be eligible for the Department first year summer funding support program (dependent on availability of funding). Advanced planning is required in order to meet funding application deadlines for summer support.

Second-year students are required to complete one or more full time quarterly teaching assistant assignments. In order to be eligible for a predoctoral research assistantship in support of summer field research, second-year students must submit the Department graduate report of degree progress form and research proposal on or by May 15th.

Third-year students must pass the Department qualifying examinations and receive Department approval by the dissertation reading committee for the dissertation proposal. Third-year students who have not secured fourth-year field research funding are required to make at least three extramural funding applications to support dissertation research by the end of Autumn Quarter of the third year. Advanced planning is required in order to meet funding application deadlines for dissertation research funding support. If receiving Department funding for fourth year field research, third-year students must submit the graduate student informed agreement for department funding support form before leaving to conduct field research.

While in the field, fourth year students make quarterly reports of their dissertation research progress to the dissertation reading committee via email. Fourth year students returning from the field must submit the Department's graduate report of degree progress form to establish eligibility for fifth year funding on or by May 15th.

Fifth-year students are required to complete one or more full time quarterly teaching assistantship assignments. Fifth-year students who have not secured extramural funding for the sixth year are required to make at least two dissertation write-up funding applications to secure extramural or intramural funding for dissertation write-up in order to be eligible for consideration of a department teaching affiliateship in the sixth year. During the fifth year and after returning from field research, students confirm Bay Area residency to be eligible for Department fifth-year dissertation writing funds. Eligibility for Department support is based on seminar attendance as well as on Bay Area residency (the Bay Area is defined as Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, or Sonoma counties)..

### Program

The Ph.D. in Anthropology allows the student to develop a flexible program reflecting special research interests, under the supervision of a faculty committee, chosen by the student. Students are encouraged to plan for completion of all work for the Ph.D. in five years. Matriculation in the PhD is full-time, only. In order to be eligible for Department and intramural support, students must reside locally through the Autumn, Winter and Spring Quarters of the academic years one through five. Note: The University oral examination may be scheduled in the fifth year or

beyond depending upon a student's dissertation completion progress. Ph.D. students in Anthropology must complete a minimum of 135 quarter units with a minimum grade point average (GPA) of 3.0 (B). The maximum allowable number of transfer units is 45.

## Degree Options

Students may pursue three different tracks in the Anthropology Ph.D. degree program. The tracks are not declarable in axes and do not appear on the transcript or the diploma. The three tracks are:

- Archaeology
- Culture and Society
- Ecology and Environment.

## Degree Requirements

For students who matriculate beginning 2012-13, the requirements for the doctoral degree program include the following:

1. For the first year in the degree program, students must submit a first year plan of study form detailing the courses, by quarter, to be taken in the first year of the Ph.D. The plan of study form should be signed by the assigned faculty adviser by the first day of Autumn Quarter. The plan of study form also confirms the Department track: Archaeology, Culture and Society, or Ecology and Environment.
2. Within the first two years, pass with a minimum grade of 'B+', six graduate level ANTHRO subject code Department review courses appropriate to the student's chosen track.
3. In the first year of the program:
  - A. pass with a minimum grade of 'B+' the theory course(s) appropriate for the chosen track in Archaeology, Culture and Society, and Ecology and Environment:

		Units
<b>Archaeology track (5)</b>		
ANTHRO 303	Introduction to Archaeological Theory	5
<b>Culture and Society track (15)</b>		
ANTHRO 300	Reading Theory Through Ethnography	5
ANTHRO 301	History of Anthropological Theory, Culture and Society	5
ANTHRO 301A	Foundations of Social Theory	5
<b>Ecology and Environment track (5)</b>		
ANTHRO 302	History of Anthropological Theory, Ecology and Environment (or comparable, approved course at the ANTHRO 200 level)	5

- B. pass with a minimum grade of 'B+' at least one track-designated methods course:

		Units
<b>Archaeology track (5)</b>		
ANTHRO 307	Archaeological Methods and Research Design	5
(may be taken in either the first or second year of the PhD degree program)		
<b>Ecology and Environment track (0)</b>		
Within the first year, pass at least one of two required methods courses:		
ANTHRO 304	Data Analysis for Quantitative Research	

ANTHRO 305	Research Methods in Ecological Anthropology
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Or comparable, approved courses at the ANTHRO 200 level

- C. complete at least 45 units overall by the end of Spring Quarter in the first year.
  - D. satisfy the Department ethics requirement for review of ethics in Anthropology by attending the Department ethics workshop in Spring Quarter (all tracks).
  - E. enroll in ANTHRO 310G Introduction to Graduate Studies during Autumn Quarter (all tracks).
  - F. Culture and Society track students only enroll in ANTHRO 311G Introduction to Culture and Society Graduate Studies in Anthropology during Winter and Spring quarters for 1-2 units (no more than 5 units total over two quarters).
  - G. enroll in ANTHRO 444 Anthropology Colloquium: Graduate Seminar and attend the Departmental colloquia series each quarter.
  - H. submit a graduate report of degree progress form and research proposal to the faculty adviser and the graduate committee on or by May 15th in Spring Quarter of the first year. Receive final approval for the pre-dissertation research proposal from the adviser and the graduate committee by the first day of finals week in Spring Quarter.
    - I. submit at least one extramural funding applications within the first year (deadlines are usually early Autumn Quarter and advanced planning is required).
    - J. to be eligible for Summer Quarter funding support, submit at least two intramural or extramural summer research funding proposals (deadlines are usually early Winter Quarter and advanced planning is required).
  - K. complete the appropriate CITI tutorial for non-medical human subjects, and, either submit a non-medical human subjects protocol, based on the pre-dissertation research proposal, to the Institutional Review Board before departing for summer field research in the first year, or confirm approval for exemption status. Alternately, a notice of determination may be confirmed with the Institutional Review Board for a pilot study proposal that does not require protocol submission.
  - L. complete the appropriate CITI tutorial for Responsible Conduct of Research on or by May 15th in Spring Quarter.
  - M. submit the First-year pre-dissertation summer funding petition on or by May 15th in Spring Quarter.
  - N. upon completion of the above requirements and with recommendation from the faculty advisor and Department chair, request the Masters degree 'on the way to the Ph.D.' by the first day of final week in Spring Quarter, if desired.
4. In the second year:
    - A. Culture and Society track, only - pass the research methods course:

ANTHRO 306	Anthropological Research Methods	5
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    - B.
 

ANTHRO 306	Anthropological Research Methods	5
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    - C. as required by the chosen track, pass with a minimum grade of 'B+' ANTHRO 308, Proposal Writing Seminar (offered Spring Quarter). For all tracks, submit the pre-dissertation proposal to the assigned faculty adviser and the graduate committee by the first day of finals week in Spring Quarter. Receive approval for the draft proposal for the purpose of the second year summer pre-dissertation research from the adviser and the graduate committee before departing for field research.

- D. complete at least 40 units of course work in the second year and a total of at least 50 units overall including the summer quarter directed reading units. Student must have completed a total of 95 units overall by the end of the second year.
- E. pass with a minimum grade of 'B+' remaining ANTHRO subject code review courses to complete the six course requirement.
- F. Ecology and Environment track, only: pass the second of two required methods courses, if not completed in the first year:
- G.
- |            |   | Units |
|------------|---|-------|
| ANTHRO 304 | Data Analysis for Quantitative Research     | 5     |
| ANTHRO 305 | Research Methods in Ecological Anthropology | 5     |
- Or comparable, approved courses at the ANTHRO 200 level
- H. As scheduled by the Department, attend the teaching assistant training workshop (to be scheduled during the week before the first day of Autumn Quarter).
- I. complete one or more full time quarterly teaching assistant assignments in the second year.
- J. submit a second-year graduate report of degree progress form and research proposal on or by May 15th in Spring Quarter. Receive approvals from the assigned faculty adviser and the graduate committee by the first day of finals week in Spring Quarter.
- K. by the first day of finals week in Winter Quarter, confirm the qualifying examination committee advisor for each examination committee (i.e. one committee for AREA and one committee for TOPIC) to the Department graduate committee.
- L. by the first day of finals week in Winter Quarter (for those whose native language is English), either pass a foreign research or field language exam, or petition the Department's language committee for exemption from a foreign research or field language examination (based on a description of previous field or research language training). For those whose native language is not English, demonstrate satisfactory command of the English language, as evidenced by completion of the first two years of graduate study and a petition to the language committee.
- M. upon completion of the above requirements and the recommendation of the Anthropology faculty, petition the University for candidacy using the University application for candidacy for doctoral degree form by the first day of finals week in Winter Quarter.
5. In the third year, complete the following:
- A. by the last day of the third week of Autumn Quarter, confirm the committee reader for each of the qualifying examination committees (i.e. one committee for AREA and one committee for TOPIC) to the Department graduate committee .
- B. by the first day of finals week in Autumn Quarter, submit three dissertation research grant proposals (i.e. the grant application, and the approved non-medical human subjects protocol) to the faculty adviser for approval. In order to be eligible for fourth year field research funding support, submit approved extramural funding proposals (i.e. comparable to the NSF dissertation research improvement grant application) to three funding agencies .
- C. by the first day of finals week in Autumn Quarter, confirm the dissertation reading committee by submitting the University dissertation reading committee form to the graduate committee.

- D. by the last day of third week in Winter Quarter, submit the third year report of qualifying examination status form to the graduate committee reaffirming committee formulation, confirming the exam dates, preliminary qualifying bibliographies, and the proposed question set for each examination.
- E. by the first day of finals week in Winter Quarter, complete the qualifying examinations for area and for topic (two separate examinations to be scheduled one week apart), inclusive of the final bibliographies.
- F. by the last day of the second week in Spring Quarter, submit a draft of the dissertation proposal to the dissertation reading committee and schedule a meeting with the dissertation reading committee members for review of the proposal.
- G. on or by May 15th in Spring Quarter, meet with the dissertation reading committee to review the dissertation proposal.
- H. by the first day of finals week in Spring Quarter, submit the approved dissertation proposal to the graduate committee.
- I. before departing for field research, receive approval for the non-medical human subjects protocol from the Institutional Review Board.
6. In the fourth year, complete the following requirements:
- A. by the first day of finals week in the Autumn, Winter and Spring Quarters, submit a quarterly report of dissertation field research via email to the dissertation reading committee.
- B. submit a fourth-year graduate report of degree progress form to the graduate committee on or by May 15th in the Spring Quarter.
7. In the fifth year, complete the following requirements:
- A. during the fifth year and after returning from field research, confirm Bay Area residency to be eligible for Department fifth-year dissertation writing funds. Eligibility for Department support is based on seminar attendance as well as on Bay Area residency (the Bay Area is defined as Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, or Sonoma counties).
- B. during the fifth year and after returning from field research, complete one or more quarterly full time teaching assistant assignments in the Department.
- C. during Autumn, Winter, Spring Quarters in the fifth year, students attend a minimum of four out of five class meetings of ANTHRO 400 Dissertation Writers Seminar (required of Culture and Society track, only; and, recommended for the Archaeology and the Ecology and Environment tracks). Each quarter, chapter drafts of the dissertations must be handed in to the dissertation reading committee for review.
- D. submit the fifth year dissertation writers report of dissertation progress to completion form by the last day of finals week in the Autumn, Winter and Spring Quarters.
8. In the fifth year or beyond, complete the following requirements:
- A. submit a penultimate draft of the dissertation by the last day of the first week of the quarter preceding the quarter in which the university required oral examination (i.e. defense of dissertation) has been scheduled, and the dissertation is to be submitted for conferral of degree.
- B. at least four weeks prior to a proposed date for the oral examination (i.e. dissertation defense), submit the oral examination schedule form and a final draft of the dissertation, approved by the dissertation reading committee, to the graduate committee.

- C. pass the oral examination (i.e. defense of dissertation), inclusive of an oral presentation held at the beginning of the oral examination period (i.e. approximately 30 minute public presentation with a 15 minute public discussion period preceding a closed session with the oral examination committee, only), prior to the final submission of the dissertation to the University registrar and the conferral of the doctoral degree.

2. Enlist a faculty member within the Department of Anthropology who provides written consent to serve as the adviser for the Ph.D. Minor and serve on the student's oral examination and dissertation committees.
3. With the faculty adviser, determine a coherent plan and submit the plan of study form for the Ph.D. Minor.
4. Pass with a minimum grade of 'B+' three ANTHRO theory courses, and one ANTHRO course in a geographical or theoretical area.

For additional information regarding the Ph.D. Minor in Anthropology, please consult the Department webpages.

*Emeriti: (Professors)* Clifford R. Barnett, Harumi Befu, George A. Collier, Jane F. Collier, Carol Delaney, Charles O. Frake, James L. Gibbs, Jr., Renato I. Rosaldo, Robert B. Textor

*Chair:* James Ferguson

*Professors:* Lisa Curran, William H. Durham, James Ferguson, Thomas Blom Hansen, Ian Hodder, Richard G. Klein, Tanya Luhmann, Lynn Meskell, Sylvia J. Yanagisako

*Associate Professors:* Rebecca Bliege Bird, Paulla Ebron, James A. Fox, Duana Fullwiley, Miyako Inoue, S. Lochlann Jain, James Holland Jones, Matthew Kohrman (on leave), Liisa Malkki, John W. Rick, Barbara Voss

*Assistant Professors:* Angela Garcia, Ian G. Robertson, Krish Seetah, Kabir Tambar

*Associate Professors (Teaching):* Michael V. Wilcox

*Senior Research Scientist/Lecturers:* Douglas W. Bird

*Courtesy Professors:* H. Samy Alim, Penelope Eckert, Raymond McDermott

*Visiting Professors:* James Clifford, Andres Laguens, Liliana Suarez-Navaz,

*Visiting Associate Professors:* Ewa Domanska, Efstratios Nanoglou

*Visiting Assistant Professors:* Sharika Thiranagama

*Lecturers:* Kathleen Coll, Claudia Engel, Raven Garvey, Cari Kapur, Alma Kunanbaeva, Stephen Murphy-Shigematsu, Katrinka Reinhart

*Affiliated Faculty:* Li Liu, Richard White

*Postdoctoral Fellows:* Ayca Alemdaroglu, Melissa Baird, Carter Hunt, Jocelyn Marrow, Lindsay Weiss, Brian Wood

*Teaching Affiliates:* Jesse Davie-Kessler, Curtis Murungi, Angel Roque

## Required Courses

### Archaeology Track

	Units
ANTHRO 303 Introduction to Archaeological Theory	5
ANTHRO 307 Archaeological Methods and Research Design	5
ANTHRO 308 Proposal Writing Seminar (Recommended)	5
ANTHRO 310G Introduction to Graduate Studies	2
ANTHRO 444 Anthropology Colloquium: Graduate Seminar	1
<b>Total Units</b>	<b>18</b>

### Culture and Society Track

	Units
ANTHRO 300 Reading Theory Through Ethnography	5
ANTHRO 301 History of Anthropological Theory, Culture and Society	5
ANTHRO 301A Foundations of Social Theory	5
ANTHRO 306 Anthropological Research Methods (not given in 2012-13)	5
ANTHRO 308 Proposal Writing Seminar	5
ANTHRO 310G Introduction to Graduate Studies	2
ANTHRO 311G Introduction to Culture and Society Graduate Studies in Anthropology	2
ANTHRO 444 Anthropology Colloquium: Graduate Seminar	1
<b>Total Units</b>	<b>30</b>

### Ecology and Environment Track

	Units
ANTHRO 302 History of Anthropological Theory, Ecology and Environment	5
ANTHRO 304 Data Analysis for Quantitative Research (Or comparable, approved courses at the ANTHRO 200 level)	5
Or comparable, approved courses at the ANTHRO 200 level	
ANTHRO 305 Research Methods in Ecological Anthropology (Or comparable, approved courses at the ANTHRO 200 level)	5
Or comparable, approved courses at the ANTHRO 200 level	
ANTHRO 310G Introduction to Graduate Studies	2
ANTHRO 444 Anthropology Colloquium: Graduate Seminar	1
<b>Total Units</b>	<b>18</b>

## Ph.D. Minor in Anthropology

The requirements for a Ph.D. Minor in Anthropology include the following:

1. Complete 30 units of ANTHRO subject code courses at the 300 level, each course with a minimum (GPA) of 3.0 (B).

## Overseas Studies Courses in Anthropology

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/anthropology/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/anthropology/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/anthropology/http://bosp.stanford.edu>).

		<b>Units</b>
OSPCPTWN 36	The Archaeology of Southern African Hunter Gatherers	4
OSPOXFRD 43	Anthropology, Material Culture, and the Meanings of Space	4
OSPOXFRD 52	The Education of Immigrant and Minority Populations in England	4-5

# Applied Physics

Courses offered by the Department of Applied Physics are listed under the subject code APPPHYS on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=APPPHYS&filter-catalognumber-APPPHYS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=APPPHYS&filter-catalognumber-APPPHYS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=APPPHYS&filter-catalognumber-APPPHYS=on>).

The Department of Applied Physics offers qualified students with backgrounds in physics or engineering the opportunity to do graduate course work and research in the physics relevant to technical applications and natural phenomena. These areas include accelerator physics, biophysics, condensed matter physics, nanostructured materials, quantum electronics and photonics, quantum optics and quantum information, space science and astrophysics, synchrotron radiation and applications. Student research is supervised by the faculty members listed above and also by various members of other departments such as Biology, Chemistry, Electrical Engineering, Materials Science and Engineering, Physics, the SLAC National Accelerator Laboratory, and faculty of the Medical School who are engaged in related research fields. Research activities are carried out in laboratories including the Geballe Laboratory for Advanced Materials, the Edward L. Ginzton Laboratory, the Hansen Experimental Physics Laboratory, the SLAC National Accelerator Laboratory, the Center for Probing the Nanoscale, and the Stanford Institute for Materials and Energy Science.

The number of graduate students admitted to Applied Physics is limited. Applications should be received by December 18, 2012. Graduate students normally enter the department only in Autumn Quarter.

## Graduate Programs in Applied Physics

Admission requirements for graduate work in Applied Physics include a bachelor's degree in Physics or an equivalent engineering degree. Students entering the program from an engineering curriculum should expect to spend at least an additional quarter of study acquiring the background to meet the requirements for advanced degrees in Applied Physics.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Applied Physics and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis

in Applied Physics. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Applied Physics and to interpret and present the results of such research.

## Master of Science in Applied Physics

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The minimum requirements for the degree are 45 units, of which at least 39 units must be graduate-level courses in applied physics, engineering, mathematics, and physics. The required program consists of the following:

1. Courses in Physics and Mathematics to overcome deficiencies, if any, in undergraduate preparation.
2. Basic graduate courses (letter grade required):
- 3.

	<b>Units</b>
Advanced Mechanics	
Select one of the following:	3
PHYSICS 210    Advanced Mechanics	
PHYSICS 211    Continuum Mechanics (approved substitute)	
Electrodynamics	3
PHYSICS 220    Classical Electrodynamics	
Quantum Mechanics	6
Select two of the following:	
PHYSICS 230    Quantum Mechanics	
PHYSICS 231    Quantum Mechanics	
PHYSICS 330    Quantum Field Theory I (approved substitute)	
PHYSICS 331    Quantum Field Theory II (approved substitute)	
PHYSICS 332    Quantum Field Theory III (approved substitute)	

4. 33 units of additional advanced courses in science and/or engineering. At least 18 of these 33 units must be taken for a letter grade.

5. **Units**

18 of the 33 units may be any combination of:

Advanced courses	
APPPHYS 290	Directed Studies in Applied Physics
1-unit seminar courses	
Examples of suitable courses include:	
BIO 217	Neuronal Biophysics
EE 222	Applied Quantum Mechanics I
EE 223	Applied Quantum Mechanics II
EE 231	Introduction to Lasers
EE 232	Laser Dynamics
EE 248	Fundamentals of Noise Processes
EE 268	Introduction to Modern Optics
EE 346	Introduction to Nonlinear Optics



PHYSICS Condensed Matter Theory I  
372

PHYSICS Condensed Matter Theory II  
373

6. A final overall grade point average (GPA) of 3.0 (B) is required for courses used to fulfill degree requirements.

There are no department or University examinations, and a thesis is not required. If a student is admitted to the M.S. program only, but later wishes to change to the Ph.D. program, the student must apply to the department's admissions committee.

## Doctor of Philosophy in Applied Physics

The University's basic requirements for the Ph.D. including residency, dissertation, and examinations are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The program leading to a Ph.D. in Applied Physics consists of course work, research, qualifying for Ph.D. candidacy, a research progress report, a University oral examination, and a dissertation as follows:

1. *Course Work:*

- A. Courses in Physics and Mathematics to overcome deficiencies, if any, in undergraduate preparation.
- B. *Basic graduate courses:* These requirements may be totally or partly satisfied with equivalent courses taken elsewhere, pending the approval of the graduate study committee. Letter grades required for all courses:

C.	Units
Advanced Mechanics	3
Select one of the following:	
PHYSICS Advanced Mechanics 210	
PHYSICS Continuum Mechanics (approved substitute) 211	
Statistical Physics	3-4
Select one of the following:	
APPPHYS Estimation and Control Methods for 217 Applied Physics	
APPPHYS Stochastic and Nonlinear Dynamics 223	
APPPHYS Physics of Disordered Systems 285	
APPPHYS Methods in Computational Biology 315	
APPPHYS Quantum Optics and Measurements 387	
Electrodynamics	3
PHYSICS Classical Electrodynamics 220	
Quantum Mechanics	6
Select two of the following:	
PHYSICS Quantum Mechanics 230	
PHYSICS Quantum Mechanics 231	
PHYSICS Quantum Field Theory I (approved substitute) 330	

PHYSICS Quantum Field Theory II (approved  
substitute)  
331

PHYSICS Quantum Field Theory III (approved  
substitute)  
332

Laboratory 3-4

Select one of the following:

APPPHYS Laboratory Electronics  
207

APPPHYS Laboratory Electronics  
208

APPPHYS Advanced Imaging Lab in Biophysics  
232

APPPHYS Lasers Laboratory  
304

APPPHYS Advanced Nonlinear Optics Laboratory  
305

BIOE 370 Microfluidic Device Laboratory

EE 234 Photonics Laboratory

EE 410 Integrated Circuit Fabrication Laboratory

MATSCI Nanocharacterization Laboratory  
171

MATSCI Mechanical Behavior Laboratory  
173

PHYSICS Astrophysics Laboratory  
301

- D. 21 units of additional advanced courses in science and/or engineering. Units from APPPHYS 290, APPPHYS 390, and any 1-unit courses do not count towards this requirement. Examples of suitable courses include:

E.	Units
BIO 217 Neuronal Biophysics	4
EE 222 Applied Quantum Mechanics I	3
EE 223 Applied Quantum Mechanics II	3
EE 231 Introduction to Lasers	3
EE 232 Laser Dynamics	3
EE 248 Fundamentals of Noise Processes	3
EE 268 Introduction to Modern Optics	3
EE 346 Introduction to Nonlinear Optics	3
PHYSICS 372 Condensed Matter Theory I	3
PHYSICS 373 Condensed Matter Theory II	3

- F. Only 3 units at the 300 or above level may be taken on a satisfactory/no credit basis.
- G. Additional units of courses as needed to meet the minimum residency requirement of 135. Directed study and research units as well as 1-unit seminar courses can be included.
- H. A final average overall grade point average (GPA) of 3.0 (B) is required for courses used to fulfill degree requirements.
- I. Students are normally expected to complete the specified course requirements by the end of their third year of graduate study.
2. *Research:* may be conducted in a science/engineering field under the supervision of a member of the Applied Physics faculty or appropriate faculty from other departments.
3. *Ph.D. Candidacy:* satisfactory progress in academic and research work, together with passing the Ph.D. candidacy qualifying examination, qualifies the student to apply for Ph.D. candidacy, and must be completed before the third year of graduate registration. The examination consists of a seminar on a suitable subject delivered

by the student before the faculty academic adviser (or an approved substitute) and two other members of the faculty selected by the department.

4. *Research Progress Report*: normally before the end of the Winter Quarter of the fourth year of enrollment in graduate study at Stanford, the student arranges to give an oral research progress report of approximately 45 minutes, of which a minimum of 15 minutes should be devoted to questions from the Ph.D. reading committee.
5. *University Ph.D. Oral Examination*: consists of a public seminar in defense of the dissertation, followed by private questioning of the candidate by the University examining committee.
6. *Dissertation*: must be approved and signed by the Ph.D. reading committee.

*Emeriti*: (Professors) Malcolm R. Beasley, Arthur Bienenstock, Steven Chu, Alexander L. Fetter, Theodore H. Geballe, Stephen E. Harris, Walter A. Harrison, Peter A. Sturrock; (Professors, Research) Calvin F. Quate, Helmut Wiedemann, Herman Winick; (Courtesy) Gordon S. Kino, Douglas D. Osheroff

*Chair*: Hideo Mabuchi

*Professors*: Steven M. Block, Philip H. Bucksbaum, Robert L. Byer, Sebastian Doniach, Martin M. Fejer, Daniel S. Fisher, Harold Y. Hwang, Aharon Kapitulnik, Mark A. Kasevich, Hideo Mabuchi, Kathryn A. Moler, Vahé Petrosian, Stephen R. Quake, Zhi-Xun Shen, Yuri Suzuki, Yoshihisa Yamamoto

*Associate Professors*: Ian R. Fisher, David A. Reis, Mark J. Schnitzer

*Assistant Professors*: Surya Ganguli, Benjamin L. Lev

*Professor (Research)*: Michel J-F. Dignonnet

*Courtesy Professors*: Bruce M. Clemens, James S. Harris, Lambertus Hesselink, David A. B. Miller, W. E. Moerner, Shoucheng Zhang

*Consulting Professors*: Thomas M. Baer, Raymond G. Beausoleil, John D. Fox, Bernardo A. Huberman, Richard M. Martin, Stuart S. P. Parkin, Daniel Rugar

## Archaeology

Courses offered by the Archaeology Program are listed under the subject code ARCHLGY on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ARCHLGY&filter-catalognumber-ARCHLGY=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ARCHLGY&filter-catalognumber-ARCHLGY=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ARCHLGY&filter-catalognumber-ARCHLGY=on>).

Archaeology is the study of the past through its material remains that survive into the present. Archaeology is a discipline that offers direct access to the experiences of a wide range of people in numerous cultures across the globe. Increasingly, archaeology bridges past and present societies through the study of the human heritage and its role in contemporary societies. Stanford's Archaeology Program provides students with an interdisciplinary approach to the material remains of past societies, drawing in equal parts on the humanities, social sciences, and natural sciences.

The Archaeology curriculum draws on faculty from a wide range of University departments and schools. To complete the requirements for the major, students must take courses from the offerings of the program and from the listings of other University departments. The program culminates in a Bachelor of Arts (B.A.) in Archaeology.

## Mission of the Undergraduate Program in Archaeology

The mission of the undergraduate program in Archaeology is to provide students with a broad and rigorous introduction to the analysis of the material culture of past societies, drawing on the questions and methods of the humanities, social sciences, and natural sciences. Students in the major learn to relate these analyses to the practice of archaeology in the contemporary world. The program seeks to help each student achieve a high level of understanding through concentrated study of a particular research area. Courses in the major complete a comprehensive curriculum that draws on faculty from a wide range of University departments and programs. Archaeology majors are well prepared for advanced training in professional schools such as education, law, and journalism and, depending upon their choice of upper-division course, graduate programs in the humanities, social sciences, and natural sciences.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. demonstrate an understanding of core knowledge of the history of thought and basic theoretical foundations in archaeology.
2. write clearly and persuasively, communicating ideas about archaeology to multiple audiences and different communities, from the scholarly and to the general public in a variety of formats.
3. learn about the development of archaeology as a discipline and the major trends that have influenced thinking and writing about archaeology today.
4. demonstrate their mastery of the broad historical and theoretical trends in the field through critique of research within archaeology.

## Bachelor of Arts in Archaeology

To declare a major in Archaeology, students should apply for the B.A. in Archaeology on AxBESS and contact the student services specialist, who provides an application form, answers initial questions, and helps the student choose a faculty adviser and area of concentration. All majors must complete 65 units, which must form a coherent program of study and be approved by the student's faculty adviser and the program director.

Students who plan to pursue graduate work in Archaeology should be aware of the admission requirements of the particular departments to which they intend to apply. These vary greatly. Early planning is advisable to guarantee completion of major and graduate school requirements.

## Degree Requirements

The B.A. in Archaeology requires a minimum of 65 units in the major, divided among five components:

## 1. Core Courses (20 units)

		Units
ARCHLGY 1	Introduction to Prehistoric Archeology (Gateway)	3-5
ARCHLGY 102	Archaeological Methods (Intermediate)	5
ARCHLGY 103	History of Archaeological Thought (Intermediate)	5
ARCHLGY 107A	Archaeology as a Profession (Capstone)	5

ARCHLGY 1 Introduction to Prehistoric Archeology is recommended as a first course, and many upper-level courses in Archaeology require this course as a prerequisite. Students should normally take the capstone course in their final year of course work in the major.

## 2. Analytical Methods and Computing (at least 3-5 units)

Quantitative skills and computing ability are indispensable to archaeologists. It is recommended that students take:

		Units
Select one of the following:		
ANTHRO 98B	Digital Methods in Archaeology (recommended)	5
PSYCH 10/STATS 60	Introduction to Statistical Methods: Precalculus	
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	

## 3. Archaeological Skills (at least 10 units)

Archaeological skills include archaeological formation processes, botanical analysis, cartography, ceramic analysis, dating methods, faunal analysis, geographic information systems, geology, geophysics, genetics, osteology, remote sensing, soil chemistry, and statistics. With the approval of the instructor and Archaeology director, undergraduates may fulfill part of this requirement from graduate-level courses (typically courses with catalog numbers of 200 or higher).

		Units
ARCHLGY 55	Introduction to Archaeobotany	5
ANTHRO 98B	Digital Methods in Archaeology	5
ARCHLGY 106A	Museums and Collections	5
ANTHRO 116	Data Analysis for Quantitative Research	5
ANTHRO 119	Zooarchaeology: An Introduction to Faunal Remains	5
ARCHLGY 124	Archaeology of Food: production, consumption and ritual	3-5
ARCHLGY 127	Introduction to bioarchaeological Method and Theory	3-5
ANTHRO 175	Human Skeletal Anatomy	5
BIO 8N	Human Evolution	3
EESS 161	Statistical Methods for the Earth and Environmental Sciences: Geostatistics	4
EESS 164	Fundamentals of Geographic Information Science (GIS)	4

GES 1A	Introduction to Geology: The Physical Science of the Earth	5
GES 102	Earth Materials: Introduction to Mineralogy	3

## 4. Theory (at least 10 units)

Topics include archaeological, art-historical, sociocultural, historical, and material culture theory. With the approval of the instructor, undergraduates may fulfill part of this requirement from graduate-level courses (typically courses with catalog numbers of 200 or higher).

		Units
ANTHRO 90B	Theory of Cultural and Social Anthropology	5
ANTHRO 125	Language and the Environment	3-4
ANTHRO 134	Object Lessons	5
CLASSART 113	Ten Things: An Archaeology of Design	3-5

## 5. Area of Concentration (at least 20 units)

In consultation with their faculty advisers, students choose an area of concentration in archaeological research. Concentrations can be defined in terms of time and space such as small-scale societies or the archaeology of complex societies, or in terms of research problems such as new world archaeology or Mediterranean archaeology. An area of concentration should provide both breadth and depth in a specific research area. Courses should be chosen from the list below. Courses other than those on this list can be used to fulfill this requirement with the prior approval of the student's faculty adviser and the program director. With the approval of the instructor, undergraduates may fulfill part of this requirement from graduate-level courses, typically courses numbered 200 or higher. However, each course may only count toward one component of the program. Students are encouraged to design their own area of concentration, with the prior approval of the student's faculty adviser and the program director.

## 6. Small Scale Societies

		Units
ANTHRO 16	Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America	5

## Archaeology of Complex Societies

		Units
ARCHLGY 111	Emergence of Chinese Civilization from Caves to Palaces	3-4
ARCHLGY 135	Constructing National History in East Asian Archaeology	3-5
ANTHRO 100C	Chavin de Huantar Research Seminar	2-5
CLASSART 21Q	Eight Great Archaeological Sites in Europe (also offered in spring)	3-5
CLASSART 101	Archaic Greek Art	4
CLASSART 109	Greek Art In and Out of Context	4-5
CLASSGEN 123	Urban Sustainability: Long-Term Archaeological Perspectives	3-5

## Mediterranean Archaeology

		Units
ARCHLGY 85	The Archaeology of Roman Imperialism	3-5
ARCHLGY 130	To the Gods of the Underworld: Roman Funerary Archaeology	3-5
ARCHLGY 139	The Aegean in the Neolithic and Bronze Age	3-5
ARCHLGY 142	Lost and found: Roman Coinage	4-5
CLASSART 101	Archaic Greek Art	4
CLASSART 109	Greek Art In and Out of Context	4-5
CLASSART 110	Appropriations of Greek Art	4-5

## New World Archaeology

		Units
ANTHRO 101	The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology	3-5
ANTHRO 105	Ancient Cities in the New World	3-5
ANTHRO 200C	STS Senior Capstone	5

## Heritage

		Units
ARCHLGY 64	Cultural Heritage and Human Rights	1
ARCHLGY 132	The Anthropology of Heritage: Concepts, Contexts and Critique	3-5
ARCHLGY 129	Archaeology, Heritage, and the Contemporary Middle East	3-5

## Urbanism and Cities

		Units
ANTHRO 105	Ancient Cities in the New World	3-5
ANTHRO 112	Public Archaeology: Market Street Chinatown Archaeology Project	5
CLASSART 21Q	Eight Great Archaeological Sites in Europe	3-5
CLASSGEN 123	Urban Sustainability: Long-Term Archaeological Perspectives	3-5

## 7. Archaeological Fieldwork

Students may meet this requirement in two ways:

- A. Taking part in a month-long field project directed by a Stanford faculty member, and taking a directed reading during the returning academic year for credit. In 2012, field projects were underway in Peru, New Mexico, China, and Turkey.
- B. Completing a field school offered by another institution. Such field schools must be approved in advance by the student's undergraduate adviser and by the director of the Archaeology Center.

## 8. Collateral Language Requirement

All Archaeology majors must demonstrate competence in a foreign language beyond the first-year level. Students can meet this requirement by completing a course beyond the first-year level with

a grade of 'B' or better, and are encouraged to choose a language that has relevance to their archaeological region or topic of interest. Students may petition to take an introductory-level course in a second language to fulfill this requirement by demonstrating the connection between the language(s) and their research interest(s).

## 9. Research and Independent Study

Students may count up to 15 units of research and independent study toward the Archaeology major:

		Units
10.	including but not limited to:	
ARCHLGY 190	Archaeology Directed Reading/Independent Study	1-5
ARCHLGY 195	Independent Study/Research	1-5
ARCHLGY 199	Honors Independent Study	5

## Honors Program

The honors program in Archaeology gives qualified majors the chance to work closely with faculty on an individual research project culminating in an honors thesis. Students may begin honors research from a number of starting points, including topics introduced in the core or upper-division courses, independent interests, research on artifacts in Stanford's collections, or fieldwork experiences.

Interested Archaeology majors of junior standing may apply for admission by submitting an honors application form, including a 4-5 page statement of the project, a transcript, and a letter of recommendation from the faculty member supervising the honors thesis to the student services specialist, no later than the end of the fourth week of the Spring Quarter. Archaeology majors are eligible to apply for honors candidacy. The thesis is due in early May of the senior year and is read by the candidate's adviser and a second reader appointed by the undergraduate committee.

## Overseas Studies Courses in Archaeology

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/archaeology/>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/archaeology/Bing%20Overseas%20Studies>) web site. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

## Minor in Archaeology

A minor in Archaeology provides an introduction to the study of the material cultures of past societies. It can complement many majors, including but not limited to Anthropology, Applied Physics, Art and Art History, Classics, Earth Systems, Geological and Environmental Sciences, History, and Religious Studies.

Students must complete the declaration process, including the planning form submission and Axxess registration, by the last day of the quarter, two quarters prior to degree conferral; for example, by the last day of Autumn Quarter if Spring graduation is the intended quarter of graduation.

## Requirements

To minor in Archaeology, the student must complete at least 27 units of relevant course work, including:

### 1. Core Program (10 units)

		Units
ARCHLGY 1	Introduction to Prehistoric Archeology (Gateway Course, Required)	3-5
ARCHLGY 103	History of Archaeological Thought	5
ARCHLGY 107A	Archaeology as a Profession	5

ARCHLGY 1 Introduction to Prehistoric Archeology is recommended as a first course, and many of the upper-level courses in Archaeology require this course as a prerequisite. Students have the option to take ARCHLGY 103 History of Archaeological Thought or ARCHLGY 107A Archaeology as a Profession to fulfill the rest of the 10 unit core requirement for the minor.

### 2. Archaeological Skills (2-5 units)

Archaeological skills include dating methods, faunal analysis, botanical analysis, ceramic analysis, geology, geophysics, soil chemistry, remote sensing, osteology, genetics, statistics, cartography, and geographic information systems. The course(s) must be chosen from the list of courses under Archaeological Skills (requirement 3) in the Bachelor's tab of this section.

### 3. Theory (5 units)

Topics include archaeological, art historical, sociocultural, historical, and material culture theory. The course(s) must be chosen from the list of courses under Theory (requirement 4) in the Bachelor's tab of this section.

### 4. Area of Concentration (10 units)

In consultation with their faculty advisers, students choose an area of concentration in archaeological research. Concentrations can be defined in terms of time and space such as small-scale societies or the archaeology of complex societies, or in terms of research problems such as new world archaeology or Mediterranean archaeology. An area of concentration should provide both breadth and depth in a specific research area.

Courses must be chosen from the lists of courses under Area of Concentration (requirement 5) in the Bachelor's tab of this section. Students are encouraged to design their own area of concentration, with the prior approval of both the student's faculty adviser and the program director.

ANTHRO 21N	The Anthropology of Globalization	4
ANTHRO 30Q	The Big Shift: An Anthropological Approach to Wealth, Migration, and the New Margins of America	4
ANTHRO 90B	Theory of Cultural and Social Anthropology	5
ANTHRO 90C	Theory of Ecological and Environmental Anthropology	5
ANTHRO 98E	Catalhoyuk and Neolithic Archaeology	1-3
ANTHRO 100C	Chavin de Huantar Research Seminar	2-5
ANTHRO 103	The Archaeology of Modern Urbanism	5
ANTHRO 116	Data Analysis for Quantitative Research	5
ANTHRO 135H	Conversations in CSRE: Case Studies in the Stanford Community	1-2
ANTHRO 117	A cultural Animals as Proxies for Cultural Humans	5
ARTHIST 101	Archaic Greek Art	4
ARTHIST 203	Greek Art In and Out of Context	4-5
CLASSART 21Q	Eight Great Archaeological Sites in Europe	3-5
CLASSART 113	Ten Things: An Archaeology of Design	3-5
CLASSGEN 123	Urban Sustainability: Long-Term Archaeological Perspectives	3-5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
EESS 160	Statistical Methods for Earth and Environmental Sciences: General Introduction	3
EESS 164	Fundamentals of Geographic Information Science (GIS)	4
GES 102	Earth Materials: Introduction to Mineralogy	3
STATS 60	Introduction to Statistical Methods: Precalculus	5
URBANST 115	Urban Sustainability: Long-Term Archaeological Perspectives	3-5

*Director:* Lynn Meskell (Anthropology)

*Professors:* Ian Hodder (Anthropology), Mark Lewis (History, Asian Languages), Li Liu (East Asian Languages and Cultures), Gail Mahood (Geological and Environmental Sciences), Mike Moldovan (Geological and Environmental Sciences), Ian Morris (Classics, History), Amos Nur (Geophysics), Michael Shanks (Classics), Peter Vitousek (Biology)

*Associate Professors:* Jody Maxmin (Art and Art History, Classics), John Rick (Anthropology), Jennifer Trimble (Classics) (on leave), Barbara Voss (Anthropology)

*Assistant Professors:* Giovanna Ceserani (Classics) (on leave), Ian Robertson (Anthropology), Krish Seetah (Anthropology)

*Assistant Professor (Teaching):* Michael V. Wilcox (Anthropology)

*Acting Assistant Professor:* Alicia Jiménez

*Visiting Professors:* Efstratios Nanoglou, Sandra Scham

*Postdoctoral Fellows:* Melissa Baird, Sheahan Bestel, Lindsay Weiss

*Associated Staff:* Laura Jones (Campus Archaeologist), Lisa Newble (Collections Manager)

## Cognate Courses

Students are advised to meet with their adviser about degree requirements and the applicability of these courses to a major or minor program.

		Units
ARCHLGY 12	Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years	3-5
ANTHRO 1	Introduction to Cultural and Social Anthropology	5
ANTHRO 3	Introduction to Prehistoric Archeology	3-5

## Overseas Studies Courses in Archaeology

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/archaeology/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services

office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/archaeology/>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/archaeology/>) <http://bosp.stanford.edu>.

Units

OSPCPTWN 36 The Archaeology of Southern African Hunter Gatherers 4

## Art and Art History

Courses offered by the Department of Art & Art History are listed on the Stanford Bulletin's ExploreCourses web site under the subject codes ARTHIST (Art History) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ARTHIST&filter-catalognumber-ARTHIST=on>), ARTSTUDI (Art Practice) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ARTSTUDI&filter-catalognumber-ARTSTUDI=on>), FILMSTUD (Film Studies) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=FILMSTUD&filter-catalognumber-FILMSTUD=on>), and FILMPROD (Film Practice) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=FILMPROD&filter-catalognumber-FILMPROD=on>).

## Mission of the Department of Art and Art History

The department offers courses of study in:

1. Art History
2. Art Practice (studio)
3. Film and Media Studies
4. Film Production

leading to the following degrees: B.A. degree in Art History; B.A. degree in Art Practice; B.A. degree in Film and Media Studies; M.F.A. degree in Art Practice; M.F.A. degree in Design; M.F.A. degree in Documentary Film and Video; Ph.D. degree in Art History.

The undergraduate program is designed to help students think critically about the visual arts and visual culture. Courses focus on the meaning of images and media, and their historical development, roles in society, and relationships to disciplines such as literature, music, and philosophy. Work performed in the classroom, studio, and screening room is designed to develop a student's powers of perception, capacity for visual analysis, and knowledge of technical processes.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. knowledge and awareness of art terminology and concepts.
2. ability to develop effective and nuanced lines of interpretation.
3. improved critical thinking skills using primary and secondary source materials.
4. improvement in analytical writing skills and close reading skills.
5. ability to form and validate their own and others' opinions through knowledge of artistic movements and sociohistorical events.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Art and Art History and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Art and Art History. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Art and Art History and to interpret and present the results of such research.

## Iris and B. Gerald Cantor Center For Visual Arts

The Cantor Arts Center at Stanford University is a major resource for the department. The Cantor presents art from around the world in 24 galleries: from Africa to the Americas to Asia, from classical to contemporary. The Cantor offers changing selections from its 30,000-object collection; the Rodin Sculpture Garden; special exhibitions; and a variety of educational programs. Through collaborations with the teaching program, student internships, and student activities, the Cantor provides a rich resource for Stanford students.

## Art History

### Undergraduate Program in Art History

The discipline of Art History teaches students how to analyze and interpret works of fine art (paintings, drawings, prints, and sculpture), photography and moving image media (film, video, television, and digital art), material culture (ritual objects, fashion, advertisements, and the decorative, applied, and industrial arts), and the built environment (architecture, urbanism, and design). The department takes it as axiomatic that the skills of visual literacy and analysis are not innate but may be acquired through training and practice. Objects of study are drawn from the cultures of Africa, Asia, the Americas, from the Middle East; from Western, Central, and Eastern Europe; and from antiquity to the present.

Art History is a historical discipline that seeks to reintegrate the work of art into the original context of its making and reception, foregrounding its significant status as both historical document and act of social communication. At the same time, Art History seeks to understand the ways in which the work of art transcends the historical moment of its production, taking on different meanings in later historical periods, including the present. As part of their visual training, students of Art History become proficient in cultural analysis and historical interpretation. Art History thus envisions itself as uniquely well positioned to train students from a variety

of disciplines in the light of the dramatic visual turn that has gripped the humanities and the sciences over the course of the last decade, with more and more disciplines becoming vitally interested in visual forms and modes of communication.

## Graduate Program in Art History

The doctoral program in Art History at Stanford is relatively small, and affords the graduate student the opportunity to work intensively with individual members of the faculty. The Doctor of Philosophy degree is taken in a particular field, supported by a background in the general history of art. Doctoral candidates also undertake collateral studies in other graduate departments or in one of the University's interdisciplinary programs.

## Art Practice (Studio)

### Undergraduate Program in Art Practice (Studio)

The Art Practice program offers production-based courses founded on the concepts, skills and cultural viewpoints that characterize contemporary art practice. The goal is to educate students, both majors and minors, in the craft, culture, and theory of current fine art practices to prepare them for successful careers as artists. The art practice program is designed to develop in-depth skills in more than one area of the visual arts. It emphasizes the expressive potential of an integration of media, often via a cross-disciplinary, interactive path. Through collaboration and connections with scientists, engineers, and humanities scholars, the program addresses a breadth of topical and artistic concerns central to a vital undergraduate education.

### Graduate Program in Painting, Sculpture, New Genres, and Photography

The program provides a demanding course of study designed to challenge advanced students. Participants are chosen for the program on the basis of work that indicates high artistic individuality, achievement, and promise. Candidates should embody the intellectual curiosity and broad interests appropriate to, and best served by, work and study within the University context.

## The Graduate Program in Design

Working jointly, the departments of Art & Art History and Mechanical Engineering offer graduate degrees in product and visual design. A large physical environment, the Design Yard, provides professional studio space and well-equipped shops. Flexible programs may include graduate courses in fields such as engineering design, biotechnology, marketing, microcomputers, or the studio and art history curriculum. The program centers on a master's project and may also include work in advanced art and design. The program is structured to balance independent concentration with the use of the University and community, and interaction with the students and faculty of the graduate Design program. Cross-disciplinary interaction is encouraged by a four-person graduate Design faculty.

## Film and Media Studies

### Undergraduate Program in Film and Media Studies

The Bachelor of Arts in Film and Media Studies provides an introduction to film aesthetics, national cinematic traditions, modes of production in narrative, documentary, and experimental films, the incorporation of moving image media by contemporary artists, and the proliferation of new

forms of digital media. The program is designed to develop the critical vocabulary and intellectual framework for understanding the role of cinema and related media within broad cultural and historical concepts.

## Graduate Program in Documentary Film and Video

The Master of Fine Arts program in documentary production provides a historical, theoretical, and critical framework within which students master the conceptual and practical skills for producing nonfiction film and video. The M.F.A. is a terminal degree program with a two-year, full-time curriculum representing a synthesis of film praxis and film and media history, theory, and criticism. Courses provide an intellectual and theoretical framework within which students' creative work is developed. Students proceed through the program as a cohort. The program does not permit leaves of absence.

The M.F.A. degree is designed to prepare graduate students for professional careers in film, video, and digital media. Graduates are qualified to teach at the university level. The philosophy of the program is predicated on a paradigm of independent media that values artistic expression, social awareness, and an articulated perspective. Students become conversant with the documentary tradition as well as with alternative media and new directions in documentary. Training in documentary production is combined with the development of research skills in film criticism and analysis. Electives in film studies, art history, and studio art provide an intellectual and theoretical framework within which creative work is realized. The parallel focus on production and studies prepares students for an academic position that may require teaching both film studies and production.

## Art and Art History Department Course Catalog Numbering System

The first digit of the ARTHIST and FILMSTUD course number indicates its general level of sophistication.

Digit	Area
001-099	Introductory
100-199	Undergraduate level lectures
200-299	Undergraduate seminars/individual work
300-399	Graduate level lectures
400-599	Graduate seminars/individual work

## Art History

Digit	Area
001-099	Introductory
100-104	Ancient
105-109	Medieval
110-119	Renaissance
120-139	Early Modern
140-159	Modern
160-179	Contemporary
180-189	Asia
190-195	Africa and the Americas
200-299	Seminars and Colloquia
410-499	Historical Studies
500-599	Critical Studies
600-699	Graduate Research

## Art Practice (Studio)

Digit	Area
001-099	Courses for Non-Major (Lower Level)
100-199	Lower Level Undergraduate Courses
200-299	Upper Level Undergraduate Courses
300-399	Graduate Seminars

## Film and Media Studies

Digit	Area
004-103	Introductory
111-118	Genre
130-139	National Cinemas
140-149	Aesthetics
150-159	Other
220-299	Undergraduate Seminars
400-660	Graduate Seminars

## Film Production

Digit	Area
001-199	Undergraduate Courses
300-399	Graduate Courses
400-499	Graduate Courses for MFA Doc Film Students Only

# Bachelor of Arts in Art History

## Suggested Preparation for the Major

Students considering a major in art history should take ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (WIM course), during their freshman or sophomore year.

## Fields of Study or Degree Options

Students who wish to major in Art History declare the Art History major on Axess. Concentrations within the major are approved by the faculty adviser and are not declared on Axess. Sample concentrations include:

1. Topical concentrations: art and gender; art, politics, race, and ethnicity; art, science, and technology; urban studies
2. Genre concentrations: architecture; painting; sculpture; film studies; prints and media; decorative arts and material culture
3. Historical and national concentrations: ancient and medieval; Renaissance and early modern; modern and contemporary; America; Africa; Asia; the Americas
4. Interdisciplinary concentrations: art and literature; art and history; art and religion; art and economics; art and medicine (with adviser consent a maximum of two concentration courses may be taken outside the department).

## Degree Requirements

All undergraduate majors complete a minimum of 61 units (14 courses of 4-5 units each). Students are required to complete two foundation courses

(including the WIM course: ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present), five Art History distribution courses, five concentration courses, one studio course (4 units), and ARTHIST 296 Junior Seminar: Methods & Historiography of Art History. Courses must be taken for a letter grade. To declare the major, students must meet with the Undergraduate Coordinator. At that time the student selects a faculty adviser. Majors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the major declaration.

## Required Courses

### 1. Foundational Courses (10 units)

	Units
ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present	5
Select one of the following:	5
ARTHIST 2 Asian Art and Culture	
ARTHIST 3 Introduction to the History of Architecture	
FILMSTUD 4 Introduction to Film Study	4
<b>Total Units</b>	<b>10</b>

### 2. Distribution Courses (20 units)

In order that students acquire a broad overview of different historical periods and different geographic regions, majors must take five Art History lecture courses, one from each of the following five categories:

	Units
<b>Ancient and Medieval (4)</b>	
Select one of the following:	4
ARTHIST 101 Archaic Greek Art	
ARTHIST 102 Empire and Aftermath: Greek Art from the Parthenon to Praxiteles	
ARTHIST 105 Art & Architecture in the Medieval Mediterranean	
ARTHIST 108 Virginity and Power: Mary in the Middle Ages	
ARTHIST 109 The Book in the Medieval World	
<b>Renaissance and Early Modern (4)</b>	
Select one of the following:	4
ARTHIST 111 Introduction to Italian Renaissance, 1420-1580	
ARTHIST 118 Titian, Veronese, Tintoretto	
ARTHIST 120 Living in a Material World: Seventeenth-century Dutch and Flemish Painting	
ARTHIST 121 18th-Century Art in Europe, ca 1660-1780	
ARTHIST 124 The Age of Naturalism, ca 1830-1874	
ARTHIST 126 Post-Naturalist Painting	
<b>Modern, Contemporary, and the U.S (4)</b>	



Select one of the following:		4
ARTHIST 142	Architecture Since 1900	
ARTHIST 143A	American Architecture	
ARTHIST 147	The Visual Culture of Modernism and its Discontents	
ARTHIST 156	American and European Art, 1945-1968	
ARTHIST 159	American Photographs, 1839-1971: A Cultural History	
ARTHIST 165A	Fashion Shows: From Lady Godiva to Lady Gaga	
ARTHIST 173	Issues in Contemporary Art	
ARTHIST 176	Feminism and Contemporary Art	

<b>Asia, Africa, and the Americas (4)</b>		
Select one of the following:		4
ARTHIST 184	Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting	
ARTHIST 187	Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868	
ARTHIST 188A	The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism	

<b>Film &amp; Media Studies (4)</b>		
Select one of the following:		4
FILMSTUD 4	Introduction to Film Study	
FILMSTUD 6	Introduction to Digital Media	
FILMSTUD 100A	History of World Cinema I, 1895-1929	
FILMSTUD 100B	History of World Cinema II, 1930-1959	
FILMSTUD 100C	History of World Cinema III, 1960-Present	
FILMSTUD 101	Fundamentals of Cinematic Analysis	
FILMSTUD 102	Theories of the Moving Image	
FILMSTUD 116	International Documentary	
FILMSTUD 133	Contemporary Chinese Auteurs	
FILMSTUD 145	Politics and Aesthetics in East European Cinema	
FILMSTUD 141	Music Across Media: Music Video to Postclassical Cinema	
FILMSTUD 155	Comics and the City	
FILMSTUD 164A	Technology and the Visual Imagination	

#### 4. Area of Concentration (22 units)

The department encourages students to pursue their interests by designing an area of concentration tailored to their own intellectual concerns. This area of concentration provides the student with an in-depth understanding of a coherent topic in Art History and consists of five Art History courses: two must be seminars, and four of the five courses must be in a single field or concentration constructed by the student in consultation with their faculty adviser. Students must submit an area of concentration form, signed by their faculty adviser, during Winter Quarter of their junior year.

#### 5. Capstone Seminar (5 units)

This course is designed to introduce majors to methods and theories underlying the practice of Art History. The seminar is offered annually, typically during Autumn Quarter.

- |    |   |                   |
|----|---|-------------------|
| 6. | ARTHIST 296 Junior Seminar: Methods & Historiography of Art History | <b>Units</b><br>5 |
|----|---|-------------------|

#### 7. Studio Course (4 units)

Majors are required to complete at least one introductory Studio Art course.

### Honors Program in Art History

The purpose of the honors thesis is to extend and deepen work done in an Art History class; the topic should have focus and clear parameters. Typically an honors thesis is not an exploration of a new area that the student has never studied before. The minimum requirement for admission to the honors program is an overall GPA of 3.7, and at least 3.7 in Art History courses. Students must complete at least five Art History courses at Stanford by the end of their junior year; four must be completed by the end of winter quarter. Students interested in the honors program should consult their potential adviser by the beginning of junior year. Thesis advisers must be in residence during Autumn Quarter of the student's senior year, and it is highly recommended that they are in residence during the rest of senior year. Students wishing to write an honors thesis must announce their intention by submitting an intent form signed by their thesis adviser (who need not be the student's academic adviser) by February 1 of their junior year.

Candidates for the honors program must submit to the Art History faculty a five-page thesis proposal, including bibliography and illustrations, and one completed paper that demonstrates the student's ability to conceptualize and write about issues. The complete proposal must be submitted to the department's undergraduate coordinator no later than the third week of Spring Quarter of the candidate's junior year so it can be read, discussed, and voted upon at the faculty's regular meeting in early May. A candidate is accepted into the honors program by a simple majority.

Once admitted to the honors program, students work with their thesis advisers to define the scope of study, establish a research and writing timetable, and enlist one other faculty member to serve on the thesis reading committee. The summer between junior and senior years is usually devoted to refining the topic and pursuing any off-campus research. Students may apply for UAR research grants to help finance trips or expenses related to preparing the research for their honors thesis.

During their senior year, students must register for 10 units of ARTHIST 297 Honors Thesis Writing, Honors Thesis Writing, 5 units of which may count towards the student's concentration in Art History. Students are required to register for two to five units each quarter during their senior year, for a total of ten units. To aid the process of research and writing, students preparing an honors thesis are paired with a graduate student mentor. Students must contact the graduate student mentor in their junior

year as soon as they begin to think about writing an honors thesis. Through regular meetings, mentors guide students through the proposal process and the research and writing year.

Students and thesis advisers should plan their work so that a complete, final manuscript is in the hands of each member of the student's reading committee by the beginning of the seventh week of the student's final quarter at Stanford (one year from proposal to final manuscript). The thesis adviser assigns a letter grade; both faculty readers must approve the thesis for honors before the student is qualified to graduate with honors.

## Required Course

ARTHIST 297	Honors Thesis Writing	<b>Units</b> 1-5
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# Bachelor of Arts in Art Practice (Studio)

## Degree Requirements

All undergraduate majors complete a minimum of 65 units including six lower level courses, six upper level courses, and four art history courses, including the WIM course ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present. All courses must be taken for a letter grade. University units earned by placement tests or advanced placement work in secondary school are not counted within the 65 units. The studio requirements are divided into lower level (introductory, 100 level) and upper level (advanced, 200 level) course work. At the lower level, students focus on a range of subject matter from historical motifs (figure, still life, landscape) to contemporary ideas in art. Upper level courses are designed to stretch the student's understanding of materials, techniques, site, and social relevance. Experimental and challenging in nature, these courses cross area boundaries. Independent study supervised by a member of the permanent faculty is also available to the advanced student.

Students are encouraged to move through the requirements for the major in the sequence outlined. Students are exposed to a range of practices early in their development in order to have a good basis of comparison if they choose to focus on a particular medium. This sequence of courses also broadens the students' skills and enables them to combine materials and methods. In all courses, students are expected to pass mid-term and final reviews and critiques of their work.

To declare the major, students must meet with the undergraduate coordinator. At that time the student selects a faculty adviser. Art Practice majors are required to meet with both their adviser and the undergraduate coordinator during the first two weeks of each quarter to have course work approved and make certain they are meeting degree requirements. Majors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the major declaration.

## Required Courses

### 1. Six lower level courses (24 units)

2.	<b>Units</b>
Select six of the following:	24
ARTSTUDI Interactive Art: Making it with Arduino 130	
ARTSTUDI Sound Art I 131	

ARTSTUDI Sound and Image 138	
ARTSTUDI Drawing I 140	
ARTSTUDI Painting I 145	
ARTSTUDI Monotype 148	
ARTSTUDI Artist's Book 147	
ARTSTUDI Lithography 148A	
ARTSTUDI Introduction to Printmaking Techniques 148B	
ARTSTUDI Sculpture I 151	
ARTSTUDI Design I : Fundamental Visual Language 160	
ARTSTUDI Catalysts for Design 161	
ARTSTUDI Introduction to Animation 167	
ARTSTUDI Introduction to Photography 170	
ARTSTUDI Video Art I 177	
ARTSTUDI Art and Electronics 178	
ARTSTUDI Digital Art I 179	
ARTSTUDI Color 180	
FILMPROD Introduction to Film and Video Production 114	

### 3. Six upper level courses (24 units):

- A. ARTSTUDI 230 Interdisciplinary Art Survey is a required course which focuses on direct experiences of multidisciplinary art and art practices. ARTSTUDI 249 Advanced Undergraduate Seminar is a required course which emphasizes investigation of visual concepts interpreted by a single medium, by cross-practices, or by collaboration among students working in a variety of materials. This seminar gives the student an opportunity to be exposed to the work of other majors in a critique-based forum directed by a visiting artist or critic.

B. **Units**

#### Required Courses (8)

ARTSTUDI Interdisciplinary Art Survey 230	4
ARTSTUDI Advanced Undergraduate Seminar 249	4

C. Students select four optional courses from the following list.

D. **Units**

Select four of the following:	12-16
ARTSTUDI Future Media, Media Archaeologies 236	
ARTSTUDI Painting II 245	

ARTSTUDI Advanced Undergraduate Seminar 249
ARTSTUDI Sculpture II 252
ARTSTUDI Kinetic Sculpture 254
ARTSTUDI Design II: The Bridge 260
ARTSTUDI The Chair 262
ARTSTUDI Advanced Photography Seminar 270
ARTSTUDI The View Camera: Its Uses and 271 Techniques
ARTSTUDI Individual Work: Photography 272
ARTSTUDI Alternative Processes 274
ARTSTUDI Introduction to Digital Photography and 275 Visual Images
ARTSTUDI The Photographic Book 276
ARTSTUDI Projects in Photography 277
ARTSTUDI Intermediate Black and White Photography 278
ARTSTUDI Digital Art II 279A
ARTSTUDI Art and Biology 284

4. **Four Art History courses (17-20 units).**

5.		<b>Units</b>
ARTHIST 1	Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (Required: WIM course)	5
	Three other art history courses, one must be from the modern art 12-15 series.	
	One Film & Media Studies course may satisfy an Art History elective.	

**Transfer Credit Evaluation**

Upon declaring an Art Practice major, a student transferring from another school must have his or her work evaluated by a Department of Art and Art History adviser. A maximum of 13 transfer units are applied toward the 65 total units required for the major. A student wishing to have more than 13 units applied toward the major must submit a petition to the adviser and then have his or her work reviewed by a studio committee.

**Overseas Study or Study Abroad**

A minimum of 52 of the 65 units required for the Art Practice major and a minimum of 32 of the 36 units required for the Art Practice minor must be taken at the Stanford campus. A student must meet with his or her adviser and undergraduate coordinator before planning an overseas campus program.

**Bachelor of Arts in Film and Media Studies**

**Suggested Preparation for the Major**

Students considering a major in film and media studies should take FILMSTUD 4 Introduction to Film Study, and are encouraged to take ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present, during their freshman or sophomore year. These courses anchor the major through exposure to film language, genre, and visual and narrative structures. Majors are required to take one course in the fundamentals of film and video production.

**Suggested or Recommended Courses (all of which meet major requirements)**

		<b>Units</b>
ARTHIST 1	Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present	5
FILMSTUD 4	Introduction to Film Study	5
FILMSTUD 101	Fundamentals of Cinematic Analysis	4

**Fields of Study or Degree Option**

Advanced undergraduate courses are offered in five fields of study. These fields are declared on Axess; they appear on the transcript but they do not appear on the diploma:

- Film History
- Film and Culture
- Film, Media, and Technology
- Writing, Criticism, and Practice
- Aesthetics and Performance

Working with a faculty adviser, students choose five courses in their field from course offerings in Art and Art History and one course from another department in the University.

**Degree Requirements**

All undergraduate majors complete a minimum of 65 units (16 courses of 3-5 units each), or 15 courses plus an honors thesis. FILMSTUD 101 Fundamentals of Cinematic Analysis (WIM course) is required for all majors. All courses for the major must be taken for a letter grade. To declare the major, students must meet with the undergraduate coordinator. At that time the student selects a faculty adviser. Majors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the major declaration.

**Required Courses**

		<b>Units</b>
ARTHIST 1	Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (May be substituted with an Art History elective)	5
FILMSTUD 4	Introduction to Film Study	5
FILMSTUD 6	Introduction to Digital Media	5

FILMSTUD 100A	History of World Cinema I, 1895-1929	4
FILMSTUD 100B	History of World Cinema II, 1930-1959	4
FILMSTUD 100C	History of World Cinema III, 1960-Present	4
FILMSTUD 101	Fundamentals of Cinematic Analysis (WIM Course)	4
FILMSTUD 102	Theories of the Moving Image	4
FILMPROD 114	Introduction to Film and Video Production	5
Concentration <sup>1</sup>		
FILMSTUD 290	Movies and Methods <sup>2</sup>	5

<sup>1</sup> Concentration - Five courses, four of which must be in a single film and media studies concentration developed by the student in consultation with an adviser. Concentration areas are: film history; film and culture; aesthetics and performance; film, media, and technology; and writing, criticism, and practice. The remaining course must be related, situating the student's concentration in a broader context.

<sup>2</sup> Capstone Experience - FILMSTUD 290 Movies and Methods, offered once a year. The Senior Seminar represents the culminating intellectual experience for Film Studies majors choosing not to write an honors thesis. Honors thesis writers may also take the senior seminar. Seniors who may not be in residence in the quarter that the senior seminar is offered may enroll in their junior year. Movies and Methods provides majors with an opportunity to synthesize their previous work in Film Studies and work in an advanced setting with a faculty member.

## Electives (20 units)

		Units
Film Studies Concentration Electives		
FILMSTUD 116	International Documentary	4
FILMSTUD 132	East Asian Cinema	4
FILMSTUD 133	Contemporary Chinese Auteurs	4
FILMSTUD 136	Gender and Sexuality in Chinese Cinema	4
FILMSTUD 137	European New Wave Cinemas	4
FILMSTUD 140	Film Aesthetics: Editing	4
FILMSTUD 141	Music Across Media: Music Video to Postclassical Cinema	4
FILMSTUD 145	Politics and Aesthetics in East European Cinema	4
FILMSTUD 155	Comics and the City	4
FILMSTUD 164A	Technology and the Visual Imagination	4
FILMSTUD 235	Emotions of Japanese Cinema (Postindustrial Version)	4
FILMSTUD 240A	History and Poetics of Cinematography	5
FILMSTUD 251	Media in Transition	5
FILMSTUD 279	Asian American Experiences and Documentary Practice	5
FILMPROD 101	Screenwriting (must be approved by the faculty advisor)	5
FILMPROD 104	Visual Writing (must be approved by the faculty advisor)	4
FILMPROD 105	Script Analysis (must be approved by the faculty advisor)	4
FILMPROD 110	Advanced Screenwriting (must be approved by the faculty advisor)	5

# Honors Program in Film and Media Studies

Students who want to write an honors thesis should consult with a potential adviser by the beginning of junior year. The adviser must be a faculty member in residence during the student's senior year who can oversee the student's progress throughout the project.

The minimum requirements for admission to the honors program in the department are an overall GPA of 3.7 and at least 3.7 in Film and Media Studies courses. Students must complete at least five Film and Media Studies courses at Stanford by the end of their junior year; four must be completed by the end of Winter Quarter. Students wishing to write an honors thesis must announce their intention by submitting a form signed by the thesis adviser, who need not be the student's academic adviser, by February 1 of their junior year.

Candidates for the honors program must submit to the Film and Media Studies faculty a 3-5 page thesis proposal outlining the themes of the thesis, a bibliography, a tentative schedule for research and writing, and one completed paper that demonstrates the student's ability to conceptualize and write about ideas. This complete proposal must be submitted to the department's undergraduate coordinator no later than the third week of Spring Quarter of the candidate's junior year so that it can be read, discussed, and voted upon at the faculty's regular meeting in early May. A candidate is accepted into the honors program by a simple majority.

Once admitted to the honors program, students work with their thesis advisers to research, organize, and write the thesis, and to enlist one other faculty member to serve on the thesis reading committee.

To aid the process of research and writing, students preparing an honors thesis are paired with a graduate student mentor. Students should contact the graduate student mentor in their junior year as soon as they begin to think about writing an honors thesis. Honors thesis writers must register for 10 units of FILMSTUD 297 Honors Thesis Writing, while working on the thesis. Students are required to register for two to five units each quarter during their senior year, for a total of ten units. Students may apply for UAR research grants to help finance trips or expenses related to preparing the research for their honors thesis.

Students and thesis advisers should plan the work schedule so that a final manuscript is in the hands of each member of the thesis reading committee by the beginning of the seventh week of the student's final quarter at Stanford (one year from proposal to final manuscript). The thesis adviser assigns a letter grade; both faculty readers must approve the thesis for honors before the student is qualified to graduate with honors.

## Required Course

	Units
FILMSTUD 297 Honors Thesis Writing	1-5

## Minor in Art History

A student declaring a minor in Art History must complete 25 units of course work in one of the following four tracks: Open, Modern, Asian, or Architecture. Upon declaring the minor, students are assigned an adviser with whom they plan their course of study and electives. A proposed course of study must be approved by the adviser and placed in the student's departmental file. Only one class may be taken for credit outside of the Stanford campus; this includes courses taken in the Overseas Studies Program. Minors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the minor declaration.

## Degree Requirements

A student with a minor in Art History must complete six Art History courses for a total of 25 units.

	Units
Open Track	
ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (WIM)	
Plus five Art History lecture courses or seminars in any field.	
Modern Track	
ARTHIST 1 Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (WIM)	
Plus five Art History lecture courses or seminars in any aspect of 19th- to 20th-century art.	
Asian Track	
ARTHIST 2 Asian Art and Culture	
Plus five Art History lecture courses or seminars in Asian Art (ARTHIST 1 may be one of the five courses).	
Architecture Track	
ARTHIST 3 Introduction to the History of Architecture	
Plus five Art History lecture courses or seminars in Architectural History (ARTHIST 1 may be one of the five courses).	

## Minor in Art Practice (Studio)

A student declaring a minor in Art Practice must complete 36 units of Art Practice and Art History course work. All minors are required to attend an orientation session presented by the professional staff of the Art and Architecture Library, which introduces the tools of research and reference available on campus or through the internet. Minors are required to meet with both their adviser and the undergraduate coordinator during the first two weeks of each quarter to have course work approved and to make certain they are meeting degree requirements.

## Degree Requirements

A student with a minor in Art Practice must complete nine courses for a total of 36 units.

1. Three lower level courses (12 units) selected from:	
2.	Units
Select three of the following:	12
ARTSTUDI Interactive Art: Making it with Arduino 130	
ARTSTUDI Sound Art I 131	
ARTSTUDI Sound and Image 138	
ARTSTUDI Drawing I 140	
ARTSTUDI Painting I 145	
ARTSTUDI Artist's Book 147	
ARTSTUDI Monotype 148	
ARTSTUDI Lithography 148A	
ARTSTUDI Introduction to Printmaking Techniques 148B	

ARTSTUDI Sculpture I 151	
ARTSTUDI Design I: Fundamental Visual Language 160	
ARTSTUDI Catalysts for Design 161	
ARTSTUDI Introduction to Animation 167	
ARTSTUDI Introduction to Photography 170	
ARTSTUDI Video Art I 177	
ARTSTUDI Art and Electronics 178	
ARTSTUDI Digital Art I 179	
ARTSTUDI Color 180	
FILMPROD Introduction to Film and Video Production 114	

3. Three upper level courses (11 units):		Units
A.		4
ARTSTUDI Interdisciplinary Art Survey 230		
B.		Units
Select two of the following:		8
ARTSTUDI Future Media, Media Archaeologies 236		
ARTSTUDI Painting II 245		
ARTSTUDI Individual Work: Drawing and Painting 246		
ARTSTUDI Advanced Undergraduate Seminar 249		
ARTSTUDI Sculpture II 252		
ARTSTUDI Kinetic Sculpture 254		
ARTSTUDI Design II: The Bridge 260		
ARTSTUDI The Chair 262		
ARTSTUDI Advanced Photography Seminar 270		
ARTSTUDI The View Camera: Its Uses and Techniques 271		
ARTSTUDI Individual Work: Photography 272		
ARTSTUDI Alternative Processes 274		
ARTSTUDI Introduction to Digital Photography and Visual Images 275		
ARTSTUDI The Photographic Book 276		
ARTSTUDI Projects in Photography 277		
ARTSTUDI Intermediate Black and White Photography 278		

ARTSTUDI Digital Art II  
279A

ARTSTUDI Art and Biology  
284

4. Three Art History Courses (13 units):

5. Units

ARTHIST 1	Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (WIM course)	5
Select one of the following:		4-5
ARTHIST 142	Architecture Since 1900	
ARTHIST 143A	American Architecture	
ARTHIST 145	Culture Wars: Art and Social Conflict in the USA, 1890-1950	
ARTHIST 147	The Visual Culture of Modernism and its Discontents	
ARTHIST 156	American and European Art, 1945-1968	
ARTHIST 157A	Histories of Photography	
ARTHIST 159	American Photographs, 1839-1971: A Cultural History	
ARTHIST 164A	Technology and the Visual Imagination	
ARTHIST 173	Issues in Contemporary Art	
ARTHIST 176	Feminism and Contemporary Art	
ARTHIST 232B	Design Theory	
ARTHIST 244	The Visual Culture of the American Home Front, 1941-1945	
ARTHIST 246A	California Dreaming: West Coast Art and Visual Culture, 1848 - present	
ARTHIST 264A	Picturing the Cosmos	
One other art history course		4-5
ARTHIST 101	Archaic Greek Art	
ARTHIST 105	Art & Architecture in the Medieval Mediterranean	
ARTHIST 108	Virginity and Power: Mary in the Middle Ages	
ARTHIST 109	The Book in the Medieval World	
ARTHIST 111	Introduction to Italian Renaissance, 1420-1580	
ARTHIST 118	Titian, Veronese, Tintoretto	
ARTHIST 120	Living in a Material World: Seventeenth-century Dutch and Flemish Painting	
ARTHIST 121	18th-Century Art in Europe, ca 1660-1780	
ARTHIST 124	The Age of Naturalism, ca 1830-1874	
ARTHIST 126	Post-Naturalist Painting	

ARTHIST 165A Fashion Shows: From Lady Godiva to Lady Gaga

ARTHIST 184 Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting

ARTHIST 187 Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868

ARTHIST 188A The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism

ARTHIST 203 Greek Art In and Out of Context

ARTHIST 205 Cairo: Architecture and Urbanism from the Middle Ages to the 19th century

ARTHIST 205A Islamic Painting: Landscape, Body, Power

ARTHIST 208 Hagia Sophia

ARTHIST 209 Art and Religious Experience in Byzantium and Islam

ARTHIST 212 Renaissance Florence, 1440-1540

ARTHIST 213 Renaissance Print Culture: From Durer to Goltzius

ARTHIST 240N Couture Culture: Fashion, Art & Modernism from Manet to Mondrian

ARTHIST 245 Art, Business & the Law

ARTHIST 262 Office of Metropolitan Architecture: Workshop of the New

ARTHIST 287 Pictures of the Floating World: Images from Japanese Popular Culture

ARTHIST 287A The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime

ARTHIST 288B The Enduring Passion for Ink: Contemporary Chinese Ink Painting

Courses may not be offered every year and are subject to change.

## Minor in Film and Media Studies

A minor in Film Studies requires four core courses and three elective courses for a total of seven courses. Courses must focus on film and use the method of film study towards completion of the minor; courses that use film to illustrate a cultural topic are not eligible. Film Production and Studio Art courses may not be used towards the requirements.

Upon declaring the minor, students are assigned an adviser with whom they plan their course of study and electives. A proposed course of study must be approved by the adviser and placed in the student's departmental file. Only one class may be taken for credit outside the Stanford campus, including Stanford Overseas Studies programs. Minors are required to attend an orientation session presented by the professional staff of the Art Library, which introduces the many tools of research and reference available on campus or through the Internet. This requirement should be completed no later than the quarter following the minor declaration.

## Degree Requirements

The minor in Film Studies requires seven courses for a minimum of 29 units.

### Required Courses for the Minor

		Units
FILMSTUD 4	Introduction to Film Study	5
FILMSTUD 102	Theories of the Moving Image	4
Select one of the following:		4
FILMSTUD 100A	History of World Cinema I, 1895-1929	
FILMSTUD 100B	History of World Cinema II, 1930-1959	
FILMSTUD 100C	History of World Cinema III, 1960-Present	

One course in a national cinema or an additional course in film history 4-5

### Elective Courses for the Minor

Three elective courses, which may include only one film production course. An elective can be chosen from courses in other departments only if approved by the Film Studies coordinator and core faculty for their stress on methods of film analysis. These may include courses in national cinemas, film genres, experimental and documentary film, or film theory.

Elective Courses (12-15)	Units
FILMSTUD 116 International Documentary	12-15
FILMSTUD 132 East Asian Cinema	
FILMSTUD 133 Contemporary Chinese Auteurs	
FILMSTUD 136 Gender and Sexuality in Chinese Cinema	
FILMSTUD 137 European New Wave Cinemas	
FILMSTUD 140 Film Aesthetics: Editing	
FILMSTUD 141 Music Across Media: Music Video to Postclassical Cinema	
FILMSTUD 145 Politics and Aesthetics in East European Cinema	
FILMSTUD 150 Cinema and the City	
FILMSTUD 155 Comics and the City	
FILMSTUD 164A Technology and the Visual Imagination	
FILMSTUD 210N Darkness in Light: The Filmic Imagination of Horror	
FILMSTUD 235 Emotions of Japanese Cinema (Postindustrial Version)	
FILMSTUD 240A History and Poetics of Cinematography	
FILMSTUD 251 Media in Transition	
FILMSTUD 279 Asian American Experiences and Documentary Practice	
FILMPROD 101 Screenwriting	
FILMPROD 104 Visual Writing	
FILMPROD 105 Script Analysis	

FILMPROD 110 Advanced Screenwriting

FILMPROD 114 Introduction to Film and Video Production

## Master of Arts in Art History

University requirements for the M.A. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

### Admission

The department offers M.A. and Ph.D. degrees, although the M.A. is only granted as a step toward fulfilling requirements for the Ph.D. The department does not admit students who wish to work only toward the M.A. degree. Please see the Ph.D. section for admissions information.

### Degree Requirements

#### 1. Units

Completing a total of at least 45 units of graduate work at Stanford in the history of art in courses at the 200 level and above, including a seminar in art historiography/visual theory.

#### 2. Languages

Reading knowledge of two foreign languages, preferably German and French or Italian. Students in Chinese and Japanese art are ordinarily expected to demonstrate reading competence in modern and classical Chinese or Japanese, depending on the student's area of focus. Final determination is made in consultation with the student's primary adviser.

#### 3. Papers

Submission of one paper from among those written during the year.

#### 4. Area Coverage

Demonstration to the faculty, by course work and/or examination, that the student has adequate knowledge of the major areas of the history of art.

## Master of Fine Arts in Art Practice (Studio)

University requirements for the M.F.A. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

### Admission

The applicant must have a B.A., B.F.A., or B.S. from an accredited school. It is expected that the applicant will have a strong background in art practice, either an undergraduate degree or at least three years of independent studio practice. Applications and portfolios for the Art Practice program must be received by January 10, 2012. Students accepted to the program are admitted for the beginning of the following Autumn Quarter. No applicants for mid-year entrance are considered.

Portfolio Specifications—See the department's Graduate Admission (<http://art.stanford.edu/graduate/admission>) web site for portfolio requirements.

## Fields of Study or Degree Options

Fields of study for the M.F.A. degree are offered in Painting, Sculpture, New Genres, and Photography. These fields of study are not declared on ACESS; they are not printed on the transcript or the diploma.

## Degree Requirements

### 1. Residency

Completing a minimum of two years (six quarters) of graduate work in residence at Stanford.

### 2. Units

The student must complete 48 units of study. Students must discuss their programs of study with their academic adviser and the department's student services administrator to ensure that an appropriate program of study is chosen.

- A. Seminar Requirement—Six quarters (36 units) of , which includes two weekly seminars (the Object Seminar and the Concept Seminar) and Studio Practice, which is an individual tutorial with a selected member of the faculty.
- B. Elective Requirement—Three courses of academic electives (12 units) are required in the first year. These courses can be chosen from a large variety of disciplines in consultation with the Director of Graduate Studies.

### 3. Faculty Reviews

The student is expected to pass four faculty reviews:

The purpose of these reviews is to evaluate development and to assess the progress of the student.

- A. At the end of the first quarter; any student judged to be making inadequate progress is placed on probation and requires an additional review at the end of the second quarter
- B. At the end of the third quarter, at which time recommendation to proceed to the second year is determined.
- C. At the start of the fifth quarter. If the review is not satisfactory the student is placed on probation and an additional review is scheduled at the end of the 5th quarter.
- D. At the time of the M.F.A. exhibition.

### 4. Thesis

The thesis consists of two portions: an exhibition at the end of the final quarter, and a written paper addressing the development of their work over the two-year period at Stanford, to be completed during the fifth quarter. Both the written portion and participation in the M.F.A. exhibition at the end of the year are required.

### 5. Graduate Student Teaching

Regardless of their source of funding, students are required to assist with the department's teaching program for a minimum of eight hours per week over the period of six quarters; the particulars of this assignment are at the department's convenience.

The studio faculty reserves the right to make use of graduate paintings, sculptures, and photographs in exhibitions serving the interests of the graduate program.

Graduate students must remain in residence at Stanford for the duration of the program.

## Master of Fine Arts in Design

University requirements for the M.F.A. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

## Admission

1. The applicant must have a B.A., B.F.A., or B.S. from an accredited school. It is expected that the applicant will have a strong background in studio art, either an undergraduate degree or at least three years of independent studio practice.
2. Applications and portfolios for the design program must be received by January 10, 2012. Students accepted to the program are admitted for the beginning of the following Autumn Quarter. No applicants for mid-year entrance are considered.
3. Portfolio Specifications:
  - A. A portfolio or book containing 12-24 photographs, originals, or printouts of creative work, appropriately labeled and identified.
  - B. A DVD showing works in action. Total run time should not exceed five minutes, and the disc should be playable in any standard DVD player. CD-ROMs are not accepted.

## Fields of Study or Degree Options

Fields of study for the M.F.A. degree are offered in Product or Visual Design.

These fields of study are not declared on ACESS; they are not printed on the transcript or the diploma.

## Degree Requirements

### 1. Residency

The student must complete a minimum of two years (six quarters) of graduate work in residence at Stanford.

### 2. Units

The student must complete 57 units of course work chosen in consultation with an adviser in the department. Typically, students working for the M.F.A. degree are encouraged to take full advantage of both sides of the Joint Program in Design, as well as courses that tap the broader resources of the university. At least 18 of the 57 units (12 units in the ARTSTUDI series and 6 units in the ME series) must be in :

		Units
<b>Required Courses (24-26)</b>		
ARTSTUDI 260	Design II: The Bridge	3-4
ARTSTUDI 350A	Art in Context I: Post-Readymade Production	4
ARTSTUDI 350B	Art in Context II: Expanded Forms, Alternative Functions	4
ME 203	Design and Manufacturing	4
ME 312	Advanced Product Design: Formgiving	3
ME 313	Human Values and Innovation in Design	3
Any one course sponsored by the d.school		3-4
Total Units		24-26
<b>4. Units</b>		
<b>Select two of the following: (6-8)</b>		<b>6-8</b>



ARTSTUDI 161	Catalysts for Design
ARTSTUDI 166	Design in Motion
ARTSTUDI 167	Introduction to Animation
ARTSTUDI 180	Color
ARTSTUDI 262	The Chair
ME 120	History and Philosophy of Design
ME 216A	Advanced Product Design: Needfinding

5. **Thesis Requirements (18 units)**

		Units
ME 316A	Product Design Master's Project	2-6
ME 316B	Product Design Master's Project	2-6
ME 316C	Product Design Master's Project	2-6
ARTSTUDI 360A	Master's Project: Design (given next year)	2-4
ARTSTUDI 360B	Master's Project: Design (given next year)	2-4
ARTSTUDI 360C	Master's Project: Design (given next year)	2-4

6. Electives (6 units)

		Units
	Any two courses at student's discretion.	6

## Master of Fine Arts in Documentary Film and Video

University requirements for the M.F.A. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

### Admission

The program requires residency for two consecutive years. The admissions committee seeks applicants who have some work experience beyond their undergraduate years and can articulate why they want to learn documentary film and video production. The committee looks for evidence of the likelihood of success in a rigorous academic program that emphasizes creative work. The conceptual and technical skills required for documentary work are sufficiently different from fictional narrative to make the Stanford program inappropriate for students interested in narrative filmmaking. Each year, eight students are admitted to the program. Applications and portfolios must be received by January 10, 2012. Students accepted into the program at this time must enroll in Autumn Quarter of 2013. The program does not allow for deferred admission or a mid-year enrollment.

### Portfolio

The department requires a DVD (NTSC only) copy of film or video work for which the applicant has had creative control. The sample work must be well labeled and accompanied by a brief synopsis, running time of the clips, the circumstances of production, and the applicant's role. Total running time for the work sample should not exceed 15 minutes and may consist of more than one project. Work on which the applicant had only a production assistant role is not appropriate for submission. Student work, however, is appropriate for consideration. Applicants who have had only minimal

film or video production experience should submit an example of their best creative work in any medium.

## Fields of Study or Degree Options

Fields of study for the M.F.A. degree are offered in Documentary Film.

### Degree Requirements

1. **Residency**

Completing two years (six quarters) of graduate work in residence at Stanford.

2. **Units**

A minimum of 80 units is required for the M.F.A. degree. In the production core, students are required to conceptualize and visualize their ideas in a series of writing and producing courses that focus on documentary story structure. These courses are taken in tandem with project-based production courses that provide training in the technical and conceptual aspects of cinematography, sound recording, and editing. Discussion of form and content is a signature component of the writing and production courses. The production core is complemented by a series of required film studies courses in documentary plus elective courses in the history, aesthetics, ideology, and theory of all genres of moving image media. Core film production courses are offered S/NC only. All other courses must be taken for a letter grade.

3. **M.F.A. Thesis Project**

In the second year of the program, each student produces a 20-minute film or video documentary that constitutes the thesis project. In FILMPROD 405 Producing Practicum, students choose a topic, research and develop their project, and write a proposal for submission. A project may not begin production until the final proposal has been approved. Most of the production and post-production occurs (in Winter and Spring quarters) in:

		Units
4.	FILMPROD 406A Documentary M.F.A. Thesis Seminar I	4
	FILMPROD 406B Documentary M.F.A. Thesis Seminar II	4

5. **Required Courses**

A. Core Production courses (32 units)  
Core courses must be taken in sequence.

		Units
FILMPROD 400	Film/Video Writing and Directing	4
FILMPROD 401	Nonfiction Film Production	4
FILMPROD 402	Digital Video	4
FILMPROD 403	Advanced Documentary Directing	4
FILMPROD 404	Advanced Film and Video Production	4
FILMPROD 405	Producing Practicum	4
FILMPROD 406A	Documentary M.F.A. Thesis Seminar I	4
FILMPROD 406B	Documentary M.F.A. Thesis Seminar II	4

B. Core Film Studies courses (25 units)

		Units
FILMSTUD 302	Theories of the Moving Image	4
FILMSTUD 316	International Documentary	4
FILMSTUD 410A	Documentary Perspectives I	4
FILMSTUD 410B	Documentary Perspectives II	4

C. Electives

To be chosen in consultation with the student's adviser.

D.

	Units
Art History—one course	4
Studio Art and/or Communications—two courses	8
Film Studies—three courses	12
Choice Elective—one course	4

B.

		Units
ARTHIST 1	Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present (with concurrent registration in ARTHIST 610, Seminar in Teaching Praxi)	5
ARTHIST 2	Asian Art and Culture	5
ARTHIST 3	Introduction to the History of Architecture	5
FILMSTUD 4	Introduction to Film Study	5

C. Students are required to serve as a teaching assistant for a minimum of four quarters. Further opportunities for teaching may be available.

### 3. Admission to Candidacy

A graduate student's progress is formally reviewed at the end of Spring Quarter of the second year. The applicant for candidacy must put together a candidacy file showing that he/she has completed the requirements governing the M.A. program in the History of Art (see above), and at least an additional 18-24 units by the end of Winter Quarter of the second year. The graduate student does not become a formal candidate for the Ph.D. degree until he/she has fully satisfied these requirements and has been accepted as a candidate by the department.

### 4. Area Core Examination (ACE)

All graduate students conceptualize an area core and bibliography in consultation with their primary adviser and two other Stanford faculty members, one of whom is drawn from a field other than Art History, or, if in Art History, has expertise outside of the student's main area of interdisciplinary concentration. Students are required to pass an area core examination, in either written or oral form, during Winter Quarter of the third year of study. To prepare for the exam, students may enroll in the 5-unit reading course:

	Units
ARTHIST 620 Area Core Examination Preparation	5

### 6. Dissertation and Oral Defense Requirements

A. *Reading Committee:* After passing the Area Core Examination (ACE), each student is responsible for the formation of a dissertation reading committee consisting of a principal adviser and three readers. Normally, at least two of the three readers are drawn from the department and one may come from outside the department.

B. *Dissertation Proposal:* By the beginning of Autumn Quarter in the fourth year, students should have identified a dissertation subject and written a proposal in consultation with their principal adviser. To prepare the proposal, students may take:

i	one 5-unit independent study course:	
ii		Units
	ARTHIST 640 Dissertation Proposal Preparation	5

iii and apply for a funded Summer Quarter to research and write the proposal. The proposal is submitted for approval by the Art History faculty at the beginning of the fourth year for comments. In the event that a proposal is not approved, the faculty establishes conditions for its resubmission and reconsideration at a later date.

## Doctor of Philosophy in Art History

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin. An expanded explanation of department requirements is given in the Art History Graduate Student Handbook.

### Admission

In addition to University requirements, the department requires a research paper of approximately 15-20 pages demonstrating the student's capacity to pursue independent investigation of an art historical problem as part of the application. All applicants must have been awarded a B.A., B.F.A., or B.S. from an accredited university.

### Degree Requirements

To be eligible for the doctoral degree, the student must complete a minimum of three years of full-time graduate work in Art History, at least two years of which must be in residence at Stanford. Doctoral students must complete a minimum of 135 units. Of these 135, the student must complete at least 100 units of graduate course work at the 200 level or above, including all required courses, with a minimum of 62 units in Art History lecture courses and seminars.

#### 1. Collateral Studies

The student is required to take at least three courses in supporting fields of study (such as anthropology, classics, history, literature, or philosophy), determined in consultation with the department advisers. These courses are intended to strengthen the student's interdisciplinary study of art history.

#### 2. Graduate Student Teaching

As a required part of their training, graduate students in Art History, regardless of their source of funding, must participate in the department's teaching program.

A. At least one, one quarter assignment in:

- C. *Dissertation*: A member of the Art History faculty acts as the student's dissertation adviser and as chair of the reading committee. The final draft of the dissertation must be in all the readers' hands at least four weeks before the date of the oral defense. The dissertation must be completed within five years from the date of the student's admission to candidacy for the Ph.D. degree. A candidate taking more than five years must apply for an extension of candidacy.
- D. *Oral Defense Examinations*: Each student arranges an oral examination with the four members of the reading committee and a chair chosen from outside the department. The oral examination consists mainly of a defense of the dissertation but may range, at the committee's discretion, over a wider field. The student is required to discuss research methods and findings at some length and to answer all questions and criticisms put by members of the examining committee. At the end of the defense, the committee votes to pass or fail the student on the defense. The committee also makes recommendations for changes in the dissertation manuscript before it is submitted to the University as the final requirement for the granting of the Ph.D. degree in the History of Art. After incorporating the changes, the manuscript is given a final review and approval by the student's principal adviser.

*Emeriti*: (Professors) Keith Boyle, Kristina Branch, Wanda M. Corn, Elliot Eisner, David Hannah, Matthew S. Kahn, Suzanne Lewis, Frank Lobdell, Dwight C. Miller, Michael Sullivan, Paul V. Turner

*Chair*: Nancy Troy

*Area Director for Art History*: Nancy Troy

*Area Director for Film and Media Studies*: Scott Bukatman

*Area Director for Art Practice*: Enrique Chagoya

*Director of Undergraduate Studies in Art History*: Jody Maxmin

*Director of Undergraduate Studies in Art Practice*: Xiaoze Xie

*Director of Undergraduate Studies in Film and Media Studies*: Pavle Levi

*Director of Graduate Studies in Art History*: Pamela M. Lee

*Director of Graduate Studies in Art Practice*: Paul DeMarinis

*Director of Graduate Studies in Documentary Film*: Jan Krawitz

*Professors*: Scott Bukatman (Film Studies), Enrique Chagoya (Painting/Drawing/Printmaking), Paul DeMarinis (Electronic Media), Jan Krawitz (Documentary Film), Pamela M. Lee (Contemporary Art), Michael Marrinan (18th- and 19th-century European Art), Richard Meyer (American Art), Alexander Nemerov (American Art), Kristine Samuelson (Documentary Film), Melinda Takeuchi (Japanese Art), Richard Vinograd (Chinese Art, on leave), Bryan Wolf (American Art, on leave), Xiaoze Xie (Painting/Drawing)

*Associate Professors*: Pavle Levi (Film Studies), Jody Maxmin (Ancient Art), Bissera Pentcheva (Medieval Art), Gail Wight (Electronic Media)

*Assistant Professors*: Terry Berlier (Sculpture), Morten Steen Hansen (Renaissance Art), Jean Ma (Film Studies), Jamie Meltzer (Documentary Film)

*Professor (Teaching)*: Joel Leivick (Photography)

*Lecturers*: Kevin Bean (Painting & Drawing), Thomas Beischer (Architectural History), Elizabeth L. Bennett (Art History), Joseph Z. Chang (Art History), Robert Dawson (Photography), John Edmark (Design), Britta Erickson (Art History), Lukas Felzmann (Photography), Kathryn Kain (Printmaking), Elizabeth Kessler (Art History), Beatrice Kitzinger (Art History), David Laderman (Film Studies), Barbara Thompson (Art History), Adam Tobin (Screenwriting), Carol Vernallis (Film Studies).

*Affiliated Professor*: John H. Merryman (Law, emeritus)

## Overseas Studies Courses in Art History

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://bosp.stanford.edu>).

		Units
OSPBER 17	Split Images: A Century of Cinema	4
OSPBER 60	Cityscape as History: Architecture and Urban Design in Berlin	5
OSPFLOR 34	The Woman in Florentine Art	4
OSPFLOR 48	Sharing Beauty: Florence and the Western Museum Tradition	4
OSPFLOR 54	High Renaissance and Maniera	5
OSPFLOR 58	Space as History: Urban Change and Social Vision in Florence 1059 to the Present	4
OSPFLOR 111Y	From Giotto to Michelangelo: Introduction to the Renaissance in Florence	4
OSPFLOR 115Y	The Duomo and Palazzo della Signoria: Symbols of a Civilization	4
OSPMADRD 45	Women in Art: Case Study in the Madrid Museums	4
OSPOXFRD 15	British Architecture and the Renaissance: 1500-1850	4-5
OSPOXFRD 221Y	Art and Society in Britain	4-5
OSPPARIS 54	The Artist's World: The Workshop, Patronage and Public in 19th and 20th Century France	4
OSPPARIS 60	Representations of Women in Christian Art: Boldness and Virtue	4
OSPPARIS 72	The Ceilings of Paris	4
OSPPARIS 92	Building Paris: Its History, Architecture, and Urban Design	4

## Overseas Studies Courses in Art Practice

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://bosp.stanford.edu>).

		<b>Units</b>
OSPFLOR 41	The Contemporary Art Scene in Tuscany: Theory and Practice	3-5
OSPFLOR 55	Academy of Fine Arts: Studio Art	1-5
OSPFLOR 71	Becoming an Artist in Florence: Contemporary Art in Tuscany and New Tendencies in the Visual Future	3-5
OSPMADR4 46	Drawing with Four Spanish Masters: Goya, Velazquez, Picasso and Dali	3
OSPPARIS 42	EAP: Drawing with Live Models	2
OSPPARIS 43	EAP: Painting and Use of Color	2
OSPPARIS 44	EAP: Analytical Drawing and Graphic Art	2

## Overseas Studies Courses in Film

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/artandarthistory/http://bosp.stanford.edu>).

		<b>Units</b>
OSPBEIJ 17	Chinese Film Studies	4
OSPBER 17	Split Images: A Century of Cinema	4
OSPFLOR 49	The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema	5
OSPFLOR 67	Women in Italian Cinema: Maternity, Sexuality, and the Image	4
OSPFLOR 134F	Modernist Italian Cinema	5

## Astronomy

Astronomy courses are offered primarily through the Physics department, with subject code PHYSICS (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PHYSICS&filter-catalognumber-PHYSICS=on>) on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PHYSICS&filter-catalognumber-PHYSICS=on>) website.

Although Stanford University does not have a degree program in astronomy or astrophysics, teaching and research in various branches of these

disciplines are ongoing activities in the departments of Applied Physics, Electrical Engineering, and Physics.

For the convenience of students interested in astronomy, astrophysics, and cosmology, a course program for undergraduate and graduate study is listed in the "Astronomy Cognate Courses" section of this bulletin. The list provides introductory courses for the student who wishes to be informed about the fields of astronomy without the need for prerequisites beyond high school algebra and physics. Courses in astronomy numbered below 100 are designed to serve this group of students. Astronomy courses numbered 100-199 serve the student interested in an initial scientific study of astronomy. The courses numbered 200 and above are for graduate students and advanced undergraduates, subject to prior approval by the course instructor.

## Undergraduate Programs in Astronomy

The University does not offer a separate undergraduate major in Astronomy. Students who intend to pursue graduate study in astronomy or space science are encouraged to major in physics, following the advanced sequence if possible, or in electrical engineering if the student has a strongly developed interest in radioscience. The course descriptions for these basic studies are listed under the appropriate department sections of this bulletin. Students desiring guidance in developing an astronomy-oriented course of study should contact the chair of the Astronomy Program Committee. The following courses are suitable for undergraduates and are recommended to students considering advanced study in astronomy or astrophysics:

		<b>Units</b>
PHYSICS 100	Introduction to Observational and Laboratory Astronomy	4
PHYSICS 160	Introduction to Stellar and Galactic Astrophysics	3
PHYSICS 161	Introduction to Extragalactic Astrophysics and Cosmology	3
GES 222	Planetary Systems: Dynamics and Origins	3-4
Students planning study in astronomy beyond the B.S. are urged to take:		
PHYSICS 260	Introduction to Astrophysics and Cosmology	
PHYSICS 262	Introduction to Gravitation	

The above-mentioned courses are required for physics majors who choose the curriculum with a concentration in astrophysics (see the "Physics (p. 503)" section of this bulletin). The student observatory, located in the hills to the west of the campus and equipped with a 24-inch and other small reflecting telescopes, is used for instruction of the observation-oriented courses.

## Minor in Astronomy

The minor program in Astronomy is described in the "Physics (p. 503)" section of this bulletin. The non-technical minor, intended for students whose major does not require the Physics 40 series, requires:

Minor in Astronomy (Non-Technical)		
PHYSICS 21	Mechanics and Heat	3
PHYSICS 23	Electricity and Optics	3
PHYSICS 25 & PHYSICS 26	Modern Physics and Modern Physics Laboratory	4
PHYSICS 50	Astronomy Laboratory and Observational Astronomy	3-4
or PHYSICS 100	Introduction to Observational and Laboratory Astronomy	
Select two of the following:		

PHYSICS 15	The Nature of the Universe	3
PHYSICS 16	Cosmic Horizons	3
PHYSICS 17	Black Holes	3
PHYSICS 18N	Frontiers in Theoretical Physics and Cosmology	3
Total Units:		19-20
Minor in Astronomy (Technical)		
Select one of the following Series:		
Series A		
PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
PHYSICS 45	Light and Heat	4
PHYSICS 46	Light and Heat Laboratory	1
PHYSICS 70	Foundations of Modern Physics	4
Series B		
PHYSICS 61	Mechanics and Special Relativity	4
PHYSICS 63	Electricity, Magnetism, and Waves	4
PHYSICS 65	Quantum and Thermal Physics	4
PHYSICS 67	Introduction to Laboratory Physics	2
And take the following three courses:		
PHYSICS 100	Introduction to Observational and Laboratory Astronomy (or greater)	4
PHYSICS 160	Introduction to Stellar and Galactic Astrophysics	3
PHYSICS 161	Introduction to Extragalactic Astrophysics and Cosmology	3
Total Units:		24-27

To be accepted to the minor program, students need to obtain an adviser selected from the faculty in the Astronomy Course Program. The minor declaration deadline is three quarters before graduation (that is, beginning Autumn Quarter if the student is graduating at the end of Spring Quarter). All courses for the minor must be taken at Stanford University, and a letter grade of 'C-' or better must be received for all units applied toward the minor.

## Graduate Programs in Astronomy

Graduate programs in astronomy and astrophysics and related topics are carried out primarily in the Department of Physics but also the departments of Applied Physics and Electrical Engineering. Students should consult the course listings, degree requirements, and research programs of these departments for more detailed information.

Graduate research opportunities are available in many areas of theoretical and observational astronomy, including research projects using the Hobby Eberly telescope, a 10-meter-class telescope located at McDonald Observatory in Texas. Other observational and experimental opportunities are in ground-based observations of CMB and space-based gamma-ray observations with Fermi and in the future, X-ray observations with NuSTAR.

For further information on graduate research opportunities, see the "Center for Space Science and Astrophysics (p. 621)" section of this bulletin and the Kavli Institute of Particle Astrophysics and Cosmology (<http://exploredegrees.stanford.edu/schoolofhumanitiesandsciences/astronomy/> <http://kipac.stanford.edu/>).

**Students planning to conduct research in astronomy and astrophysics are required to take: (3-4)**

Select one of the following: 3-4

PHYSICS 361	Advanced Topics in Radiative Processes and Stellar Astrophysics	
PHYSICS 362	Advanced Extragalactic Astrophysics and Cosmology	

**Students lacking a background in astrophysics, gravitation, and plasma physics should take: (9)**

PHYSICS 260	Introduction to Astrophysics and Cosmology	3
PHYSICS 262	Introduction to Gravitation	3
PHYSICS 312	Basic Plasma Physics	3

**Students with special interests in gravitation should take: (3)**

PHYSICS 364	Advanced Gravitation	3
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Students interested in research programs in space physics involving spacecraft studies of the planets, their satellites, and their near-space environments should see the "Center for Space Science and Astrophysics (p. 621)" section of this bulletin.

*Emeriti: (Professors)* Von R. Eshleman, Peter A. Sturrock, G. Leonard Tyler, Robert V. Wagoner

*Committee in Charge:* Vahé Petrosian (Director), Roger W. Romani, Sarah Church

*Professors:* Roger Blandford (Physics, SLAC), Blas Cabrera (Physics), Sarah Church (Physics), Steven Kahn (Physics, SLAC), Peter Michelson (Physics, SLAC), Vahé Petrosian (Physics, Applied Physics), Roger W. Romani (Physics)

*Associate Professors:* Steve Allen (Physics, SLAC), Tom Abel (Physics, SLAC)

*Assistant Professors:* Stefan Funk (Physics, SLAC), Chao-Lin Kuo (Physics, SLAC), Risa Wechsler (Physics, SLAC)

*Professor (Research):* Philip H. Scherrer (Physics)

## Astronomy Cognate Courses

### Elementary Lectures

The following courses provide a descriptive knowledge of astronomical objects and astrophysics. PHYSICS 15, PHYSICS 16 Cosmic Horizons, and PHYSICS 17 Black Holes are for students not majoring in the sciences and are taught in different quarters by different instructors, and may be taken individually or in any order.

		Units
PHYSICS 15	The Nature of the Universe	3
PHYSICS 16	Cosmic Horizons	3
PHYSICS 17	Black Holes	3

### Observatory

The following courses are intended to familiarize students with observational methods and analysis of astronomical data. PHYSICS 100 Introduction to Observational and Laboratory Astronomy involves more advanced observations and is intended for students with a college level background in physics.

		Units
PHYSICS 50	Astronomy Laboratory and Observational Astronomy	3
PHYSICS 100	Introduction to Observational and Laboratory Astronomy	4

## Advanced Undergraduate

The following courses are for students with a more advanced knowledge of basic physics and mathematics, and form the core courses for a concentration in astrophysics for Physics majors.

		Units
PHYSICS 160	Introduction to Stellar and Galactic Astrophysics	3
PHYSICS 161	Introduction to Extragalactic Astrophysics and Cosmology	3

## Graduate

		Units
GES 222	Planetary Systems: Dynamics and Origins	3-4
PHYSICS 260	Introduction to Astrophysics and Cosmology	3
PHYSICS 262	Introduction to Gravitation	3
PHYSICS 301	Astrophysics Laboratory	3
PHYSICS 312	Basic Plasma Physics	3
PHYSICS 361	Advanced Topics in Radiative Processes and Stellar Astrophysics	3
PHYSICS 362	Advanced Extragalactic Astrophysics and Cosmology	3

# Athletics, Physical Education, and Recreation

Courses offered by the Department of Athletics, Physical Education, and Recreation are listed under the subject code ATHLETIC on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ATHLETIC&filter-catalognumber-ATHLETIC=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ATHLETIC&filter-catalognumber-ATHLETIC=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ATHLETIC&filter-catalognumber-ATHLETIC=on>).

From the founding of the University, Stanford's leaders have believed physical activity is valuable for its own sake and complementary to the educational purpose of the University. The mission of the Department of Athletics, Physical Education, and Recreation is to offer the widest possible range of quality programs for athletic participation and physical fitness at all levels of skill and interest. Within the limitations of its resources, the department provides a broad range of instructional, recreational, and intramural competitive programs for all who wish to participate. The intrinsic value to the participant is the primary criterion by which the worth of the programs should be judged.

The goals of the department's programs are to promote understanding of the value and role of physical activity as an important dimension of the human condition, to develop performance skills in sport, to develop the habit of participation, and to provide leadership opportunities in aquatics, sports, and other physical activities. To this end, the program encompasses a diversity of learning and participating opportunities from informal recreation through organized intramural competition, basic instructional classes, and theoretical study to, and including, intercollegiate athletic competition.

## Programs in Athletics, Physical Education, and Recreation

No degrees are offered in Physical Education.

### Intercollegiate Athletics

In keeping with American university tradition, Stanford offers a broad intercollegiate athletic program. The objectives are to provide the opportunity to compete at the highest possible level without jeopardizing the integrity of the individual or the institution; to adhere strictly to all University, association, and conference rules governing athletic participation; and to encourage effectively the achievement of academic goals by student athletes at the same rate as other University students. As a member of the National Collegiate Athletic Association (NCAA), Stanford fields both men's and women's varsity teams. Those for men are baseball, basketball, crew, cross country, fencing, football, golf, gymnastics, sailing, soccer, swimming and diving, tennis, track and field, volleyball, water polo, and wrestling. Those for women are basketball, crew, cross country, fencing, field hockey, golf, gymnastics, lacrosse, sailing, soccer, softball, squash, swimming and diving, synchronized swimming, tennis, track and field, volleyball, and water polo.

Both men's and women's teams are affiliated with the Pacific Ten Conference, one of the premier athletic conferences in the nation. Additional or alternative intercollegiate athletic competition is available for all teams.

### Club Sports

The Stanford Club Sports program provides competition in sports not included in the intercollegiate varsity program and instruction in classes or activities not included in the Physical Education program. It also develops student leadership in organizing, administering, and funding activities. The club program is actively supervised by the Coordinator of Club Sports, but the emphasis is on student interest and leadership to initiate, organize, and conduct the respective clubs. Those students in clubs that meet the criteria for inclusion in the formal curriculum may apply for units of credit.

### Intramural Sports (IM)

Students interested in participating in intramural sports should visit the intramural (<http://www.stanford.edu/group/intramurals>) web site for more information. They may visit the IM Office in Ford/Burnham. The program includes formal competition in fifteen team and individual sports, using both league and single elimination tournament play structure. Individuals are encouraged to check the web site at the beginning of each quarter to obtain registration and league information. Registration occurs on the second Monday and Tuesday of each quarter, with mandatory captain meetings held that Thursday evening. Intramural leagues are offered in Autumn, Winter, Spring, and Summer quarters.

### Recreation

The department provides facility use for faculty, staff, and students (and, for some activities, their immediate families) to participate in aquatics, conditioning, and sports for general recreation. Specific recreation hours for all the facilities are posted throughout the year at the respective facilities and at the Physical Education, Recreation & Wellness (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/athleticsphysicaleducationandrecreation/http://suwellness.stanford.edu>) web site.

The golf course and driving range are available for faculty, staff, and student use on a fee basis; information is available from the Golf Pro Shop.

Recreational classes are offered in areas such as rock climbing, indoor cycling, and golf.

## Facilities

Athletic facilities are located throughout the campus. On the west side of campus are the Golf Course, the Golf Driving Range, the Red Barn Stables, Roble Field and Pool, the Sand Hill Intramural Fields, and the West Campus Tennis Courts. Centrally located is the Tresidder Fitness Center. On the east side of campus are the Arrillaga Center for Sports and Recreation, the Arrillaga Family Racquetball Center, the Arrillaga Family Sports Center, Avery Aquatic Center, Burnham Pavilion, Cobb Track and Angell Field, the Ford Center for Sports and Recreation, the Manzanita Basketball Court and Field, Maples Pavilion, Taube South Tennis Courts, and Taube Tennis Stadium.

Off-campus facilities include the Morrison Boathouse, a sailing and rowing facility.

## Curriculum and Services

The diverse instructional program strives to accommodate the sports interests of all undergraduates and graduate students. Only intercollegiate varsity men's and women's teams are limited to undergraduates. Skill groupings and limited class sizes enable the beginning student or the advanced performer to achieve success within the limits of individual motivation and potential. Skill level in, and knowledge about, a specific activity as well as available space are the only limitations to enrollment. Physically disabled students are encouraged to contact Eric Stein (elstein@stanford.edu) for enrollment advice.

## Academic Credit

Activity classes carry 1 unit of credit for satisfactory completion of work. Although there is no limitation on the number of activity classes in which a student may enroll, no more than 8 units of these activity classes (and/or other University activity classes) may be applied toward undergraduate graduation requirements (see the "Undergraduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4868.htm>)" section of this bulletin).

## Auditing

No auditing is allowed in activity classes. Faculty and staff may take an activity class as space is available with instructor consent after student enrollment is completed.

## Class Fees

Fees are charged for enrollment in all physical education activity classes and club sports. Class fees are posted directly to the student's university account.

## Class Sign-ups

Students sign up for classes on Axess. For classes with limited enrollment, students must attend the first class meeting or contact the instructor to guarantee their space in class.

## Deadline for Adding a Class

Students who have never appeared in a class may not enroll in that class after the fourth class meeting has passed. Students may add the class after the fourth meeting if they have been in regular attendance, but must add the class to their study list by the study list deadline, Friday of the third week of the quarter.

## Equipment

Information on equipment and recommended class attire is available from the department or instructor.

## Lockers

Lockers are available for rent to faculty/staff and students at the Arrillaga Family Sports Center, Ford Center and Roble Gym. The fee for faculty/staff is \$30 per quarter or \$70 per year. The fee for students is \$20 per quarter or \$50 per year.

*Emeriti:* (Professor) Wesley K. Ruff; (Associate Director) Robert C. Young; (Assistant Director) Shirley School; (Athletic Director) Ted Leland

*Athletic Director:* Bernard Muir

*Deputy Athletic Directors:* Patrick Dunkley, Ray Purpur

*Senior Associate Athletic Director, Intercollegiate Services/Senior Woman Administrator:* Beth Goode

*Senior Associate Athletic Director, External Relations:* Chris Hutchins

*Senior Associate Athletic Director, Intercollegiate Sports:* Earl Koberlein

*Senior Associate Athletic Director, Physical Education, Recreation, and Wellness:* Eric Stein

*Senior Associate Athletic Director, CFO:* Brian Talbott

*Associate Director of Development, Development:* Joe Karlgaard

*Associate Athletic Director for Business Strategy:* Kevin Blue

*Associate Directors of Development for Major Gifts:* Scott Alexander

*Senior Assistant Athletic Director, Media Relations:* Jim Young

*Assistant Athletic Director, Compliance Services:* Megan Boone

*Assistant Athletic Director, Marketing:* Marie Vasquez

*Assistant Athletic Director, Capital Planning:* David Schinski

*Sport Directors:*

- *Baseball:* Mark Marquess
- *Basketball, men:* Johnny Dawkins
- *Basketball, women:* Tara VanDerveer
- *Crew, men:* Craig Amerkhanian
- *Crew, women:* Yasmin Farooq
- *Crew, Lightweight women:* Al Acosta
- *Cross Country:* Jason Dunn
- *Diving:* Richard Schavone
- *Fencing, men and women:* Lisa Milgram, George Pogossoff
- *Field Hockey:* Tara Danielson
- *Football:* David Shaw
- *Golf, men:* Conrad Ray
- *Golf, women:* Caroline O'Connor
- *Gymnastics, men:* Thom Glielmi
- *Gymnastics, women:* Kristen Smyth
- *Lacrosse:* Amy Bokker
- *Sailing:* John Vandemoer
- *Soccer, men:* Jeremy Gunn
- *Soccer, women:* Paul Ratcliffe
- *Softball:* John Rittman
- *Squash, women:* Mark Talbott
- *Swimming, men:* Ted Knapp
- *Swimming, women:* Lea Maurer
- *Synchronized Swimming:* Sara Lowe
- *Tennis, men:* John Whitlinger
- *Tennis, women:* Lele Forood
- *Track and Field:* Edrick Floreal

- *Volleyball, men*: John Kosty
- *Volleyball, women*: John Dunning
- *Water Polo, men*: John Vargas
- *Water Polo, women*: John Tanner
- *Wrestling*: Jason Borrelli

# Biology, Hopkins Marine Station

Courses offered by the Department of Biology are listed under the subject code BIOHOPK on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOHOPK&filter-catalognumber-BIOHOPK=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>).

The Hopkins Marine Station, located 90 miles from the main University campus in Pacific Grove, was founded in 1892 as the first marine laboratory on the west coast of North America. The modern laboratory facilities on the 11-acre campus on Cabrillo Point house nine faculty, all members of the Department of Biology. The Miller Library has a collection of literature in marine science. The Hopkins faculty offers undergraduate and graduate courses in biology which focus on the marine realm and involve topics including oceanography, environmental and comparative physiology, molecular evolution, biomechanics, cellular biology, conservation biology, and neurobiology and behavior. Most courses have laboratory sections that exploit the potential of working with readily available marine plants and animals. Small class sizes encourage close student-faculty interactions. Undergraduates have opportunities to carry out research projects with Hopkins faculty during the academic year or summer months. Courses are offered in Winter, Spring, and Summer quarters.

Courses at Hopkins Marine Station can satisfy many requirements, from the Natural Sciences GER to major and minor requirements in departments housed in the Schools of Engineering, Humanities and Sciences, and Earth Sciences. Students are encouraged to check with their department's student services office to see which courses at Hopkins may be used to fulfill major or minor requirements.

## Summer Program at Hopkins Marine Station

The summer program is open to advanced undergraduate, graduate students, and postdoctoral students, and to teachers whose biological backgrounds, teaching, or research activities can benefit from a summer's study of marine life. Applications, deadlines, and further information are available at the Hopkins Marine Station (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biologyhopkinsmarinestation/http://hopkins.stanford.edu>) web site.

*Emeritus*: (Professor) David Epel

*Director*: Stephen R. Palumbi

*Associate Director*: George N. Somero

*Professors*: Barbara A. Block, Larry Crowder, Giulio De Leo, Mark W. Denny, William F. Gilly, Fiorenza Micheli, Stephen R. Palumbi, George N. Somero, Stuart H. Thompson

*Assistant Professor*: Christopher J. Lowe

*Lecturer*: James Watanabe

# Biology

Courses offered by the Department of Biology are listed under the subject code BIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>).

The department provides:

- a major program leading to the B.S. degree
- a minor program
- a coterminal program leading to the M.S. degree
- a doctoral program leading to the Ph.D. degree, and
- courses designed for the non-major.

## Mission of the Undergraduate Program in Biology

The mission of the undergraduate program in Biology is to provide students with in-depth knowledge in the discipline, from molecular biology to ecology. Students in the program learn to think and analyze information critically, to draw connections among the different areas of biology, and to communicate their ideas effectively to the scientific community. The major exposes students to the scientific process through a set of core courses and electives from a range of subdisciplines. The Biology major serves as preparation for professional careers, including medicine, dentistry, veterinary sciences, teaching, consulting, research, and field studies.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to use discipline-specific tools and content knowledge to analyze and interpret scientific data, to evaluate the significance of the data, and to articulate conclusions supportable by the data.
2. the ability, independently and collaboratively, to formulate testable scientific hypotheses and to design approaches to obtain data to test the respective hypotheses.
3. the ability to communicate content understanding and research outcomes effectively using various media.

## Mission of the Graduate Program in Biology

For graduate-level students, the department offers resources and experience learning from and working with world-renowned faculty involved in research on ecology, neurobiology, population biology, plant and animal physiology, biochemistry, immunology, cell and developmental biology, genetics, and molecular biology.



The M.S. degree program offers general or specialized study to individuals seeking biologically oriented course work, and to undergraduate science majors wishing to increase or update their science background or obtain advanced research experience.

The training for a Ph.D. in Biology is focused on learning skills required to be a successful research scientist and teacher, including how to ask important questions and then devise and carry out experiments to answer these questions. Students work closely with an established adviser and meet regularly with a committee of faculty members to ensure that they understand the importance of diverse perspectives on experimental questions and approaches. Students learn how to evaluate critically pertinent original literature in order to stay abreast of scientific progress in their areas of interest. They also learn how to make professional presentations, write manuscripts for publication, and become effective teachers.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Biology and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Biology. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Biology and to interpret and present the results of such research.

## Facilities

The offices, labs, and personnel of the Department of Biology are located in the Gilbert Biological Sciences, Herrin Laboratories, Herrin Hall, James H. Clark Center, Lorry I. Lokey Laboratory, and Jerry Yang and Akiko Yamazaki Environment and Energy (Y2E2) buildings. Along with the Carnegie Institution of Washington all are on the main campus. Jasper Ridge Biological Preserve (JRBP) is located near Stanford University's campus in the eastern foothills of the Santa Cruz Mountains. Hopkins Marine Station is on Monterey Bay in Pacific Grove.

Jasper Ridge Biological Preserve encompasses geologic, topographic, and biotic diversity within its 1,189 acres and provides a natural laboratory for researchers from around the world, educational experiences for students and docent-led visitors, and refuge for native plants and animals. See the JRBP (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biology/http://jrpbp.stanford.edu>) web site.

Hopkins Marine Station, located 90 miles from the main University campus in Pacific Grove, was founded in 1892 as the first marine laboratory on the west coast of North America. For more information, including courses taught at Hopkins Marine Station with the subject code BIOHOPK, see the "Hopkins Marine Station (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biology/%20/schoolofhumanitiesandsciences/biologyhopkinsmarinestation>)" section of this bulletin.

The department's large collections of plants (Dudley Herbarium), fish, reptiles, and amphibians, as well as smaller collections of birds, mammals, and invertebrates, are housed at the California Academy of Sciences in San Francisco, where they, and extensive collections of the Academy, are available to those interested in the systematics of these groups. Entomological collections, restricted to those being used in particular research projects, are housed in the Herrin Laboratories. No general collections are maintained except for teaching purposes.

The Falconer Biology Library (<http://library.stanford.edu/depts/falconer>) in Herrin Hall contains over 1,200 current subscriptions and an extensive collection of monographs and reference works. A specialized library is maintained at Hopkins Marine Station.

## Biology Course Numbering System

The department uses the following course numbering system:

Number	Level
000-099	Introductory and Core
100-199	Undergraduate
200-299	Advanced Undergraduate, Coterminal and PhD
300+	PhD

## Bachelor of Science in Biology

The undergraduate major in Biology can serve as a stepping-stone for a wide variety of career opportunities. For students planning to attend medical, dental, or veterinary school, or graduate school in biological and applied sciences, the biology major provides a strong foundation in the basic life sciences. This foundation of knowledge, plus laboratory experience, also prepares students well for research and technical positions in universities, government, and industry.

While a major in Biology provides an excellent background for these technical careers, it can also serve as a valuable and satisfying focus of a liberal arts education for those not planning careers in science-related fields. An understanding of basic biological principles is of increasing importance in today's world. A knowledgeable and concerned citizenry is the best guarantee that these issues will be resolved most effectively. Finally, an understanding of the processes of life can heighten our perception and appreciation of the world around us, in terms of its beauty, variety, and uniqueness.

## Advising

Members of the Biology faculty are available for advising on such academic matters as choice of courses, research, suggested readings, and career plans. The student services office maintains a current list of faculty advisers, advising availability, and research interests.

The student services staff and BioBridge (<http://www.stanford.edu/group/biobridge>), the department's peer advising group, are prepared to answer questions on administrative matters, such as requirements for the major, approved out-of-department electives, transfer course evaluations, and petition procedures. This office also distributes the department's Bachelor of Science Handbook ([http://biology.stanford.edu/sites/all/files/BS\\_Handbook.pdf](http://biology.stanford.edu/sites/all/files/BS_Handbook.pdf)), which delineates policies and requirements, as well as other department forms and informational handouts.

Each undergraduate interested in the Biology major is required to select a department faculty adviser as part of the major declaration process.

## Degree Requirements

Candidates for the general Biology B.S. degree must complete the following, which range from 90-105 total units. There is also an option to add honors to the general major. Honors requirements are explained in detail below.

## Core Courses

(must be taken for a letter grade when available):

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	
BIO 44X	Core Molecular Biology Laboratory	5
BIO 44Y	Core Plant Biology & Eco Evo Laboratory <sup>1</sup>	5
or BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	

<sup>1</sup> BIO 44Y Core Plant Biology & Eco Evo Laboratory not required if completing honors program. Failure to complete honors program results in student being required to complete BIO 44Y Core Plant Biology & Eco Evo Laboratory.

## Required Foundational Breadth Courses

(two courses may be taken credit/no credit):

### Chemistry (25-33)

The following CHEM courses are required:

		Units
CHEM 31A & CHEM 31B	Chemical Principles I and Chemical Principles II	4-10
or CHEM 31X	Chemical Principles	
CHEM 33	Structure and Reactivity	4
or CHEM 1	Structure and Reactivity	
CHEM 35	Organic Monofunctional Compounds	4
or CHEM 2	Organic Monofunctional Compounds	
CHEM 36	Organic Chemistry Laboratory I	3-4
or CHEM 1L & CHEM 2L	Introduction to Organic Chemistry Lab and Organic Chemistry Lab I	
CHEM 130	Organic Chemistry Laboratory II <sup>1</sup>	4
or CHEM 2L & CHEM 3L	Organic Chemistry Lab I and Organic Chemistry Lab II	
CHEM 131	Organic Polyfunctional Compounds	3-4
or CHEM 3	Organic Polyfunctional Compounds	
CHEM 135	Physical Chemical Principles	3
or CHEM 171	Physical Chemistry	

### Physics (8-12)

Select one of the following Series: 8-12

#### PHYSICS 20 Series

PHYSICS 21	Mechanics and Heat	
PHYSICS 22	Mechanics and Heat Laboratory	
PHYSICS 23	Electricity and Optics	
PHYSICS 24	Electricity and Optics Laboratory	

#### PHYSICS 40 Series

PHYSICS 41	Mechanics	
PHYSICS 43	Electricity and Magnetism	
PHYSICS 45	Light and Heat	

#### PHYSICS Summer Series

PHYSICS 28	Mechanics, Heat, and Electricity	
PHYSICS 29	Electricity and Magnetism, Optics, Modern Physics	

### Mathematics (5-10)

Select one of the following Series: 5-10

#### 3-Quarter Calculus Series

MATH 19	Calculus	
MATH 20	Calculus	

MATH 21	Calculus	
2-Quarter Calculus Series		
MATH 41	Calculus	
MATH 42	Calculus	
Advanced Calculus and Linear Algebra		
MATH 51	Linear Algebra and Differential Calculus of Several Variables (or beyond) <sup>2</sup>	
<b>Additional Foundational Breadth Course (3-5)</b>		
Select one of the following:		3-5
BIOHOPK 174H	Experimental Design and Probability <sup>3</sup>	
BIO/STATS 141	Biostatistics <sup>3</sup>	
CS 106A	Programming Methodology	
or CS 106X	Programming Abstractions (Accelerated)	
MATH 51	Linear Algebra and Differential Calculus of Several Variables <sup>2</sup>	
STATS 60/PSYCH 10	Introduction to Statistical Methods: Precalculus	
Total Units		41-60

<sup>1</sup> May be substituted with upper-division, above 100-level quantitative or computational course from this list: BIO 102, 182, 183, 220, 221; BIOC 218; BIOMEDIN 212, 214, 217, 231, 262, 366, 374; CS courses above 106A (may not fulfill both the CHEM 130 and additional foundational breadth requirement); GENE 212, 214, 244; MATH courses above 102; STATS 116, 166, 215.

<sup>2</sup> May be counted either toward the math requirement or foundational breadth, but not both.

<sup>3</sup> If taken to fulfill the foundational breadth requirement, these courses do not count toward the 24 elective unit requirement.

## Electives

24 units required, distributed as follows:

- No more than 6 units applied toward the elective unit requirement may be taken CR/NC.
- Biology (BIO) or Hopkins Marine Station (BIOHOPK) courses numbered 100 or above.
- Approved out-of-department electives ([http://biology.stanford.edu/sites/all/files/out\\_of\\_dept\\_electives.pdf](http://biology.stanford.edu/sites/all/files/out_of_dept_electives.pdf)) (list also available in the student services office).
- No more than 6 units from any combination of these courses may be applied toward the total number of elective units:

		Units
BIO 196A	Biology Senior Reflection	3
BIO 196B	Biology Senior Reflection	3
BIO 196C	Biology Senior Reflection	3
BIO 197WA	Senior Writing Project: The Personal Essay in Biology	3
BIO 198	Directed Reading in Biology	1-15
BIO 198X	Out-of-Department Directed Reading	1-15
BIO 199	Advanced Research Laboratory in Experimental Biology	1-15
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research	3
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	1-15
BIO 290	Teaching of Biology	1-5
BIO 291	Development and Teaching of Core Experimental Laboratories	1-2

BIOHOPK 198H	Directed Instruction or Reading	1-15
BIOHOPK 199H	Undergraduate Research	1-15
BIOHOPK 290H	Teaching of Biological Science	1-15

- One course from at least three of the four central menu areas listed below. The purpose of the central menu is to expose students to a wide range of topics studied within the field of biology and is intended to give students a breadth of knowledge. Please note—this requirement is only for the general major. Students pursuing a specialized field of study should consult the specific degree requirements listed in the "Fields of Study" section below.

## Central Menu Areas

The four Central Menu Areas are: Area 1 (Molecular); Area 2 (Cell/Developmental); Area 3 (Organismal); Area 4 (Ecology and Evolution).

Units

### 1. Molecular (Area 1)

BIO 104	Advanced Molecular Biology	
BIO 113	Fundamentals of Molecular Evolution <sup>3</sup>	
BIO 118	Genetic Analysis of Biological Processes <sup>1</sup>	
BIO 160A	Developmental Biology I <sup>1</sup>	
BIO 160B	Developmental Biology II <sup>1</sup>	
BIO 188	Biochemistry I	
BIO 189	Biochemistry II	
BIO 230	Molecular and Cellular Immunology <sup>1</sup>	
CBIO 101	Cancer Biology <sup>1</sup>	
CEE 274A	Environmental Microbiology I <sup>5</sup>	

### 2. Cell/Developmental (Area 2)

BIO 118	Genetic Analysis of Biological Processes <sup>1</sup>	
BIO 129A	Cellular Dynamics I: Cell Motility and Adhesion	
BIO 129B	Cellular Dynamics II: Building a Cell	
BIO 137	Plant Genetics	
BIO 154	Molecular and Cellular Neurobiology <sup>2</sup>	
BIO 158	Developmental Neurobiology <sup>2</sup>	
BIO 160A	Developmental Biology I <sup>1</sup>	
BIO 160B	Developmental Biology II <sup>1</sup>	
BIO 171	Principles of Cell Cycle Control	
BIO 230	Molecular and Cellular Immunology <sup>1</sup>	
CBIO 101	Cancer Biology <sup>1</sup>	
CEE 274A	Environmental Microbiology I <sup>5</sup>	

### 3. Organismal (Area 3)

BIO 112	Human Physiology	
BIO 153	Cellular Neuroscience: Cell Signaling and Behavior	
BIO 154	Molecular and Cellular Neurobiology <sup>2</sup>	
BIO 158	Developmental Neurobiology <sup>2</sup>	
BIO 163	Neural Systems and Behavior	
BIO 172	Molecular Basis of Body Plan Evolution	
BIOHOPK 161H	Invertebrate Zoology	
BIOHOPK 162H	Comparative Animal Physiology	

BIOHOPK 167H	Nerve, Muscle, and Synapse	
MI 185	Topics in Microbiology	
4. Ecology and Evolution (Area 4)		
BIO 101	Ecology	
BIO 113	Fundamentals of Molecular Evolution <sup>3</sup>	
BIO 121	Biogeography	
BIO 136	Evolutionary Paleobiology	
BIO 143	Evolution	
BIO 144	Conservation Biology	
BIO 145	Behavioral Ecology	
BIO 182	Modeling Cultural Evolution	
BIOHOPK 163H	Oceanic Biology	
BIOHOPK 185H	Ecology and Conservation of Kelp Forest Communities	
BIOHOPK 172H	Marine Ecology	
CEE 274A	Environmental Microbiology I <sup>5</sup>	

1. May be used to satisfy either area I or area II requirement.
2. May be used to satisfy either area II or area III requirement.
3. May be used to satisfy either area I or area IV requirement.
4. May be used to satisfy either area III or area IV requirement.
5. May be used to satisfy area I, area II, or area IV requirement.

## Writing In The Major

Units

3-16

Select one of the following:

BIO 137	Plant Genetics <sup>1</sup>	
BIO 145	Behavioral Ecology <sup>1</sup>	
BIO 196A	Biology Senior Reflection <sup>1</sup>	
BIO 197WA	Senior Writing Project: The Personal Essay in Biology <sup>1</sup>	
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research <sup>1</sup>	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>	

<sup>1</sup> May also count toward the elective requirement.

## Typical Schedule for a Four-Year Program

First Year	Units		
	Autumn	Winter	Spring
Chemical Principles (CHEM 31X) <sup>1</sup>	4		
Calculus (MATH 19)	3		
Freshman requirements, seminars, or GERS	8		
Structure and Reactivity (CHEM 33)		4	
Calculus (MATH 20)		3	
Freshman requirements, seminars, or GERS		8	

Organic Monofunctional Compounds (CHEM 35)	4
Organic Chemistry Laboratory I (CHEM 36)	3
Calculus (MATH 21)	4
Freshman requirements, seminars, or GERs	6
<b>Year Total:</b>	<b>15</b>

	Units		
	Autumn	Winter	Spring
Genetics, Biochemistry, and Molecular Biology (BIO 41)	5		
Organic Chemistry Laboratory II (CHEM 130)	4		
GERs	6		
Cell Biology and Animal Physiology (BIO 42)		5	
Core Molecular Biology Laboratory (BIO 44X)		5	
Organic Polyfunctional Compounds (CHEM 131)		3	
GERs		5	
Plant Biology, Evolution, and Ecology (BIO 43) or Plant Biology, Evolution, and Ecology (BIOHOPK 43)			5
Core Plant Biology & Eco Evo Laboratory (BIO 44Y) or Core Laboratory in Plant Biology, Ecology and Evolution (BIOHOPK 44Y)			5
GERs			8
<b>Year Total:</b>	<b>15</b>	<b>18</b>	<b>18</b>

	Units		
	Autumn	Winter	Spring
Mechanics and Heat (PHYSICS 21)	3		
Mechanics and Heat Laboratory (PHYSICS 22)	1		
GERs or Electives	10		
Electricity and Optics (PHYSICS 23)		3	
Electricity and Optics Laboratory (PHYSICS 24)		1	
GERs or Electives		10	
Physical Chemical Principles (CHEM 135) <sup>2</sup>			3
GERs or Electives			12
<b>Year Total:</b>	<b>14</b>	<b>14</b>	<b>15</b>

	Units		
	Autumn	Winter	Spring
General Education requirements and/or electives	13		
General Education requirements and/or electives		13	
General Education requirements and/or electives			13
<b>Year Total:</b>	<b>13</b>	<b>13</b>	<b>13</b>
<b>Total Units in Sequence:</b>		<b>180</b>	

- <sup>1</sup> This schedule varies slightly if the student takes CHEM 31A Chemical Principles I, CHEM 31B Chemical Principles II
- <sup>2</sup> Or take CHEM 171 Physical Chemistry in autumn

## Fields of Study

In addition to the undergraduate major program described above, the department offers these six fields of study for students wishing to concentrate their studies in particular areas of biology:

- Biochemistry and Biophysics
- Ecology and Evolution
- Marine Biology
- Microbes and Immunity
- Molecular, Cellular, and Developmental Biology
- Neurobiology

These fields of study are declared on Axxess at the time of the major declaration; they appear on the transcript but not on the diploma. Candidates for the B.S. degree in Biology with a field of study are required to complete the departmental honors program as well as the set of requirements outlined below.

## Biochemistry and Biophysics

Candidates for the Biochemistry and Biophysics field of study must complete the following, which range from 101-110 total units:

## Core Courses (must be taken for a letter grade when available):

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	
BIO 44X	Core Molecular Biology Laboratory	5

## Required Foundational Breadth Courses (two courses may be taken credit/no credit):

		Units
<b>Chemistry (22-29)</b>		
The following CHEM courses are required:		
CHEM 31A & CHEM 31B or CHEM 31X	Chemical Principles I and Chemical Principles II Chemical Principles	4-10
CHEM 33 or CHEM 1	Structure and Reactivity	4
CHEM 35 or CHEM 2	Organic Monofunctional Compounds	4
CHEM 36 or CHEM 1L & CHEM 2L	Organic Chemistry Laboratory I Introduction to Organic Chemistry Lab and Organic Chemistry Lab I	3-4
CHEM 130 or CHEM 2L & CHEM 3L	Organic Chemistry Laboratory II Organic Chemistry Lab I and Organic Chemistry Lab II	4
CHEM 135 or CHEM 171	Physical Chemical Principles Physical Chemistry	3

## Physics (12)

PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
PHYSICS 45	Light and Heat	4
<b>Mathematics (10)</b>		
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 52	Integral Calculus of Several Variables	5
<b>Additional Foundational Breadth Course (5)</b>		
STATS 60 or BIO 141	Introduction to Statistical Methods: Precalculus Biostatistics	5
Total Units		49-56

## Required Biology Courses (must be taken for a letter grade):

		Units
BIO 104	Advanced Molecular Biology	5
BIO 118	Genetic Analysis of Biological Processes	5
BIO 129A or BIO 129B	Cellular Dynamics I: Cell Motility and Adhesion Cellular Dynamics II: Building a Cell	4
BIO 188	Biochemistry I	3

## Approved Biochemistry and Biophysics Courses (must be taken for a letter grade):

		Units
Select three of the following:		
APPPHYS/ BIOC 236	Biology by the Numbers: Evolution	8-14
APPPHYS 293	Theoretical Neuroscience	
APPPHYS 294	Cellular Biophysics	
BIO 132/232/ APPPHYS/ BIOPHYS/ MCP 232	Advanced Imaging Lab in Biophysics	
BIO 152/MCP 222	Imaging: Biological Light Microscopy	
BIO 154/254/ NBIO 254	Molecular and Cellular Neurobiology	
BIO 189/289/ CHEM 183/ CHEMENG 183/283	Biochemistry II	
BIO 214/ BIOC 224	Advanced Cell Biology	
BIO 217	Neuronal Biophysics	
BIOC 218	Computational Molecular Biology	
BIOE 101	Systems Biology	
BIOE 103	Systems Physiology and Design	
BIOE/RAD 220	Introduction to Imaging and Image-based Human Anatomy	
BIOMEDIN 210	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	
BIOMEDIN/ BIOE/GENE 214/CS 274	Representations and Algorithms for Computational Molecular Biology	

BIOPHYS/ SBIO 228	Computational Structural Biology
BIOPHYS/ SBIO 241	Biological Macromolecules
CHEM 184	Biological Chemistry Laboratory
CHEM 185	Biochemistry III
EE 268	Introduction to Modern Optics
MCP 256	How Cells Work: Energetics, Compartments, and Coupling in Cell Biology
PHYSICS 105	Intermediate Physics Laboratory I: Analog Electronics

## Electives

7 units required. Electives must be 100-level or above and chosen from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and research are allowed. Only one course can be taken credit/no credit.

## Writing in the Major

		Units
Select one of the following		
BIO 137	Plant Genetics <sup>1</sup>	3-16
BIO 145	Behavioral Ecology <sup>1</sup>	
BIO 196A	Biology Senior Reflection <sup>1</sup>	
BIO 197WA	Senior Writing Project: The Personal Essay in Biology <sup>1</sup>	
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research <sup>1</sup>	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>	

<sup>1</sup> These courses can also be used to count toward the elective requirement.

## Honors Requirements

- Approved Honors Proposal
- 10 units of research from the same lab; only research units from BIO or BIOHOPK are permitted as follows:

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	
BIOHOPK 199H	Undergraduate Research	

- Poster/oral presentation at annual honors symposium
- Approved Honors Thesis
- 3.0 GPA in all courses taken for the major with the exception of research and/or teaching units

## Ecology and Evolution

Candidates for the Ecology and Evolution field of study must complete the following, which range from 99-116 total units:

## Core Courses (must be taken for a letter grade when available):

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	
BIO 101	Ecology <sup>1</sup>	4
or BIOHOPK 172H	Marine Ecology	
Select one of the following:		5
BIO 44X	Core Molecular Biology Laboratory	
BIO 44Y	Core Plant Biology & Eco Evo Laboratory	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	

<sup>1</sup> This course cannot also be used to count toward the elective requirement.

## Required Foundational Breadth Courses (two courses may be taken credit/no credit):

		Units
<b>Chemistry (15-22)</b>		
The following CHEM courses are required:		
CHEM 31A & CHEM 31B	Chemical Principles I and Chemical Principles II	4-10
or CHEM 31X	Chemical Principles	
CHEM 33	Structure and Reactivity	4
or CHEM 1	Structure and Reactivity	
CHEM 35	Organic Monofunctional Compounds	4
or CHEM 2	Organic Monofunctional Compounds	
CHEM 36	Organic Chemistry Laboratory I	3-4
or CHEM 1L & CHEM 2L	Introduction to Organic Chemistry Lab and Organic Chemistry Lab I	
<b>Physics (8-12)</b>		
Select one of the following Series:		8-12
PHYSICS 20 Series		
PHYSICS 21	Mechanics and Heat	
PHYSICS 22	Mechanics and Heat Laboratory	
PHYSICS 23	Electricity and Optics	
PHYSICS 24	Electricity and Optics Laboratory	
PHYSICS 40 Series		
PHYSICS 41	Mechanics	
PHYSICS 43	Electricity and Magnetism	
PHYSICS 45	Light and Heat	
PHYSICS Summer Series		
PHYSICS 28	Mechanics, Heat, and Electricity	
PHYSICS 29	Electricity and Magnetism, Optics, Modern Physics	
<b>Mathematics (5-10)</b>		
Select one of the following Series:		5-10
3-Quarter Calculus Series		
MATH 19	Calculus	
MATH 20	Calculus	
MATH 21	Calculus	

### 2-Quarter Calculus Series

MATH 41	Calculus
MATH 42	Calculus
Advanced Calculus and Linear Algebra	
MATH 51	Linear Algebra and Differential Calculus of Several Variables

Total Units 28-44

## Required Evolutionary Biology Course (must be taken for a letter grade):

		Units
Select one of the following:		3-5
BIO 113	Fundamentals of Molecular Evolution	
BIO 136	Evolutionary Paleobiology	
BIO 143	Evolution	

## Required Quantitative Methods Course (must be taken for a letter grade):

		Units
Select one of the following:		3-5
BIO 141	Biostatistics	
BIOHOPK 174H	Experimental Design and Probability	
CS 106A	Programming Methodology	
or CS 106X	Programming Abstractions (Accelerated)	
STATS 60	Introduction to Statistical Methods: Precalculus (or beyond)	

## Electives (30 units required)

Only one course can be taken credit/no credit. Electives must be from this approved list:

		Units
BIO 101	Ecology	4
BIO 102	Demography: Health, Development, Environment	3
BIO 116	Ecology of the Hawaiian Islands	4
BIO 117	Biology and Global Change	4
BIO 118	Genetic Analysis of Biological Processes	5
BIO 121	Biogeography	3
BIO 131	Mathematics of Complexity	1
BIO 139	Biology of Birds	3
BIO 144	Conservation Biology	3-4
BIO 145	Behavioral Ecology	4
BIO 146	Population Studies	1
BIO 147	Controlling Climate Change in the 21st Century	3
BIO 164	Biosphere-Atmosphere Interactions	4
BIO 166	Faunal Analysis: Animal Remains for the Archaeologist	5
BIO 175	Tropical Ecology and Conservation	5
BIO 182	Modeling Cultural Evolution	3
BIO 183	Theoretical Population Genetics	3
BIO 184	Principles and Practice of Biosystematics	4
BIO 186	Natural History of the Vertebrates	4
BIO 215	Biochemical Evolution	3

BIO 216	Terrestrial Biogeochemistry	3
BIO 220	Introduction to Theoretical Population Biology	2
BIO 227	Foundations of Community Ecology	2
BIO 274S	Hopkins Microbiology Course	3-12
BIOHOPK 161H	Invertebrate Zoology	5
BIOHOPK 162H	Comparative Animal Physiology	5
BIOHOPK 163H	Oceanic Biology	4
BIOHOPK 172H	Marine Ecology	5
BIOHOPK 173H	Marine Conservation Biology <sup>1</sup>	1
BIOHOPK 174H	Experimental Design and Probability	3
BIOHOPK 182H	Stanford at Sea <sup>3</sup>	16
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>3</sup>	8
BIOHOPK 185H	Ecology and Conservation of Kelp Forest Communities <sup>3</sup>	10-12
BIOHOPK 187H	Sensory Ecology	4
BIOHOPK 264H	POPULATION GENOMICS	3
BIOHOPK 275H	Synthesis in Ecology	2
CHEM 130	Organic Chemistry Laboratory II	4
CHEM 131	Organic Polyfunctional Compounds	3
EARTHSYS 144/EESS 164	Fundamentals of Geographic Information Science (GIS)	4
EESS 134	Stable Isotopes in Biogeochemistry	3
EESS 158	Geomicrobiology	3
GES 123	Paleobiology	4
GES 240	Geostatistics	2-3
OSPAUSTL 10	Coral Reef Ecosystems <sup>2</sup>	3
OSPAUSTL 30	Coastal Forest Ecosystems <sup>2</sup>	3

- <sup>1</sup> Only 1 unit can count.  
<sup>2</sup> Only 2 units can count.  
<sup>3</sup> Only 6 units can count.

## Writing in the Major

	Units
Select one of the following:	3-16
BIO 137	Plant Genetics
BIO 145	Behavioral Ecology <sup>1</sup>
BIO 196A	Biology Senior Reflection
BIO 197WA	Senior Writing Project: The Personal Essay in Biology
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>

<sup>1</sup> This course can also be used to count toward the elective requirement.

## Honors Requirements

- Approved Honors Proposal
- 10 units of research from the same lab; only research units from BIO or BIOHOPK are permitted as follows:

	Units
BIO 199	Advanced Research Laboratory in Experimental Biology

BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology
BIOHOPK 199H	Undergraduate Research

- Poster/oral presentation at annual honors symposium
- Approved Honors Thesis
- 3.0 GPA in all courses taken for the major with the exception of research and/or teaching units

## Marine Biology

Candidates for the Marine Biology field of study must complete the following, which range from 92-140 total units:

### Core Courses (must be taken for a letter grade when available):

	Units	
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	
Select one of the following:		5
BIO 44X	Core Molecular Biology Laboratory	
BIO 44Y	Core Plant Biology & Eco Evo Laboratory	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	

### Required Foundational Breadth Courses (two courses may be taken credit/no credit):

	Units	
<b>Chemistry (22-30)</b>		
The following CHEM courses are required:		
CHEM 31A & CHEM 31B	Chemical Principles I and Chemical Principles II	4-10
or CHEM 31X	Chemical Principles	
CHEM 33	Structure and Reactivity	4
or CHEM 1	Structure and Reactivity	
CHEM 35	Organic Monofunctional Compounds	4
or CHEM 2	Organic Monofunctional Compounds	
CHEM 36	Organic Chemistry Laboratory I	3-4
or CHEM 1L & CHEM 2L	Introduction to Organic Chemistry Lab and Organic Chemistry Lab I	
CHEM 130	Organic Chemistry Laboratory II <sup>1</sup>	4
or CHEM 2L & CHEM 3L	Organic Chemistry Lab I and Organic Chemistry Lab II	
CHEM 131	Organic Polyfunctional Compounds	3-4
or CHEM 3	Organic Polyfunctional Compounds	

	Units	
<b>Physics (8-12)</b>		
Select one of the following Series:		
PHYSICS 20 Series		
PHYSICS 21	Mechanics and Heat	
PHYSICS 22	Mechanics and Heat Laboratory	
PHYSICS 23	Electricity and Optics	
PHYSICS 24	Electricity and Optics Laboratory	
PHYSICS 40 Series		
PHYSICS 41	Mechanics	

PHYSICS 43	Electricity and Magnetism	
PHYSICS 45	Light and Heat	
PHYSICS Summer Series		
PHYSICS 28	Mechanics, Heat, and Electricity	
PHYSICS 29	Electricity and Magnetism, Optics, Modern Physics	
<b>Mathematics (5-10)</b>		
Select one of the following Series:		5-10
3-Quarter Calculus Series		
MATH 19	Calculus	
MATH 20	Calculus	
MATH 21	Calculus	
2-Quarter Calculus Series		
MATH 41	Calculus	
MATH 42	Calculus	
Advanced Calculus and Linear Algebra		
MATH 51	Linear Algebra and Differential Calculus of Several Variables	
<b>Additional Foundational Breadth Course (3-5)</b>		3-5
Select one of the following:		
STATS 60	Introduction to Statistical Methods: Precalculus	
BIO 141	Biostatistics	
BIOHOPK 174H	Experimental Design and Probability	
Total Units		38-57

<sup>1</sup> May be substituted with upper-division, above 100-level quantitative or computational course from this list: BIO 102, 182, 183, 220, 221; BIOC 218; BIOMEDIN 212, 214, 217, 231, 262, 366, 374; CS courses above 106A (may not fulfill both the CHEM 130 and additional foundational breadth requirement); GENE 212, 214, 244; MATH courses above 102; STATS 116, 166, 215.

### Required Biology Courses (must be taken for a letter grade):

		Units
BIO 101	Ecology	4
BIO 118	Genetic Analysis of Biological Processes	5
BIO 143	Evolution	3

### Approved courses (must be taken for a letter grade):

		Units
Select four of the following:		15-52
BIO/EARTHSYS 116	Ecology of the Hawaiian Islands	
BIOHOPK 161H	Invertebrate Zoology	
BIOHOPK 162H	Comparative Animal Physiology	
BIOHOPK 163H	Oceanic Biology	
BIOHOPK 167H	Nerve, Muscle, and Synapse	
BIOHOPK 172H	Marine Ecology	
BIOHOPK 173H	Marine Conservation Biology ((must be take for 3 units))	

BIOHOPK 182H	Stanford at Sea	
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County	
BIOHOPK 185H	Ecology and Conservation of Kelp Forest Communities	
OSPAUSTL 10	Coral Reef Ecosystems	
OSPAUSTL 30	Coastal Forest Ecosystems	

<sup>1</sup> These three courses as a whole count as one of the four required courses in this section.

### Writing in the Major

		Units
Select one of the following:		3-16
BIO 137	Plant Genetics	
BIO 145	Behavioral Ecology	
BIO 196A	Biology Senior Reflection	
BIO 197WA	Senior Writing Project: The Personal Essay in Biology	
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>	

<sup>1</sup> This course can also be used to count toward the approved courses requirement.

### Honors Requirements

- Approved Honors Proposal - one Hopkins Marine Station faculty member must be a reader on the thesis
- 10 units of research from the same lab; only research units from BIO or BIOHOPK are permitted as follows:

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	
BIOHOPK 199H	Undergraduate Research	
- Poster/oral presentation at annual honors symposium
- Approved Honors Thesis; one Hopkins Marine Station faculty member must be a reader on the thesis
- 3.0 GPA in all courses taken for the major with the exception of research and/or teaching units

### Microbes and Immunity

Candidates for the Microbes and Immunity field of study must complete the following, which range from 89-116 total units:

### Core Courses (must be taken for a letter grade when available):

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5



BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	
Select one of the following:		5
BIO 44X	Core Molecular Biology Laboratory	
BIO 44Y	Core Plant Biology & Eco Evo Laboratory	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	

BIO 141	Biostatistics <sup>2</sup>	4-5
or BIOHOPK 174H	Experimental Design and Probability	
<b>Total Units</b>		<b>39-57</b>

## Required Foundational Breadth Courses (two courses may be taken credit/no credit):

	Units
<b>Chemistry (22-30)</b>	
The following CHEM courses are required:	
CHEM 31A & CHEM 31B or CHEM 31X	4-10
CHEM 33 or CHEM 1	4
CHEM 35 or CHEM 2	4
CHEM 36 or CHEM 1L & CHEM 2L	3-4
CHEM 130 or CHEM 2L & CHEM 3L	4
CHEM 131 or CHEM 3	3-4
<b>Physics (8-12)</b>	
Select one of the following Series:	8-12
<b>PHYSICS 20 Series</b>	
PHYSICS 21	Mechanics and Heat
PHYSICS 22	Mechanics and Heat Laboratory
PHYSICS 23	Electricity and Optics
PHYSICS 24	Electricity and Optics Laboratory
<b>PHYSICS 40 Series</b>	
PHYSICS 41	Mechanics
PHYSICS 43	Electricity and Magnetism
PHYSICS 45	Light and Heat
<b>PHYSICS Summer Series</b>	
PHYSICS 28	Mechanics, Heat, and Electricity
PHYSICS 29	Electricity and Magnetism, Optics, Modern Physics
<b>Mathematics (5-10)</b>	
Select one of the following Series:	5-10
<b>3-Quarter Calculus Series</b>	
MATH 19	Calculus
MATH 20	Calculus
MATH 21	Calculus
<b>2-Quarter Calculus Series</b>	
MATH 41	Calculus
MATH 42	Calculus
<b>Advanced Calculus and Linear Algebra</b>	
MATH 51	Linear Algebra and Differential Calculus of Several Variables
<b>Additional Foundational Breadth Course (4-5)</b>	

- May be substituted with upper-division, above 100-level quantitative or computational course from this list: BIO 102, 182, 183, 220, 221; BIO 218; BIOMEDIN 212, 214, 217, 231, 262, 366, 374; CS courses above 106A (may not fulfill both the CHEM 130 and additional foundational breadth requirement); GENE 212, 214, 244; MATH courses above 102; STATS 116, 166, 215.
- This course cannot also be used to count toward the elective requirement.

## Required Courses in Microbiology, Immunology, Molecular Evolution (must be taken for a letter grade):

	Units
Select four of the following:	12-24
BIO 132	Advanced Imaging Lab in Biophysics
BIO 177	Plant Microbe Interaction
BIO 230	Molecular and Cellular Immunology
BIOHOPK 274	Hopkins Microbiology Course
CEE 177	Aquatic Chemistry and Biology
CEE 274A	Environmental Microbiology I
CEE 274B	Microbial Bioenergy Systems
CEE 274D	Pathogens and Disinfection
EESS 158	Geomicrobiology
HUMBIO 152	Viral Lifestyles
HUMBIO 155H	Humans and Viruses I
IMMUNOL 185	Brain and the Immune System
IMMUNOL 201	Advanced Immunology I
IMMUNOL 202	Advanced Immunology II
IMMUNOL 209	Translational Immunology
IMMUNOL 260	HIV: The Virus, the Disease, the Research
IMMUNOL 275	Tumor Immunology
MI 104	Innate Immunology
MI 120	Bacteria in Health and Disease
MI 209	Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites: Part I
MI 210	Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites
MI 211	Advanced Immunology I

## Required Course in Reading Scientific Literature (must be taken for a letter grade):

	Units
Select one of the following or students may petition for other courses in reading scientific literature:	3
BIO 178 Microbiology Literature	
MI 185 Topics in Microbiology	

## Electives

12 units required. Electives must be 100-level or above and selected from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and research are allowed. Only one course can be taken credit/no credit.

## Writing in the Major

	Units
Select one of the following:	3-16
BIO 137 Plant Genetics <sup>1</sup>	
BIO 145 Behavioral Ecology <sup>1</sup>	
BIO 196A Biology Senior Reflection <sup>1</sup>	
BIO 197WA Senior Writing Project: The Personal Essay in Biology <sup>1</sup>	
BIO 199W Senior Honors Thesis: How to Effectively Write About Scientific Research <sup>1</sup>	
BIOHOPK 44Y Core Laboratory in Plant Biology, Ecology and Evolution	
BIOHOPK 184H Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>	

<sup>1</sup> This course can also be used to count toward the elective requirement.

## Honors Requirements

1. Approved Honors Proposal
2. 10 units of research from the same lab; only research units from BIO or BIOHOPK are permitted as follows:

	Units
BIO 199 Advanced Research Laboratory in Experimental Biology	
BIO 199X Out-of-Department Advanced Research Laboratory in Experimental Biology	
BIOHOPK 199H Undergraduate Research	

3. Poster/oral presentation at annual honors symposium
4. Approved Honors Thesis
5. 3.0 GPA in all courses taken for the major with the exception of research and/or teaching units

## Molecular, Cellular, and Developmental Biology

Candidates for the Molecular and Cell Biology field of study must complete the following, which range from 99-113 total units:

## Core Courses (must be taken for a letter grade when available):

	Units
BIO 41 Genetics, Biochemistry, and Molecular Biology	5
BIO 42 Cell Biology and Animal Physiology	5
BIO 43 Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43 Plant Biology, Evolution, and Ecology	
Select one of the following:	5
BIO 44X Core Molecular Biology Laboratory	
BIO 44Y Core Plant Biology & Eco Evo Laboratory	
BIOHOPK 44Y Core Laboratory in Plant Biology, Ecology and Evolution	

## Required Foundational Breadth Courses (two courses may be taken credit/no credit):

	Units
<b>Chemistry (25-33)</b>	
The following CHEM courses are required:	
CHEM 31A Chemical Principles I & CHEM 31B and Chemical Principles II	4-10
or CHEM 31X Chemical Principles	
CHEM 33 Structure and Reactivity	4
or CHEM 1 Structure and Reactivity	
CHEM 35 Organic Monofunctional Compounds	4
or CHEM 2 Organic Monofunctional Compounds	
CHEM 36 Organic Chemistry Laboratory I	3-4
or CHEM 1L Introduction to Organic Chemistry Lab and CHEM 2L Organic Chemistry Lab I	
CHEM 130 Organic Chemistry Laboratory II <sup>1</sup>	4
or CHEM 2L Organic Chemistry Lab I & CHEM 3L Organic Chemistry Lab II	
CHEM 131 Organic Polyfunctional Compounds	3-4
or CHEM 3 Organic Polyfunctional Compounds	
CHEM 135 Physical Chemical Principles	3
or CHEM 171 Physical Chemistry	
<b>Physics (8-12)</b>	
Select one of the following Series:	8-12
<b>PHYSICS 20 Series</b>	
PHYSICS 21 Mechanics and Heat	
PHYSICS 22 Mechanics and Heat Laboratory	
PHYSICS 23 Electricity and Optics	
PHYSICS 24 Electricity and Optics Laboratory	
<b>PHYSICS 40 Series</b>	
PHYSICS 41 Mechanics	
PHYSICS 43 Electricity and Magnetism	
PHYSICS 45 Light and Heat	
<b>PHYSICS Summer Series</b>	
PHYSICS 28 Mechanics, Heat, and Electricity	
PHYSICS 29 Electricity and Magnetism, Optics, Modern Physics	
<b>Mathematics (5-10)</b>	
Select one of the following Series:	5-10
<b>3-Quarter Calculus Series</b>	
MATH 19 Calculus	
MATH 20 Calculus	

MATH 21	Calculus	
2-Quarter Calculus Series		
MATH 41	Calculus	
MATH 42	Calculus	
Advanced Calculus and Linear Algebra		
MATH 51	Linear Algebra and Differential Calculus of Several Variables	
<b>Additional Foundational Breadth Course (4-5)</b>		
BIO 141	Biostatistics <sup>2</sup>	4-5
or STATS 60	Introduction to Statistical Methods: Precalculus	
Total Units		42-60

<sup>1</sup> May be substituted with upper-division, above 100-level quantitative or computational course from this list: BIO 102, 182, 183, 220, 221; BIOC 218; BIOMEDIN 212, 214, 217, 231, 262, 366, 374; CS courses above 106A (may not fulfill both the CHEM 130 and additional foundational breadth requirement); GENE 212, 214, 244; MATH courses above 102; STATS 116, 166, 215.

<sup>2</sup> This course can also be used to count toward the elective requirement.

### Required Biology Courses (must be taken for a letter grade):

		Units
BIO 104	Advanced Molecular Biology	5
BIO 118	Genetic Analysis of Biological Processes	5
Select two of the following four courses:		8
BIO 129A	Cellular Dynamics I: Cell Motility and Adhesion	
BIO 129B	Cellular Dynamics II: Building a Cell	
BIO 160A	Developmental Biology I	
BIO 160B	Developmental Biology II	

### Electives (15 units required)

Electives must be 100-level or above and selected from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and research are allowed. Only one course can be taken credit/no credit.

### Writing in the Major

		Units
Select one of the following:		3-16
BIO 137	Plant Genetics <sup>1</sup>	
BIO 145	Behavioral Ecology <sup>1</sup>	
BIO 196A	Biology Senior Reflection <sup>1</sup>	
BIO 197WA	Senior Writing Project: The Personal Essay in Biology <sup>1</sup>	
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research <sup>1</sup>	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution <sup>1</sup>	
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>	

<sup>1</sup> This course can also be used to count toward the elective requirement.

### Honors Requirements

1. Approved Honors Proposal

2. 10 units of research from the same lab; only research units from BIO or BIOHOPK are permitted as follows:

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	
BIOHOPK 199H	Undergraduate Research	

3. Poster/oral presentation at annual honors symposium
4. Approved Honors Thesis
5. 3.0 GPA in all courses taken for the major with the exception of research and/or teaching units

### Neurobiology

Candidates for the Neurobiology field of study must complete the following, which range from 97-112 total units:

### Core Courses (must be taken for a letter grade when available):

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	
Select one of the following:		5
BIO 44X	Core Molecular Biology Laboratory	
BIO 44Y	Core Plant Biology & Eco Evo Laboratory	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	

### Required Foundational Breadth Courses (two courses may be taken credit/no credit):

		Units
<b>Chemistry (22-30)</b>		
The following CHEM courses are required:		
CHEM 31A & CHEM 31B or CHEM 31X	Chemical Principles I and Chemical Principles II Chemical Principles	4-10
CHEM 33 or CHEM 1	Structure and Reactivity Structure and Reactivity	4
CHEM 35 or CHEM 2	Organic Monofunctional Compounds Organic Monofunctional Compounds	4
CHEM 36 or CHEM 1L & CHEM 2L	Organic Chemistry Laboratory I Introduction to Organic Chemistry Lab and Organic Chemistry Lab I	3-4
CHEM 130 or CHEM 2L & CHEM 3L	Organic Chemistry Laboratory II <sup>1</sup> Organic Chemistry Lab I and Organic Chemistry Lab II	4
CHEM 131 or CHEM 3	Organic Polyfunctional Compounds Organic Polyfunctional Compounds	3-4
<b>Physics (8-12)</b>		
Select one of the following Series:		8-12
PHYSICS 20 Series		
PHYSICS 21	Mechanics and Heat	

PHYSICS 22	Mechanics and Heat Laboratory
PHYSICS 23	Electricity and Optics
PHYSICS 24	Electricity and Optics Laboratory
PHYSICS 40 Series	
PHYSICS 41	Mechanics
PHYSICS 43	Electricity and Magnetism
PHYSICS 45	Light and Heat
PHYSICS Summer Series	
PHYSICS 28	Mechanics, Heat, and Electricity
PHYSICS 29	Electricity and Magnetism, Optics, Modern Physics

**Mathematics (5-10)**

Select one of the following Series: 5-10

3-Quarter Calculus Series

MATH 19	Calculus
MATH 20	Calculus
MATH 21	Calculus

2-Quarter Calculus Series

MATH 41	Calculus
MATH 42	Calculus

Advanced Calculus and Linear Algebra

MATH 51	Linear Algebra and Differential Calculus of Several Variables
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**Additional Foundational Breadth Course (4-5)**

BIO 141	Biostatistics <sup>2</sup>	4-5
or STATS 60	Introduction to Statistical Methods: Precalculus	

Total Units 39-57

<sup>1</sup> May be substituted with upper-division, above 100-level quantitative or computational course from this list: BIO 102, 182, 183, 220, 221; BIOC 218; BIOMEDIN 212, 214, 217, 231, 262, 366, 374; CS courses above 106A (may not fulfill both the CHEM 130 and additional foundational breadth requirement); GENE 212, 214, 244; MATH courses above 102; STATS 116, 166, 215.

<sup>2</sup> This course cannot also be used to count toward the elective requirement.

**Required Biology Courses (must be taken for a letter grade):**

BIO 118	Genetic Analysis of Biological Processes	5
or BIO 104	Advanced Molecular Biology	
BIO 158	Developmental Neurobiology	4
Select one of the following:		4
BIO 129A	Cellular Dynamics I: Cell Motility and Adhesion	
BIO 129B	Cellular Dynamics II: Building a Cell	
BIO 160A	Developmental Biology I	
BIO 160B	Developmental Biology II	
Select one from the following list of neural systems courses:		4-8
BIO 149	The Neurobiology of Sleep	
BIO 150	Human Behavioral Biology	
BIO 163	Neural Systems and Behavior	
NBIO 206	The Nervous System <sup>1</sup>	
Select one of the following cell biology courses:		4-8
BIO 154	Molecular and Cellular Neurobiology	
NBIO 206	The Nervous System <sup>1</sup>	

<sup>1</sup> If taken for 8 units, can be used to fulfill the cell biology and neural systems course requirements.

**Electives (12 units required)**

Electives must be at the 100-level or above and selected from the offerings in the Department of Biology, Hopkins Marine Station, or from the list of approved out-of-department electives. Up to 6 units of teaching and/or research are allowed. Only one course can be taken credit/no credit.

**Writing in the Major**

Select one of the following:		Units
		3-16
BIO 137	Plant Genetics <sup>1</sup>	
BIO 145	Behavioral Ecology <sup>1</sup>	
BIO 196A	Biology Senior Reflection <sup>1</sup>	
BIO 197WA	Senior Writing Project: The Personal Essay in Biology <sup>1</sup>	
BIO 199W	Senior Honors Thesis: How to Effectively Write About Scientific Research <sup>1</sup>	
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	
BIOHOPK 184H	Holistic Biology: Waters of Monterey Bay and Monterey County <sup>1</sup>	

<sup>1</sup> These courses can also be used to count toward the elective requirement.

**Honors Requirements**

1. Approved Honors Proposal
2. 10 units of research from the same lab; only research units from BIO or BIOHOPK are permitted as follows:

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	
BIOHOPK 199H	Undergraduate Research	

3. Poster/oral presentation at annual honors symposium
4. Approved Honors Thesis
5. 3.0 GPA in all courses taken for the major with the exception of research and/or teaching units

**Honors**

To graduate with departmental honors, a student must conduct an independent research project typically over the course of at least one year; projects are started no later than Autumn or Winter quarter of the junior year. Research must be done in a Biology Department lab or a lab in another department for which the student has obtained prior approval. Administrative steps include:

1. Submit an approved honors proposal to the department's student services office two quarters prior to graduation. For instance, students graduating Spring Quarter must submit petitions no later than mid-Autumn Quarter.
2. Complete at least 10 units of an approved research project in from the same lab. Only research units from BIO or BIOHOPK are permitted:

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	1-15
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	1-15
BIOHOPK 199H	Undergraduate Research	1-15

- Obtain at least a 3.0 (B) grade point average (GPA) in all Biology major requirements taken at Stanford (foundational breadth, core, and elective courses). Grades earned from teaching and research are not computed into this GPA:

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	1-15
BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology	1-15
BIO 290 or BIOHOPK 290H	Teaching of Biology Teaching of Biological Science	1-5
BIO 291	Development and Teaching of Core Experimental Laboratories	1-2
BIOHOPK 199H	Undergraduate Research	1-15

- If graduating in June, participate in the annual Achauer Undergraduate Biology Honors Symposium by presenting a poster or giving an oral presentation. The symposium is typically at the end of May. If graduating Autumn, Winter, or Summer Quarter, produce a poster to be displayed at the symposium. Students graduating in quarters other than spring, are required to submit a poster in the quarter in which they graduate.
- Complete and submit, by the published deadline within the quarter graduation is expected, two signed and bound copies of an honors thesis approved by at least two readers (one of whom must be from the faculty of the Department of Biology and both must be Academic Council members). In addition, students must submit an electronic copy of the honors thesis abstract which include student name, thesis title, research sponsor, and sponsor's department.

Further information on the honors program is available in the student services office in Gilbert 108, as well as on the Honors Program and Undergraduate Research in Biology (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biology>/<http://biohonors.stanford.edu>) web.

## Hopkins Marine Station

For additional information, see the "Biology, Hopkins Marine Station (p. 295)" section of this bulletin or the Hopkins Marine Station web site (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biology/> <http://hopkins.stanford.edu>).

Courses offered by the Department of Biology are listed under the subject code BIOHOPK on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOHOPK&filter-catalognumber-BIOHOPK=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>).

## Summer Program at Hopkins Marine Station

The summer program is open to advanced undergraduate, graduate students, and postdoctoral students, and to teachers whose biological backgrounds, teaching, or research activities can benefit from a summer's study of marine life. Applications, deadlines, and further information are available at <http://hopkins.stanford.edu>.

## Courses

Courses at Hopkins Marine Station can satisfy many requirements, from the Natural Sciences GER to major and minor requirements in departments housed in the Schools of Engineering, Humanities and Sciences, and Earth Sciences. Students are encouraged to check with their department's student services office to see which courses at Hopkins may be used to fulfill major or minor requirements.

Students may go to Hopkins as early as Spring Quarter in the sophomore year, and can also go in the junior and/or senior year to take elective courses. The following Hopkins Marine Station courses may be used toward the Biology degree requirements:

## Core

		Units
BIOHOPK 43	Plant Biology, Evolution, and Ecology	5
BIOHOPK 44Y	Core Laboratory in Plant Biology, Ecology and Evolution	5

## Electives

		Units
BIOHOPK 160H	Developmental Biology in the Ocean: Diverse Embryonic & Larval Strategies of marine invertebrates	5-8
BIOHOPK 161H	Invertebrate Zoology	5
BIOHOPK 162H	Comparative Animal Physiology	5
BIOHOPK 163H	Oceanic Biology	4
BIOHOPK 165H	The Extreme Life of the Sea	3
BIOHOPK 167H	Nerve, Muscle, and Synapse	5
BIOHOPK 172H	Marine Ecology	5
BIOHOPK 173H	Marine Conservation Biology	1
BIOHOPK 174H	Experimental Design and Probability	3
BIOHOPK 177H	Dynamics and Management of Marine Populations	4
BIOHOPK 181H	Physiology of Global Change	4
BIOHOPK 182H	Stanford at Sea	16
BIOHOPK 187H	Sensory Ecology	4
BIOHOPK 185H	Ecology and Conservation of Kelp Forest Communities	10-12
BIOHOPK 189H	Sustainability and Marine Ecosystems	3
BIOHOPK 264H	POPULATION GENOMICS	3
BIOHOPK 274	Hopkins Microbiology Course	9-12
BIOHOPK 275H	Synthesis in Ecology	2
BIOHOPK 277H	Dynamics and Management of Marine Populations	4

## Research and/or Teaching (maximum 6 units combined)

		Units
BIOHOPK 198H	Directed Instruction or Reading	1-15
BIOHOPK 199H	Undergraduate Research	1-15

BIOHOPK 290H	Teaching of Biological Science	1-15
BIOHOPK 300H	Research	1-15

See Biology degree requirements above for further information. Many of the Hopkins Marine Station courses may be used to fulfill department major requirements.

## Minor in Biology

Students interested in the minor in Biology must declare the minor and submit their course plan online via Axxess no later than two quarters prior to the student's intended quarter of degree conferral. The Biology minor requires a minimum of six courses meeting the following criteria:

- All courses must be taken for a letter grade.
- All courses must be worth or approved for 3 or more units.
- All courses, other than the BIO 41, 42, 43, BIOHOPK 43, OSPASTL 10, 20, or 30 must be at or above the 100-level. Stanford Introductory Seminars may not be used to fulfill the minor requirements.
- Courses used to fulfill the minor may not be used to fulfill any other department degree requirements (minor or major).
- Courses must be chosen from the offerings of the Department of Biology or the Hopkins Marine Station, or from the list of approved out-of-department electives ([http://biology.stanford.edu/sites/all/files/out\\_of\\_dept\\_electives.pdf](http://biology.stanford.edu/sites/all/files/out_of_dept_electives.pdf)).
- At least one course from the Biology Core must be taken:

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
or BIOHOPK 43	Plant Biology, Evolution, and Ecology	

- The Biology Core Laboratory courses do not count towards the minor:

		Units
BIO 44X	Core Molecular Biology Laboratory	5
BIO/BIOHOPK 44Y	Core Plant Biology & Eco Evo Laboratory	5

- Elective credit for research is limited to a maximum of 3 units.

		Units
BIO 199	Advanced Research Laboratory in Experimental Biology	1-15
BIOHOPK 199H	Undergraduate Research	1-15

Not allowable is:

BIO 199X	Out-of-Department Advanced Research Laboratory in Experimental Biology
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## Master of Science in Biology

For information on the University's basic requirements for the M.S. degree, see the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. Students considering this degree option should meet with staff in the student services office prior to applying.

The M.S. degree program offers general or specialized study to individuals seeking biologically oriented course work, and to undergraduate science majors wishing to increase or update their science background or obtain

advanced research experience. Students who have majored in related fields are eligible to apply, but course work equivalent to the preparation of a Stanford B.S. in Biology may be required in addition to the general requirements. This includes course work in biology, chemistry, physics, and mathematics. The M.S. program does not have an M.S. with thesis option.

## Admissions

The department only accepts M.S. program applications from matriculated Stanford students:

- undergraduates wishing to pursue a coterminous MS degree.
- graduate students from other Stanford programs wishing to pursue an MS degree.
- current Biology PhD students wishing to discontinue the PhD program with an MS degree.

Undergraduates must apply in mid-January to start the program in Spring, Autumn, or the following Winter quarter. Graduate students may apply by the third week of any academic quarter.

## Required application materials

- Application for Admission, Preliminary Program Proposal, and Course Transfer Form (<http://studentaffairs.stanford.edu/sites/default/files/registrar/files/CotermApplic.pdf>)
- A statement of purpose which explains why the student wishes to enter the program and what the student plans to accomplish while in the program. The statement should also supply information about the student's science capabilities if his or her undergraduate academic record does not accurately reflect them.
- Unofficial Stanford transcript
- Two letters of recommendation, preferably from Biology faculty members in this department. If two such letters are not available, letters from faculty familiar with the student's ability to succeed in a graduate science curriculum are acceptable.
- Application fee: an application fee is charged to all students regardless of outcome; application fee is applied directly to students' accounts.

## General Requirements

The M.S. program consists of Department of Biology and/or Hopkins Marine Station course work, approved out-of-department electives, and foundational breadth courses totaling at least 45 units at or above the 100-level, distributed as follows:

- A minimum of 23 of the 45 units must be courses designated primarily for graduate students (200-level or higher).
- A minimum of 36 units must be chosen from the offerings in the Department of Biology (BIO) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIO&filter-catalognumber-BIO=on>), Hopkins Marine Station (BIOHOPK) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&page=0&catalog=&q=biohopk&collapse=>), the list of approved out-of-department electives ([http://biology.stanford.edu/sites/all/files/out\\_of\\_dept\\_electives.pdf](http://biology.stanford.edu/sites/all/files/out_of_dept_electives.pdf)), research and teaching, and/or foundational breadth courses.

- A maximum of 18 of the 36 units may be a combination of Biology research, directed reading, and/or teaching:

		Units
BIO 198	Directed Reading in Biology	1-15
BIO 198X	Out-of-Department Directed Reading	1-15
BIO 290	Teaching of Biology	1-5
BIO 291	Development and Teaching of Core Experimental Laboratories	1-2

BIO 300	Graduate Research	1-10
BIO 300X	Out-of-Department Graduate Research	1-10
BIOHOPK 198H	Directed Instruction or Reading	1-15
BIOHOPK 290H	Teaching of Biological Science	1-15
BIOHOPK 300H	Research	1-15

C. a maximum of 9 units may be foundational breadth courses in chemistry, mathematics, statistics, computer science, and/or physics beyond the level required for the undergraduate degree in Biology and at least at the 100-level.

3. No more than 9 units may be other Stanford course work relevant to a student's professional development. Students are required to petition for courses that fall into this category using the General Petition form ([http://biology.stanford.edu/sites/all/files/general\\_petition.pdf](http://biology.stanford.edu/sites/all/files/general_petition.pdf)).

Each candidate designs a coherent program of study in consultation with her or his department adviser. Although there are no specific courses required, program proposals must adhere to department parameters.

In addition to the unit requirements outlined above, students must adhere to the following:

1. A program proposal, signed by the student's adviser and approved by the chair of the M.S. committee, must be filed by the third week of the first quarter of enrollment. A revised program proposal is required to be filed whenever there are changes to a student's previously approved program proposal.
2. Students may take only 6 units CR/NC.
3. Students must maintain a GPA of 3.0 or higher.
4. Students must receive a grade of 'B-' or better in all courses taken for the degree.

Students not meeting these minimum requirements are subject to departmental academic review and/or dismissal.

The department's Master of Science Handbook ([http://biology.stanford.edu/sites/all/files/MS\\_Handbook.pdf](http://biology.stanford.edu/sites/all/files/MS_Handbook.pdf)) has additional information about the program, University policy, and the department.

## Doctor of Philosophy in Biology

For information on the University's basic requirements for the Ph.D. degree, see the "Graduate Degrees (p. 38)" section of this bulletin. The training for a Ph.D. in Biology is focused on learning skills required for being a successful research scientist and teacher, including how to ask important questions and then devise and carry out experiments to answer these questions. Students work closely with an established adviser and meet regularly with a committee of faculty members to ensure that they understand the importance of diverse perspectives on experimental questions and approaches. Students learn how to evaluate critically pertinent original literature in order to stay abreast of scientific progress in their areas of interest. They also learn how to make professional presentations, write manuscripts for publication, and become effective teachers.

### Admissions

Students seeking entrance to graduate study in Biology ordinarily should have the equivalent of an undergraduate major in Biology at Stanford. However, students from other disciplines, particularly the physical sciences, are also encouraged to apply. Such students are advised at the time of initial registration on how they should complete background training during the

first year of graduate study. In addition to the usual basic undergraduate courses in biology, it is recommended that preparation for graduate work include courses in chemistry through organic chemistry, general physics, and mathematics through calculus.

## Application, Admission, and Financial Aid

Prospective graduate students must apply via Stanford's online graduate application (<http://gradadmissions.stanford.edu>).

The department's program is divided into three separate areas of concentration:

- ecology/evolution/population studies
- integrative/organismal
- molecular/cellular/developmental/genetic/plant

Included in these concentrations is the option to conduct research at Hopkins Marine Station. These concentrations are recorded in the department as part of the admissions process and for tracking degree progress for admitted students; they do not appear on official university records.

Applicants are required to take the Graduate Record Examination (GRE) general test. The GRE subject test is not required. Applicants should plan on taking the GRE at least one month prior to the application deadline to ensure that official scores are available when applications are evaluated.

Admission to the Ph.D. program is competitive, and in recent years it has been possible to offer admission to approximately 10 percent of the applicants.

Applicants who are eligible should apply for nationally competitive predoctoral fellowships, especially those offered by the National Science Foundation.

Admitted students are typically offered financial support in the form of Stanford Graduate Fellowships, research assistantships, NIH traineeships, or Biology fellowships.

## General Requirements

All students must be enrolled in exactly 10 units during Autumn, Winter, Spring and Summer quarters until reaching TGR status and are required to pass all courses in which they are enrolled. Students must earn a grade of 'B-' or better in all courses applicable to the degree that are taken for a letter grade. Satisfactory completion of each year's general and track specific requirements listed below is required for satisfactory progress towards the degree. Students not making satisfactory degree progress are subject to departmental academic review and/or dismissal.

### 1. First year advising

Each entering student meets with the first-year advising committee within the first two weeks of Autumn Quarter and again no later than May 15. The committee reviews the student's previous academic work and current goals and advises the student on a program of Stanford courses, some of which may be required and others recommended. Completion of the core curriculum listed below under "Track Specific Requirements" is required of all students.

### 2. Ethics

Students must take a course on the ethical conduct of research

### 3. Units

BIO 312	Ethical Issues in Ecology and Evolutionary Biology	1
MED 255	The Responsible Conduct of Research	1

#### 4. Teaching

Teaching experience and training are part of the graduate curriculum.

Each student assists in teaching one course in

A. the department's core lecture or lab series

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO/ BIOHOPK 43	Plant Biology, Evolution, and Ecology	5
BIO 44X	Core Molecular Biology Laboratory	5
BIO/ BIOHOPK 44Y	Core Plant Biology & Eco Evo Laboratory	5

C. and a second course that can be either a core course or other Biology or Hopkins Marine Station course.

D. A third quarter of teaching is required for ecology, evolution, and population studies students.

#### 5. Seminars

Graduate seminars devoted to current literature and research in particular fields of biology are an important means of attaining professional perspective and competence. Seminars are presented under individual course listings or are announced by the various research groups. Topics of current biological interest are presented by speakers from Stanford and other institutions. During the first year of study, graduate students are required to attend seminars and make one formal seminar presentation which must be evaluated by a minimum of two Biology faculty members.

#### 6. Fellowship application

All eligible first and second year students must apply for a National Science Foundation fellowship.

#### 7. Adviser/lab selection

By April, each first-year student is required to have selected a lab in which to perform dissertation research and to have been accepted by the faculty member in charge.

#### 8. Qualifying exam and admission to candidacy

During the second year, students are required to write a dissertation proposal which is evaluated by a committee of three faculty (the dissertation advising committee) in an oral presentation. Track-specific deadlines are listed below. All students must be admitted to candidacy by the end of their second year. This is contingent upon satisfactory completion of course work, all first and second year requirements, the dissertation proposal, and the University's requirements for candidacy outlined in the Candidacy (<http://www.stanford.edu/dept/registrar/bulletin/4933.htm>) section of this bulletin. If a student does not meet the requirements for admission to candidacy by the end of the second year, the student is subject to dismissal from the PhD program.

#### 9. Advising meetings

Students must meet regularly with their advising committees.

For more details, see the Biology PhD Handbook ([http://biology.stanford.edu/sites/all/files/PhD\\_Handbook.pdf](http://biology.stanford.edu/sites/all/files/PhD_Handbook.pdf)).

#### 10. Publishable manuscript

Each student must complete one publishable manuscript (paper) for which s/he is the major contributor.

#### 11. Residency requirement

A minimum of 135 units of graduate registration is required of each candidate at the time of graduation.

#### 12. Doctoral dissertation

A substantial draft of the dissertation must be turned in to the student's oral examination at least one month before the oral exam is scheduled to take place. The dissertation must be presented to an oral examination committee (<http://www.stanford.edu/dept/registrar/bulletin/4937.htm>) comprised of at least five faculty members. In addition, the final written dissertation must be approved by the student's reading committee (<http://www.stanford.edu/dept/registrar/bulletin/4939.htm>) (a minimum of three approved faculty), and submitted to the Registrar's Office. Upon completion of this final requirement, a student is eligible for conferral of the degree.

### Track Specific Requirements

In addition to the general requirements listed above, students must also complete requirements within their concentration. Written petitions for exemptions to core curriculum and lab rotation requirements are considered by the advising committee and the chair of the graduate studies committee. Approval is contingent upon special circumstances and is not routinely granted.

### Molecular, Cellular, Developmental, Genetic, and Plant

#### 1. First Year:

A. Students are required to take the following courses in their first year for a letter grade:

		Units
BIOS 200	The Nucleus	8
BIO 301	Frontiers in Biology (satisfies first-year seminar requirement; must be taken Autumn and Winter quarters)	1-3

Two additional courses in the student's area of interest as advised by their committee.

B. *lab rotations*: First-year students are required to complete rotations in at least two different laboratories for a total of 20 weeks during Autumn and Winter quarters. At least one rotation must be in a lab in the Department of Biology.

#### 2. Second Year: Each student must pass a two-part qualifying exam.

A. *dissertation proposal*: During Autumn quarter of the second year, the student must prepare a written dissertation proposal that outlines the student's projected dissertation research, including an expert assessment of the current literature; deadline is November 1.

B. *oral examination*: Held after submission of the written proposal to the dissertation advising committee; deadline is November 15. The student's adviser is a silent member of the examination committee; the other members of the dissertation advising committee can provide feedback



## Integrative/Organismal

1. First year:
  - A. Students are required to take the following courses in their first year:
  - B.
 

		Units
BIO 306	Current Topics in Integrative Organismal Biology	1

Students specializing in integrative/organismal biology may be required to take additional courses as advised by committee.
  - C. *first-year paper*: Students must submit a paper that is evaluated by a minimum of two Academic Council faculty members by May 1. This paper should be a step toward the development of a dissertation proposal and may consist of an analysis of new data or a literature review and synthesis.
2. Second year: Each student must pass a two-part qualifying exam.
  - A. *dissertation proposal*: During Spring Quarter of the second year, the student must prepare a written dissertation proposal that outlines the student's projected dissertation research, including an expert assessment of the current literature.
  - B. *oral examination*: Held after submission of the written proposal to the dissertation advising committee comprised of three faculty members. The written proposal is due by May 15, and the oral defense must take place no later than June 15.

## Ecology, Evolution, and Population Studies

1. First year:
  - A. Students are required to take the following courses in their first year:
  - B.
 

		Units
BIO 302	Current Topics and Concepts in Population Biology, Ecology, and Evolution	1
BIO 303	Current Topics and Concepts in Population Biology, Ecology, and Evolution	1
BIO 304	Current Topics and Concepts in Population Biology, Ecology, and Evolution	1

Students specializing in ecology and evolution may be required to take additional courses as advised by committee.
  - C. *first-year paper*: The paper should be read, commented upon, and agreed to as satisfactory by two EcoEvo faculty by May 15. This can be satisfied in a number of ways which all involve new writing, undertaken since entering the Stanford program. These may include:
    - i a new draft research manuscript (a previously published paper is not acceptable).
    - ii some other piece of new writing, such as a review paper from a course, or an initial literature review of a potential thesis topic. In this case the paper should ordinarily be not less than 10 double-spaced pages in usual sized font, and not more than 10 single spaced pages, plus references. It should be written in the style of a standard scientific paper.
2. Second year: Each student must pass a two-part qualifying exam.

- A. *dissertation proposal*: The student should form her/his thesis committee well before the anticipated date of dissertation proposal defense, and should consult committee members in a timely manner to make sure their expectations are clearly understood, and to allow time to produce a professionally effective written proposal. In general, the student should prepare a written document and spoken presentation sufficient to support a 30 minute presentation of the goals of the thesis, typically including preliminary data, models, etc. as appropriate which are relevant to at least the first goal, and should be prepared thereafter to discuss questions raised by the committee in professional scientific depth.
- B. *oral examination*: Held after submission of the written proposal to the dissertation advising committee comprised of three faculty members. The written proposal is due by May 15, and the oral defense must take place no later than June 15.

*Emeriti Professors*: Bruce S. Baker, Winslow R. Briggs, Allan M. Campbell, David Epel, Donald Kennedy, Harold A. Mooney, Peter Ray, Joan Roughgarden, Robert Schimke, Norman K. Wessells, Dow O. Woodward, Charles Yanofsky

*Emeriti Professor (Teaching)*: R. Paul Levine

*Chair*: Robert D. Simoni

*Professors*: Barbara A. Block, Steven M. Block, Larry B. Crowder, Martha S. Cyert, Gretchen C. Daily, Giulio De Leo, Mark W. Denny, Rodolfo Dirzo, Paul R. Ehrlich, Marcus W. Feldman, Russell D. Fernald, Christopher B. Field, Wolf Frommer, Judith Frydman, William F. Gilly, Deborah M. Gordon, Elizabeth A. Hadly, Philip C. Hanawalt, H. Craig Heller, Patricia P. Jones, Richard G. Klein, Ron R. Kopito, Sharon R. Long, Liqun Luo, Susan K. McConnell, Fiorenza Micheli, W. James Nelson, Stephen R. Palumbi, Dmitri Petrov, Robert M. Sapolsky, Carla J. Shatz, Michael A. Simon, Robert D. Simoni, George N. Somero, Tim P. Stearns, Stuart H. Thompson, Shripad Tuljapurkar, Peter Vitousek, Virginia Walbot, Ward B. Watt

*Professor (Teaching)*: Carol L. Boggs

*Associate Professors*: Dominique Bergmann, Or Gozani, Mary Beth Mudgett, Noah A. Rosenberg, Mark J. Schnitzer, Kang Shen

*Assistant Professors*: Xiaoke Chen, Hunter B. Fraser, Tadashi Fukami, Christopher Lowe, Ashby Morrison, Kabir Peay, M. Kristy Red-Horse, Jan M. Skotheim

*Courtesy Professors*: Joseph Berry, Carlos D. Bustamante, Daniel Fisher, Arthur R. Grossman, Joseph S. Lipsick, Terry Root, Matthew P. Scott, Alfred Spormann, Irving Weissman, Wing Wong

*Courtesy Associate Professors*: Kathryn Barton, David Ehrhardt, Sue Rhee, Zhiyong Wang

*Courtesy Assistant Professors*: Jose R. Dinneny, Martin Jonikas, Jonathan Payne

*Lecturers*: Sara E. Brownell, Daria Hekmat-Safe, Waheeda Khalfan, Shyamala D. Malladi, Patricia Seawell, Andrew Todhunter, James Watanabe

*Consulting Professors*: Cathy Laurie, Marc Tessier-Lavigne

*Librarian*: Michael Newman

## Overseas Studies Courses in Biology

Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biology/http://explorecourses.stanford.edu>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/biology/http://bosp.stanford.edu>) web site.

		Units
OSPAUSTL 10	Coral Reef Ecosystems	3
OSPAUSTL 30	Coastal Forest Ecosystems	3
OSPSANTG 76	Ecology and Biodiversity of Latin America	4
OSPSANTG 85	Marine Ecology of Chile and the South Pacific	5

## Biophysics

Courses offered by the Biophysics Program are listed under the subject code BIOPHYS (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOPHYS&filter-catalognumber-BIOPHYS=on>) on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOPHYS&filter-catalognumber-BIOPHYS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOPHYS&filter-catalognumber-BIOPHYS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOPHYS&filter-catalognumber-BIOPHYS=on>).

The Biophysics Program offers instruction and research opportunities leading to the Ph.D. in Biophysics. Students admitted to the program may perform their graduate research in any appropriate department.

The Stanford Biophysics Program is an interdisciplinary, interdepartmental training program leading to the Ph.D. Degree in biophysics. The program centers on understanding biological function in terms of physical and chemical principles. The Program comprises faculty from 16 departments in the Schools of Humanities and Sciences, Medicine, Engineering, and the Stanford Synchrotron Radiation Laboratory. Research in the Program involves two overlapping branches of biophysics: the application of physical and chemical principles and methods to solving biological problems, and the development of new methods.

The Biophysics Program aims to train students in quantitative approaches to biological problems, while also developing their perspective in choosing forefront biological problems. A balanced academic program is tailored to the diverse backgrounds of the students. The program requires graduate-level coursework in physical and biological sciences, participation in seminar series, and most importantly achievement of a high level of proficiency in independent research.

## Learning Outcomes (Graduate)

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Biophysics. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Biophysics and to interpret and present the results of such research.

## Graduate Program in Biophysics

For information on the University's basic requirements for the Ph.D. degree, see the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

A small number of qualified applicants are admitted to the program each year. Applicants should present strong undergraduate backgrounds in the physical sciences and mathematics. The graduate course program, beyond the stated requirements, is worked out for each student individually with the help of appropriate advisers from the Committee on Biophysics. The requirements and recommendations for the Ph.D. degree include:

1. Training in a major with connections to biophysics such as physics, chemistry, or biology, with a quantitative background equivalent to that of an undergraduate physics or chemistry major at Stanford.
2. Completion of the following background courses or their equivalents at other institutions:

		Units
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 175	Physical Chemistry	3
BIOC 200	Applied Biochemistry	1

4. Completion of the following courses or their equivalents:

5. Units

Select one of the following:

BIOPHYS 241	Biological Macromolecules	1
BIOPHYS 250	Seminar in Biophysics	1
BIOE 300A & BIOPHYS 242	Molecular and Cellular Bioengineering and Methods in Molecular Biophysics	3
MED 255	The Responsible Conduct of Research	1

6. Opportunities for teaching are available during the first nine quarters, at the discretion of the advising committee.
7. The student must prepare a dissertation proposal defining the research to be undertaken, including methods of procedure. This proposal should be submitted by Winter Quarter of the third year, and it must be approved by a committee of at least three members, including the principal research adviser and at least one member from the Biophysics Program. The candidate must defend the dissertation proposal in an oral examination. The dissertation reading committee normally evolves from the dissertation proposal review committee.
8. The student must present a Ph.D. dissertation as the result of independent investigation that expresses a contribution to knowledge in the field of biophysics.
9. The student must pass the University oral exam, taken only after the student has substantially completed the dissertation research. The examination is preceded by a public seminar in which the research is presented by the candidate.

*Emeritus:* Harden M. McConnell (Chemistry)

*Director:* Vijay Pande (Chemistry)

*Professors:* Russ Altman (Genetics, Medical Informatics), Steve Block (Applied Physics, Biology), Steven Boxer (Chemistry), Axel Brunger

(Molecular and Cellular Physiology), Gilbert Chu (Oncology), Mark Davis (Microbiology and Immunology), Sebastian Doniach (Physics, Applied Physics), James Ferrell (Chemical and Systems Biology), Daniel Fisher (Applied Physics), Judith Frydman (Biology), K. Christopher Garcia (Molecular and Cellular Physiology, Structural Biology), Gary Glover (Radiology), Philip C. Hanawalt (Biology), Daniel Herschlag (Biochemistry), Keith O. Hodgson (Chemistry), Theodore Jardetzky (Structural Biology), Chaitan Khosla (Chemical Engineering, Chemistry), Brian Kobilka (Molecular and Cellular Physiology), Eric Kool (Chemistry), Ron Kopito (Biology), Roger D. Kornberg (Structural Biology), Craig Levin (Radiology), Michael Levitt (Structural Biology), Richard Lewis (Molecular and Cellular Physiology), Sharon Long (Biology), Tobias Meyer (Chemical and Systems Biology), W. E. Moerner (Chemistry), Vijay Pande (Chemistry), Norbert Pelc (Bioengineering, Radiology), Joseph D. Puglisi (Structural Biology), Stephen Quake (Bioengineering), Stephen J. Smith (Molecular and Cellular Physiology), Edward I. Solomon (Chemistry), James A. Spudich (Biochemistry, Developmental Biology), William I. Weis (Structural Biology, Molecular and Cellular Physiology), Richard N. Zare (Chemistry)

*Associate Professors:* Annelise Barron (Bioengineering), Miriam Goodman (Molecular and Cellular Physiology), Pehr Harbury (Biochemistry), Merritt Maduke (Molecular and Cellular Physiology), Jianghong Rao (Radiology), Mark Schnitzer (Biology, Applied Physics), Julie Theriot (Biochemistry)

*Assistant Professors:* Zev Bryant (Bioengineering), Lynette Cegelski (Chemistry), Jennifer Cochran (Bioengineering), Bianxiao Cui (Chemistry), Rhiju Das (Biochemistry), Adam de la Zerda (Structural Biology), Alexander Dunn (Chemical Engineering), William Greenleaf (Genetics), KC Huang (Bioengineering), Ingmar Riedel-Kruse (Bioengineering), Jan Skotheim (Biology), Andrew Spakowitz (Chemical Engineering), Mary Teruel (Chemical and Systems Biology).

## Chemistry

Courses offered by the Department of Chemistry are listed under the subject code CHEM on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHEM&filter-catalognumber-CHEM=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHEM&filter-catalognumber-CHEM=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHEM&filter-catalognumber-CHEM=on>).

Chemistry is central to many scientific disciplines and plays an important role in the emerging areas of biotechnology, catalysis, human health, materials, and earth and environmental sciences. Developing new probes of biological molecules, modeling of protein folding and reactivity, manipulation of carbon nanotubes, development of new oxidation and polymerization catalysts, and synthesis of organic molecules for probing ion-channels are all research areas that are pursued actively in the Chemistry Department. The overarching theme of these pursuits is a focus at the atomic and molecular levels, whether this concerns probing the electronic structure and reactivity of molecules as small as dihydrogen or synthesizing large polymer assemblies. The ability to synthesize new molecules and materials and to modify existing biological structures allows the properties of complex systems to be analyzed and harnessed for scientific and societal benefit.

## Mission of the Undergraduate Program in Chemistry

The mission of the undergraduate program in Chemistry is to provide students with the fundamental concepts of the molecular sciences through a program of coursework and laboratory experiences. Students acquire in-depth knowledge of the principles of chemistry, the methodologies necessary to solve complex problems, and the ability to articulate their ideas effectively to the scientific community. The Chemistry program also has a long-standing tradition of encouraging undergraduate majors to become involved in research during the academic year and through a ten-week summer research program. The major is designed to provide students with excellent preparation for further study in graduate or professional schools as well as careers in chemistry.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to:

1. understand the knowledge and master the skills to solve problems in the synthesis, measurement and modeling of chemical systems.
2. critically assess and integrate the reasoning process used in chemical science and communicate it effectively in written and spoken form.
3. apply the knowledge and skills gained by study of specific chemical systems to understand and predict the chemistry of a broad range of complex systems of scientific and societal interest.
4. apply the understanding of synthesis, measurement and modeling to extract new chemical information from experimental data and to propose new chemical investigations.

## Chemistry Premedical Recommendations

The department recommends that students interested in a health profession take the following courses for a letter grade:

	<b>Units</b>
Select one of the following:	4-10
CHEM 31A & CHEM 31B	Chemical Principles I and Chemical Principles II
CHEM 31X	Chemical Principles
CHEM 33	Structure and Reactivity 4
CHEM 35	Organic Monofunctional Compounds 4
CHEM 36	Organic Chemistry Laboratory I 3
CHEM 130	Organic Chemistry Laboratory II 4
CHEM 131	Organic Polyfunctional Compounds 3
CHEM 135	Physical Chemical Principles 3
or CHEM 171	Physical Chemistry
CHEM 181	Biochemistry I 3

Historically, these courses have fulfilled the chemistry requirements at most medical schools. For information on medical school advising and resources, please download the Undergraduate Advising and Research publication ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_planning\\_school\\_GraduateSchool.html#5](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_planning_school_GraduateSchool.html#5)).

# Graduate Programs in Chemistry

The University's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Chemistry and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in the field of chemistry. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of chemistry and to interpret and present the results of such research.

## General Requirements

### Placement Examinations

Each new graduate student must take placement examinations upon entrance. These consist of three written examinations of two hours each in the fields of inorganic, organic, and physical chemistry, and cover such material as ordinarily is given in a rigorous one-year undergraduate course in each of these subjects. Students majoring in biophysical chemistry or chemical physics must take examinations in biophysical or chemical physics, physical chemistry, and organic or inorganic chemistry. All placement examinations are given the week before instruction begins in Autumn Quarter, and must be taken at that time. Each new graduate student meets with a member of the graduate study committee to define a program of courses based on results of the placement examinations.

Candidates for advanced degrees must have a minimum grade point average (GPA) of 3.0 for all Chemistry lecture courses as well as for all courses taken during graduate study. Required courses must be taken for a letter grade. Most course work ends in the second year of studies, and students will then focus on full-time dissertation research. During the period in which a dissertation is being read by members of the faculty, candidates must be available for personal consultation until the dissertation has received final department approval.

## Course Requirements

Students may major in biophysical, inorganic, organic, or physical chemistry. All graduate students are required to take six graduate-level lecture courses (course numbers greater than 199) of at least 3 units each in chemistry or related disciplines (for example, biochemistry, electrical engineering, mathematics, chemical and systems biology, physics, and so on), to be selected in consultation with their research adviser and the Graduate Study Committee. A minimum of four courses should be completed by the end of the first year for a letter grade.

In addition:

Students majoring in organic chemistry must complete:

CHEM 231	Organic Chemistry Seminar Presentation (Autumn, Winter, and Spring of the second year)	3
CHEM 233A	Creativity in Organic Chemistry	1
CHEM 233B	Creativity in Organic Chemistry	1
CHEM 233C	Creativity in Organic Chemistry	1

Students in physical or biophysical chemistry or chemical physics must complete:

CHEM 271	Advanced Physical Chemistry (in the first year)	3
CHEM 273	Advanced Physical Chemistry (in the first year)	3
CHEM 275	Advanced Physical Chemistry (in the first year)	3
CHEM 278A	Research Progress in Physical Chemistry	1
CHEM 278B	Research Progress in Physical Chemistry	1
Students majoring in inorganic chemistry must complete:		
CHEM 258A	Research Progress in Inorganic Chemistry	1
CHEM 258B	Research Progress in Inorganic Chemistry	1
CHEM 258C	Research Progress in Inorganic Chemistry	1

## Fellowships and Scholarships

In addition to school fellowships and scholarships open to properly qualified students, there are several department fellowships in chemistry. Undergraduate scholarships are administered through the Financial Aid Office. Teaching assistantships and research assistantships are open to graduate students. Graduate fellowships, scholarships, and teaching assistantships are administered through the Department of Chemistry.

## Teaching Credentials

The requirements for certification to teach chemistry in the secondary schools of California may be ascertained by consulting the section on credentials under the "School of Education (p. 130)" section of this bulletin and the Credential Administrator of the School of Education.

## Chemical Physics

Students with an exceptionally strong background in physics and mathematics may, upon special arrangement, pursue a program of studies in chemical physics.

## Bachelor of Science in Chemistry

### Entrance Preparation

Entrance credit in the preparatory subjects of chemistry, physics, and especially mathematics provides flexibility in creating a four-year schedule for students intending to major in Chemistry.

### Degree Requirements

Additional information on the undergraduate program, including suggested course schedules, can be found on the Department of Chemistry web site beginning with the Requirements for the B.S. Degree in Chemistry (<http://chemistry.stanford.edu/undergradprograms/requirements-bs-degree>). All degree courses must be taken for a letter grade. In addition, students should have exposure to computer programming at the level of MATH 51M Introduction to MATLAB for Multivariable Mathematics, CME 100 Vector Calculus for Engineers, or CS 106A Programming Methodology.

### Chemistry Option

Requirements for students choosing the Chemistry Option:

	Units
Select one of the following:	4-10
CHEM 31A Chemical Principles I & CHEM 31B and Chemical Principles II	
CHEM 31X Chemical Principles	
<b>Required Chemistry Courses (48)</b>	
CHEM 33 Structure and Reactivity	4

CHEM 35	Organic Monofunctional Compounds	4
CHEM 36	Organic Chemistry Laboratory I	3
CHEM 130	Organic Chemistry Laboratory II	4
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 132	Synthesis Laboratory	3
CHEM 134	Analytical Chemistry Laboratory	5
CHEM 151	Inorganic Chemistry I	3
CHEM 153	Inorganic Chemistry II	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 174	Physical Chemistry Laboratory I	4
CHEM 175	Physical Chemistry	3
CHEM 176	Physical Chemistry Laboratory II	3

**Mathematics or CME (15-20)**

Select one of the following series: 15-20

## Series A

MATH 41	Calculus	
MATH 42	Calculus	
MATH 51	Linear Algebra and Differential Calculus of Several Variables	
MATH 53	Ordinary Differential Equations with Linear Algebra	

## Series B

CME 100	Vector Calculus for Engineers	
CME 102	Ordinary Differential Equations for Engineers	
CME 104	Linear Algebra and Partial Differential Equations for Engineers	

**Physics Required Courses (14)**

PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4
PHYSICS 44	Electricity and Magnetism Lab	1
PHYSICS 45	Light and Heat	4
PHYSICS 46	Light and Heat Laboratory	1

Total Units 81-92

**Biological Chemistry Option**

University Writing and General Education Requirements;

**Units**

Select one of the following: 4-10

CHEM 31A	Chemical Principles I	
& CHEM 31B	and Chemical Principles II	
CHEM 31X	Chemical Principles	

**Required Chemistry and Biology courses (56)**

CHEM 33	Structure and Reactivity	4
CHEM 35	Organic Monofunctional Compounds	4
CHEM 36	Organic Chemistry Laboratory I	3
CHEM 130	Organic Chemistry Laboratory II	4
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 132	Synthesis Laboratory	3
CHEM 134	Analytical Chemistry Laboratory	5
CHEM 151	Inorganic Chemistry I	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 176	Physical Chemistry Laboratory II	3
CHEM 181	Biochemistry I	3
CHEM 183	Biochemistry II	3

CHEM 184	Biological Chemistry Laboratory	4
CHEM 185	Biochemistry III	3
BIO 42	Cell Biology and Animal Physiology	5

**Mathematics or CME (15-20)**

Select one of the following Series: 15-20

## Series A

MATH 41	Calculus	
MATH 42	Calculus	
MATH 51	Linear Algebra and Differential Calculus of Several Variables	
MATH 53	Ordinary Differential Equations with Linear Algebra	

## Series B

CME 100	Vector Calculus for Engineers	
CME 102	Ordinary Differential Equations for Engineers	
CME 104	Linear Algebra and Partial Differential Equations for Engineers	

**Required Physics Courses (8)**

PHYSICS 41	Mechanics	4
PHYSICS 43	Electricity and Magnetism	4

**Elective (3-4)**

3-4

Select one graduate-level elective course related to your biochemical interests.

CHEM 221	Advanced Organic Chemistry	
CHEM 223	Advanced Organic Chemistry	
CHEM 225	Advanced Organic Chemistry	
CHEM 227	Synthesis and Analysis at the Chemistry-Biology Interface	
CHEM 235	Applications of NMR Spectroscopy	
CHEM 255	Advanced Inorganic Chemistry	
CHEM 271	Advanced Physical Chemistry	
CHEM 277	Materials Chemistry and Physics (strongly recommended)	
CHEM 297	Bio-Inorganic Chemistry	
BIOC 241	Biological Macromolecules	
BIOPHYS 232	Advanced Imaging Lab in Biophysics	
BIOE 214	Representations and Algorithms for Computational Molecular Biology	
BIOE 222B	Multimodality Molecular Imaging in Living Subjects II	
BIOE 300A	Molecular and Cellular Bioengineering	
BIOE 331	Protein Engineering	
BIOE 335	Molecular Motors I	
BIO 214	Advanced Cell Biology	
BIO 230	Molecular and Cellular Immunology	
BIO 232	Advanced Imaging Lab in Biophysics	

Total Units 86-98

For further information on the undergraduate program, see the Department of Chemistry (<http://chemistry.stanford.edu/undergraduate-programs>) web site.

\* Elective courses must be used to complete the University Writing, General Education, and Language Requirements. They may also be used to broaden one's background in science and non-science areas and to provide an opportunity for advanced study in Chemistry.

## Related Courses

Courses offered by other departments that may be of interest to Chemistry majors include:

		Units
BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
CHEMENG 20	Introduction to Chemical Engineering	3
CHEMENG 120A	Fluid Mechanics	4
CHEMENG 120B	Energy and Mass Transport	4
CHEMENG 130	Separation Processes	3
CME 100	Vector Calculus for Engineers	5
CS 106A	Programming Methodology (recommended for students planning graduate study)	3-5
CS 106B	Programming Abstractions (recommended for students planning graduate study)	3-5
ENGR 50	Introduction to Materials Science, Nanotechnology Emphasis	4
MATH 51M	Introduction to MATLAB for Multivariable Mathematics	1
MATH 52	Integral Calculus of Several Variables	5
MATH 106	Functions of a Complex Variable	3
MATH 109	Applied Group Theory	3
MATH 113	Linear Algebra and Matrix Theory	3
MATH 131P	Partial Differential Equations I	3
MATSCI 151	Microstructure and Mechanical Properties	4
PHYSICS 110	Advanced Mechanics	4
STATS 60	Introduction to Statistical Methods: Precalculus	5
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4-5
STATS 116	Theory of Probability	3-5

## American Chemical Society Certification:

Students who wish to be certified as having met the minimum requirements of the American Chemical Society for professional training must complete, in addition to the above requirements:

		Units
CHEM 181	Biochemistry I	3
CHEM 183	Biochemistry II	3
PHYSICS 45	Light and Heat	4
CHEM 190	Introduction to Methods of Investigation (6 units)	1-5

## Honors Program

A B.S. degree in Chemistry with honors is available to those students interested in chemical research. Admission to the honors program requires a scientific grade point average (GPA) of 3.3 and an overall GPA of 3.0 in all University courses. Beyond the standard B.S. course requirements for each track, 9 units of research credit, and 9 units of course work need to be completed during the junior and senior academic years. A thesis, approved by a Chemistry research adviser, must be completed during the senior year. Theses must be completed by May 15 to be considered for the Firestone or Golden award. The use of a single course for multiple requirements for honors, major, minor, or coterminal requirements is not

allowed. Students who wish to be admitted to the honors program should register in the student services office in the Mudd Chemistry Building in Spring Quarter of their junior year.

CHEM 190 Introduction to Methods of Investigation research units towards honors may be completed, once accepted into the program, in any laboratory within Chemistry or with courtesy faculty in Chemistry. Other chemical research can be approved through a formal petitioning of the undergraduate studies committee. At least 3 units of must be completed during the senior year. Participation in a summer research program in an academic setting between junior and senior years may be used in lieu of 3 units of CHEM 190 Introduction to Methods of Investigation. For each quarter, a progress report reflecting the units undertaken is required. This report must be signed by the Chemistry faculty adviser and filed in the department student services office in Mudd Chemistry before the last day of finals in the quarter during which the research is performed.

The 9 units of course work for honors must be completed from courses approved by the undergraduate studies committee and taken for a letter grade. At least six of these units need to be taken from the following CHEM courses:

		Units
CHEM 153	Inorganic Chemistry II	3
CHEM 174	Physical Chemistry Laboratory I	4
CHEM 175	Physical Chemistry	3
CHEM 181	Biochemistry I	3
CHEM 183	Biochemistry II	3
CHEM 185	Biochemistry III	3
CHEM 221	Advanced Organic Chemistry	3
CHEM 223	Advanced Organic Chemistry	3
CHEM 225	Advanced Organic Chemistry	3
CHEM 235	Applications of NMR Spectroscopy	3
CHEM 251	Advanced Inorganic Chemistry	3
CHEM 255	Advanced Inorganic Chemistry	3
CHEM 271	Advanced Physical Chemistry	3
CHEM 273	Advanced Physical Chemistry	3
CHEM 275	Advanced Physical Chemistry	3
CHEM 297	Bio-Inorganic Chemistry	3
MATH 113	Linear Algebra and Matrix Theory (or higher course number)	3
PHYSICS 100	Introduction to Observational and Laboratory Astronomy (or higher)	3-4

## Minor in Chemistry

Courses required for a minor are:

		Units
CHEM 33	Structure and Reactivity	4
CHEM 35	Organic Monofunctional Compounds	4
CHEM 36	Organic Chemistry Laboratory I	3
CHEM 130	Organic Chemistry Laboratory II	4
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 134	Analytical Chemistry Laboratory	5
CHEM 151	Inorganic Chemistry I	3
CHEM 171	Physical Chemistry (Prerequisite MATH 51)	3
Total Units		29

# Master of Science in Chemistry

The Master of Science is available only to current Ph.D. students or as part of a coterminal program. Applicants for the M.S. degree in Chemistry are required to complete, in addition to the requirements for the bachelor's degree, a minimum of 45 graduate-level units and a M.S. thesis. Of the 45 units, approximately two-thirds must be in the department and must include at least 12 units of graduate level lecture courses exclusive of the thesis. Courses offered in previous years that may count toward the M.S. include CHEM 285.

	Units
Of the 12 units, at least 6 units must be from:	
CHEM 221 Advanced Organic Chemistry	3
CHEM 223 Advanced Organic Chemistry	3
CHEM 225 Advanced Organic Chemistry	3
CHEM 235 Applications of NMR Spectroscopy	3
CHEM 251 Advanced Inorganic Chemistry	3
CHEM 255 Advanced Inorganic Chemistry	3
CHEM 271 Advanced Physical Chemistry	3
CHEM 273 Advanced Physical Chemistry	3
CHEM 275 Advanced Physical Chemistry	3
CHEM 277 Materials Chemistry and Physics	3
CHEM 280 Single-Molecule Spectroscopy and Imaging	3
CHEM 297 Bio-Inorganic Chemistry	3

# Doctor of Philosophy in Chemistry

Graduate students are eligible to become formal candidates for the Ph.D. degree after taking the department placement examinations, satisfactory completion of most of the formal lecture course requirements, and satisfactory progress on a dissertation research project. Admission to candidacy for the Ph.D. degree must be done before June of the second year of graduate registration.

After taking the departmental placement examinations, students select a research adviser by interviewing members of the Chemistry faculty. An Application to Start Research form is submitted to the Department as research begins under the supervision of the adviser. All students in good standing are required to start research by the end of Winter Quarter of the first year of graduate registration.

There is no foreign language requirement for the Ph.D. degree.

Candidates for the Ph.D. degree are required to participate continually in the department colloquium (CHEM 300 Department Colloquium) and in the division seminar of the major subject. In addition, continuous enrollment in CHEM 301 Research in Chemistry is expected after the student has chosen a research supervisor.

Before candidates may request scheduling of the University oral examination, clearance must be obtained from the major professor and the chair of the Graduate Study Committee. Conditions that must be fulfilled before clearance is granted vary with the different divisions of the department and may be ascertained by consulting the chair of the committee.

It is the policy of the department to encourage and support in every possible way the pursuit of research and other advanced work by qualified students. Information about faculty members with lists of their recent research publications is found in Chemistry at Stanford, the Directory of

Graduate Research published by the American Chemical Society, and at the Department of Chemistry (<http://chemistry.stanford.edu>) web site.

# Ph.D. Minor in Chemistry

Candidates for the Ph.D. degree in other departments who wish to obtain a minor in chemistry must complete, with a GPA of 3.0 or higher, 20 graduate-level units in Chemistry including four lecture courses of at least three units each.

*Emeriti:* (Professors) Hans C. Andersen, John I. Brauman, James P. Collman, Carl Djerassi, Harden M. McConnell, Robert Pecora, John Ross

*Chair:* W. E. Moerner

*Vice Chair:* T. Daniel P. Stack

*Professors:* Steven G. Boxer, Hongjie Dai, Michael D. Fayer, Keith O. Hodgson, Wray H. Huestis, Chaitan Khosla, Eric T. Kool, Todd J. Martínez, W. E. Moerner, Vijay S. Pande, Edward I. Solomon, Barry M. Trost, Robert M. Waymouth, Paul A. Wender, Richard N. Zare

*Associate Professors:* Christopher E. D. Chidsey, Justin Du Bois, T. Daniel P. Stack

*Assistant Professors:* Noah Z. Burns, Lynette Cegelski, Bianxiao Cui, Matthew Kanan, Hemamala Karunadasa, Thomas E. Markland

*Courtesy Professors:* Stacey F. Bent, Curtis W. Frank, Daniel Herschlag

*Courtesy Associate Professors:* James K. Chen, Karlene A. Cimprich, Yi Cui, Jianghong Rao, Thomas J. Wandless

*Lecturers:* Charles Cox, Hillary Hua, Megan McClory, Jennifer Schwartz (Poehlmann)

*Director of Undergraduate Laboratories:* Hillary Hua

# Classics

Courses offered by the Department of Classics are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject codes CLASSART (Classics Art/Archaeology), CLASSGEN (Classics General), CLASSGRK (Classics Greek), CLASSHIS (Classics History), and CLASSLAT (Classics Latin).

The study of Classics has traditionally centered on the literature and material culture of ancient Greece and Rome, including Greek and Latin language, literature, philosophy, history, art, and archaeology. At Stanford, Classics also explores connections with other ancient cultures and with the modern world, as well as specialized fields such as ancient economics, law, papyrology, and science. The department's faculty approaches Classics from an interdisciplinary perspective that crosses geographical, temporal, and thematic territories. Studying ancient epic poetry can lead to looking at modern cinema afresh; ancient Athenian politics opens new perspectives on modern politics; and the study of Rome presents parallels with other empires just as Latin illuminates the history of English and the Romance languages. In short, Classics at Stanford is an interdisciplinary subject concerned not only with Greek and Roman civilization but also with the interaction of cultures and societies that influenced the ancient Mediterranean basin and continue to influence human society across the globe.

# Mission of the Undergraduate Program in Classics

The mission of the undergraduate program in Classics is to provide students with a broad background centered on the literature and material culture of

ancient Greece and Rome, including Greek and Latin language, literature, philosophy, history, art, and archaeology. At Stanford, students in the Classics program also explore the connections between ancient cultures and the modern world as well as specialized fields such as ancient economics, law, papyrology, and science. The program’s faculty approaches Classics from an interdisciplinary perspective that crosses geographical, temporal and thematic territories. The program is concerned not only with Greek and Roman civilization but also with the interaction of cultures and societies that influenced the ancient Mediterranean basin and continue to influence human society across the globe.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department’s undergraduate program. Students are expected to demonstrate:

1. The ability to develop effective and nuanced lines of interpretation.
2. Critical thinking skills using primary source materials.
3. Facility with the methodologies and presuppositions underlying interpretive positions in secondary literature and in their own work.
4. Well-developed analytical writing skills and close reading skills.

The department offers the following fields of study for undergraduate degrees in Classics:

- Classical Studies
- Ancient History
- Greek
- Latin
- Greek and Latin

The Classical Studies, Greek, and Latin fields of study may also be taken with a Philosophy and Literature focus. The Classics major can be completed in conjunction with a second major in the sciences or in other humanities departments.

The department also offers minors in: Classical Languages, Ancient History, Literature and Philosophy, and Classical Studies.

## Learning Outcomes (Graduate)

The purpose of the master’s program is to further develop knowledge and skills in Classics and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Classics. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Classics and to interpret and present the results of such research.

## Bachelor of Arts in Classics

Those interested in majoring in Classics are encouraged to declare by the beginning of their junior year, but are urged to discuss their plans with the undergraduate director as early as possible. Students who choose the Greek and Latin field of study (option 5 below) should begin the curriculum as soon as possible because it is difficult to complete the

language requirements without an early start; those with no previous knowledge of Latin or Greek should begin study in the freshman year, in a summer program following freshman year, or at the beginning of the sophomore year.

To declare the major, a student must fill out the Declaration of Major on Axess and meet with the undergraduate director in the Department of Classics. At that time, the undergraduate director assigns the student a department adviser. To build a mentoring relationship, students meet with their adviser at least once a quarter. The student should then schedule an orientation with the student services officer. Each student’s progress towards fulfillment of the major requirements is recorded in a file kept in the student services officer’s office. It is the student’s responsibility to work with the adviser to keep this file up to date.

A letter grade is required in all courses taken for the major. No course receiving a grade lower than ‘C’ is counted toward fulfilling major requirements. Enrollment in an independent study section (CLASSGEN 160: Directed Reading) requires the prior approval of the undergraduate director, and a maximum of three such enrollments for a maximum total of 10 units may be counted toward the major. University credit earned by placement tests or advanced placement work in secondary school is not counted towards any major program in the department; work done in other universities or colleges is subject to department evaluation.

The B.A. degree may be earned by fulfilling the requirements for one of the following fields of study. These fields of study are declared on Axess; they appear on the transcript but not on the diploma. The fields of study are:

- Classical Studies
- Ancient History
- Greek
- Latin
- Greek and Latin

The Philosophy and Literature focus described below may be added to some of the major plans. This focus is not declared on Axess, and does not appear on the transcript or diploma.

### A. Classical Studies

This field of study is declared on Axess; it appears on the transcript but it does not appear on the diploma.

This major is recommended for students who wish to study classical civilizations in depth but do not wish to study the languages to the extent required by the Greek, Latin or Greek and Latin options described below. It is not suitable for students who wish to do graduate work in Classics or to teach Latin or Greek in high school, as the language work is insufficient for these purposes.

Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region.

Courses counted for the degree must be taken for a letter grade. Students must complete at least 60 units of approved courses including:

	Units
Students must complete at least 60 units of approved courses including:	
CLASSGEN 176 Majors Seminar	5
at least two courses in Latin or Greek at the 100 level or higher	6-20
or one course in one of the languages at the 100 level or higher, plus the 1,2,3 series of the other language	
remaining units from courses with the prefix CLASSART, CLASSGEN, CLASSHIS, CLASSLAT, or CLASSGRK <sup>1,2</sup>	35-49
<b>Total Units</b>	<b>60</b>



- Up to 8 units of THINK 10, THINK 16, THINK 35/THINK 35A (please note that this is the same course), IHUM 39A,B, IHUM 69A, or SLE may be counted toward the major; note that IHUM courses are no longer offered.
- Courses listed in the department's cognate course list may also count towards the major with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken.

## B. Ancient History:

This field of study is declared on Axess; it appears on the transcript but it does not appear on the diploma.

Courses chosen must be approved in advance and in writing by the undergraduate director. Approval should be submitted to the student services officer for the student's academic file. With the written approval of the instructor and the undergraduate director, students may substitute graduate seminars in ancient history for some of these courses. Students are also encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region.

Courses counted for the degree must be taken for a letter grade.

	Units
Students must complete at least 60 units of approved courses and must satisfy four requirements:	
CLASSGEN 176 Majors Seminar (satisfies WIM requirement)	5
<b>Core Requirement (10)</b>	
Complete two survey courses in ancient history; some such courses offered this year include:	10
CLASSHIS 60 The Romans	
CLASSHIS 101 The Greeks	
CLASSHIS 105 The Egyptians	
<b>Depth Requirement (33)</b>	
Complete at least 33 units of ancient history and civilization courses, drawn from courses with CLASSHIS, CLASSGEN and CLASSART subject code <sup>1,2</sup>	33
<b>Breadth Requirements (12)</b>	
Complete at least 4 units in each of the following three areas <sup>3</sup>	
1. Archaeology and art; courses offered this year include: <sup>4</sup>	4
CLASSART 85 The Archaeology of Roman Imperialism	
CLASSART 101 Archaic Greek Art	
CLASSART 102 Empire and Aftermath: Greek Art from the Parthenon to Praxiteles	
CLASSART 109 Greek Art In and Out of Context	
CLASSART 110 Appropriations of Greek Art	
CLASSART 113 Ten Things: An Archaeology of Design	
CLASSART 118 Hagia Sophia	
CLASSART 125 To the Gods of the Underworld: Roman Funerary Archaeology	
CLASSART 132 Lost and found: Roman Coinage	
ARCHLGY 1 Introduction to Prehistoric Archeology	

ARCHLGY 103	History of Archaeological Thought	
ARCHLGY 106A	Museums and Collections	
ARCHLGY 107A	Archaeology as a Profession	
ARCHLGY 111	Emergence of Chinese Civilization from Caves to Palaces	
ARCHLGY 124	Archaeology of Food: production, consumption and ritual	
ARCHLGY 125	ARCHAEOLOGICAL SURVEY METHODS	
ARCHLGY 127	Introduction to bioarchaeological Method and Theory	
ARCHLGY 129	Archaeology, Heritage, and the Contemporary Middle East	
ARCHLGY 132	The Anthropology of Heritage: Concepts, Contexts and Critique	
ARCHLGY 139	The Aegean in the Neolithic and Bronze Age	
ARCHLGY 142	Lost and found: Roman Coinage	
2. Comparative ancient civilizations: complete a course on the ancient world outside the Mediterranean and western Asia. Courses offered this year include:		4
ANTHRO 3	Introduction to Prehistoric Archeology	
CHINGEN 141	Emergence of Chinese Civilization from Caves to Palaces	
ANTHRO 101	The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology	
ANTHRO 102A	Ancient Civilizations: Complexity and Collapse	
ANTHRO 105	Ancient Cities in the New World	
ANTHRO 124	Maya Mythology and the Popol Vuh	
ANTHRO 24N	Maya Hieroglyphic Writing	
3. Historical and social theory. Courses offered this year include:		4
ANTHRO 1	Introduction to Cultural and Social Anthropology	
ANTHRO 90B	Theory of Cultural and Social Anthropology	
SOC 1	Introduction to Sociology at Stanford	
SOC 140	Introduction to Social Stratification	
SOC 142	Sociology of Gender	
SOC 170	Classics of Modern Social Theory	
Total Units		60

- 1 THINK 10, THINK 16, THINK 35A, IHUM 39A,B, or IHUM 69A, History of the World, may be counted toward this requirement. Note that IHUM courses are no longer offered.
- 2 CLASSGRK (<https://explorecourses.stanford.edu/search?q=CLASSGRK&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-academiclevel-UG=on&filter-coursestatus-Active=on&collapse=%2C7%2C&filter-catalognumber-CLASSGRK=on&filter-catalognumber-CLASSGRK=on>) and CLASSLAT (<https://explorecourses.stanford.edu/search?q=CLASSLAT&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-academiclevel-UG=on&filter-coursestatus-Active=on&collapse=%2C7%2C&filter-catalognumber-CLASSLAT=on&filter-catalognumber-CLASSLAT=on>) courses may also count toward this requirement if approved by the undergraduate director.
- 3 The courses chosen must be approved in advance by the undergraduate director, and are normally chosen from the list of areas noted , although courses listed in the department’s cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director. Written approval must be submitted to the student services officer for inclusion in the student’s academic file prior to the end of the term in which the course is taken.
- 4 IHUM 40B, may be counted toward this requirement. This course is no longer offered.

## C. Greek

This field of study is declared on Axxess; it appears on the transcript but it does not appear on the diploma.

Beginning courses in Greek, if required, may be counted towards the total of 60 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the undergraduate director. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region.

### Units

Students must complete at least 60 units of approved courses including:

CLASSGEN 176 Majors Seminar	5
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At least 31 units of CLASSGRK courses at the 100-level or higher. It is recommended that these include CLASSGRK 175A/CLASSGRK 175B, though this series should not be taken until students have completed three years of Greek.

At least three courses with the prefix CLASSART, CLASSGEN, or CLASSHIS <sup>1,2</sup>	9-15
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Recommended additional coursework in Latin, Sanskrit or ancient history.

CLASSLAT 1 Beginning Latin: Vocabulary and Syntax	
CLASSLAT 2 Beginning Latin	
CLASSLAT 3 Beginning Latin	
CLASSLAT 10 Intensive Beginning Latin	
CLASSLAT 101 Intermediate Latin: Introduction to Literature	
CLASSLAT 102 Intermediate Latin: Catullus and Pliny	
CLASSLAT 103 Intermediate Latin: Cicero and Ovid	
SPECLANG 183A First-Year Sanskrit, First Quarter	
SPECLANG 183B First-Year Sanskrit, Second Quarter	

SPECLANG 183C First-Year Sanskrit, Third Quarter	
<b>Total Units</b>	<b>60</b>

- 1 Up to 8 units of THINK 10, THINK 16, THINK 35/THINK 35A (please note that this is the same course), IHUM 39A,B, IHUM 69A, or SLE may be counted toward the major; note that IHUM courses are no longer offered.
- 2 Courses listed in the department’s cognate course list may also count towards the major with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student’s academic file prior to the end of the term in which the course is taken.

## D. Latin

This field of study is declared on Axxess; it appears on the transcript but it does not appear on the diploma.

Beginning courses in Latin, if required, may be counted towards the total of 60 units. Relevant courses in other departments of the humanities may count towards the major with the consent of the undergraduate director. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region.

### Units

Students must complete at least 60 units of approved courses including:

CLASSGEN 176 Majors Seminar	5
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At least 31 units of CLASSLAT courses at the 100-level or higher (it is recommended that this include CLASSLAT 175A/CLASSLAT 175B, though this series should not be taken until students have completed three years of Latin)

At least three courses with the prefix CLASSART, CLASSGEN or CLASSHIS <sup>1,2</sup>	9-15
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Recommended additional coursework in Ancient Greek, Sanskrit or ancient history

CLASSGRK 1 Beginning Greek	
CLASSGRK 2 Beginning Greek	
CLASSGRK 3 Beginning Greek	
CLASSGRK 5 Biblical Greek	
CLASSGRK 5B Biblical Greek II	
CLASSGRK 101 Intermediate Greek: Symposium	
CLASSGRK 102 Intermediate Greek	
CLASSGRK 103 Intermediate Greek	
CLASSHIS 101 The Greeks	
CLASSHIS 60 The Romans	
CLASSHIS 105 The Egyptians	
CLASSHIS 114 Economy and Economics of Ancient Greece	
CLASSHIS 133 Classical Seminar: Origins of Political Thought	
<b>Total Units:</b>	<b>60</b>

- Up to 8 units of THINK 10, THINK 16, THINK 35/THINK 35A (please note that this is the same course), IHUM 39A,B, IHUM 69A, or SLE may be counted toward the major; note that IHUM courses are no longer offered.
- Courses listed in the department's cognate course list may also count towards the major with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken.

## E. Greek and Latin

This field of study is declared on Axess; it appears on the transcript but it does not appear on the diploma.

Relevant courses in other departments of the humanities may count towards the major with the consent of the undergraduate director. Students are encouraged to meet with the undergraduate director to discuss options for pursuing a period of study in the Mediterranean region.

	Units
Students must complete at least 60 units of approved courses including:	
CLASSGEN 176 Majors Seminar (WIM)	5
At least 30 units of CLASSLAT courses at the 100-level or higher (It is recommended that this include CLASSLAT 175A,B, although this series should not be taken until completion of three years of Latin)	30
CLASSLAT 1 Beginning Latin: Vocabulary and Syntax	
CLASSLAT 2 Beginning Latin	
CLASSLAT 3 Beginning Latin	
CLASSLAT Intensive Beginning Latin	
10	
CLASSLAT Intermediate Latin: Introduction to Literature	
101	
CLASSLAT Intermediate Latin: Catullus and Pliny	
102	
CLASSLAT Intermediate Latin: Cicero and Ovid	
103	
CLASSLAT Advanced Latin: Virgil's Eclogues	
111	
CLASSLAT Advanced Latin: Cicero and Sallust on Catiline	
112	
CLASSLAT Advanced Latin: Ovid and Lucan	
113	
At least 30 units of CLASSGRK courses at the 100-level or higher (It is recommended that this include CLASSGRK 175A,B, although this series should not be taken until completion of three years of Greek)	30
CLASSGRK Beginning Greek	
1	
CLASSGRK Beginning Greek	
2	
CLASSGRK Beginning Greek	
3	
CLASSGRK Intermediate Greek: Symposium	
101	
CLASSGRK Intermediate Greek	
102	
CLASSGRK Intermediate Greek	
103	
CLASSGRK Advanced Greek: Homer's Helen and Helen in Prose	
111	
CLASSGRK Advanced Greek: Lyric Poetry	
112	

CLASSGRK	Advanced Greek: Scientific Writing	113
CLASSGRK	Greek Syntax: Prose Composition	175A
CLASSGRK	Greek Syntax: Prose Composition	175B
CLASSGRK	Biblical Greek	5
CLASSGRK	Biblical Greek II	5B
Recommended additional coursework in Sanskrit or ancient history		
SPECLANG	First-Year Sanskrit, First Quarter	183A
SPECLANG	First-Year Sanskrit, Second Quarter	183B
SPECLANG	First-Year Sanskrit, Third Quarter	183C
CLASSHIS	The Romans	60
CLASSHIS	The Greeks	101
CLASSHIS	The Egyptians	105
CLASSHIS	Economy and Economics of Ancient Greece	114
CLASSHIS	Classical Seminar: Origins of Political Thought	133
Total Units:		60

## F. Philosophy and Literature Focus:

Students who wish to add a Philosophy and Literature focus to the Classical Studies, Greek, Latin, or Greek and Latin majors should also take the courses listed below:

	Units	
PHIL 81	Philosophy and Literature	4-5
PHIL 80	Mind, Matter, and Meaning	5
One course in each of the following areas:		
1. aesthetics, ethics, and social and political philosophy		3-5
PHIL 170	Ethical Theory	
PHIL 170B	Metaphor	
2. philosophy of language, mind, metaphysics, and epistemology		3-5
PHIL 180	Metaphysics	
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	
3. history of philosophy (any course with prefix PHIL at the 100-level or above)		3-5
Two related courses in Classics or Philosophy. Students may double count a Classics course in Philosophy or ancient science for one of the two related courses provided that this course fulfills the Philosophy and Literature requirements and is approved by a member of the committee in Philosophy and Literature.		6-10
One capstone seminar		3-5
ENGLISH	Irony: From Socrates to David Foster Wallace	117A
COMPLIT	Martin Heidegger	213A

GERMAN 282	Martin Heidegger
COMPLIT 199	Senior Seminar

(<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/classics/http://cyathens.org>) offer a quarter, semester, or summer session in Greece. Interested students should visit the Bing Overseas Studies Program in Sweet Hall.

## Honors Program

A minimum grade point average (GPA) of 3.6 within the major is required for students to enroll in the honors program. To be considered for honors in Classics, the student must select a professor who can supervise his or her honors thesis. A preliminary proposal, approved by the supervisor, is due April 15 of the junior year, and a final version is due at the beginning of the senior year. The proposal must outline the project in detail, list relevant courses that have been taken, and name the supervisor. The department gives approval only if a suitable faculty supervisor is available and if it is satisfied that the student has a sufficient basis of knowledge derived from department course work in the general areas the thesis covers, such as art, Greek, Latin, history, literature, or philosophy. If the proposal is approved, the student may sign up for CLASSGEN 199 Undergraduate Thesis: Senior Research, during the senior year for a maximum of 6 units per term, up to an overall total of 10 units. These units may be counted towards fulfillment of the student's majors track requirements if relevant. Honors are awarded only if the essay receives a grade of 'B+' or higher from the supervisor and a second reader, who is chosen by the department. In addition, students must graduate with a GPA of 3.6 or higher within the major to receive honors.

## Study Abroad

Funding—Undergraduates whose record in Classics indicates that they are qualified may apply for funding from the Department of Classics. Students must submit a proposal to the undergraduate director as part of the Undergraduate Summer Research Grant Application; see the undergraduate page at <http://classics.stanford.edu> for the application. The proposal should include an itemized list of expenses based on the fees charged by the program, including room, board, tuition, and other expenses. Food expenses are not normally reimbursed unless they are an integral part of the program package. Limited funding is available each year; preference is shown to students with strong records.

## Programs

- Italy: Classics majors are encouraged to apply for the Intercollegiate Center for Classical Studies in Rome ([http://studyabroad.duke.edu/home/Programs/Semester/ICCS\\_Rome](http://studyabroad.duke.edu/home/Programs/Semester/ICCS_Rome)), which is managed by Duke University for about 50 constituent colleges and universities. It is open to Stanford majors in Classics, History, and Art History. All courses receive full credit at Stanford and may be applied to the respective major. Students interested in this program should consult the undergraduate director and the ICCS representative in the Department of Classics as early as possible in their career at Stanford to plan their course preparation and application. Competition is strong, and applicants are expected to have taken one or more courses in Roman history and at least one year of Latin before they arrive in Rome. Brochures are available at the department office. Other programs offer a quarter, semester, or summer session in Rome. Interested students should consult with the Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/classics/http://bosp.stanford.edu>).
- Greece: Students are encouraged to apply for the summer session at the American School of Classical Studies in Athens (<http://ascsa.edu.gr>). The school is recommended principally for Classics majors with at least two years of ancient Greek. A student wishing to apply should prepare by taking courses in Greek history, archaeology, and art; beginning modern Greek is strongly recommended. Applicants should see the undergraduate director early in the academic year. Other programs such as College Year in Athens

## Minor in Classics

The undergraduate director meets with each student who opts for a minor to discuss curriculum choices and assigns the student an adviser in the relevant field. Students are required to work closely with their advisers to create a cohesive curriculum within each area. Students who minor in Classics are required to take CLASSGEN 176 Majors Seminar, which is writing intensive. All minor programs must complete a minimum of 20 units.

Students may choose among four minors in Classics:

- Classical Languages
- Ancient History
- Literature and Philosophy
- Classical Studies

These fields of study are declared on Axxess; they do not appear on the transcript or the diploma.

## I. Classical Languages

Students are required to take a minimum of five courses in Greek or in Latin. In addition to the five required courses, students must take CLASSGEN 176 Majors Seminar. Students wishing to combine Greek and Latin may only do so if courses for one of the two languages are all above the 100 level; for example:

		Units
CLASSGRK 1	Beginning Greek	3-5
CLASSGRK 2	Beginning Greek	3-5
CLASSGRK 3	Beginning Greek	3-5
CLASSLAT 103	Intermediate Latin: Cicero and Ovid	3-5
CLASSLAT 111	Advanced Latin: Virgil's Eclogues	3-5

## II. Ancient History

Students are required to take a minimum of five courses in history, art history, and archaeology. Courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken. In addition to the five required courses, students must take CLASSGEN 176 Majors Seminar. Courses offered in Latin and Greek that focus on historical topics or authors may count toward this minor. Students may count up to 4 units of IHUM 69A towards the breadth requirement; note that IHUM courses are no longer offered.

## III. Literature and Philosophy

Students are required to take a minimum of five courses in classical literature or philosophy, including classical science. Courses listed in the department's cognate course list may be substituted for one or more of these courses with prior written approval from the undergraduate director; written approval must be submitted to the student services officer for inclusion in the student's academic file prior to the end of the term in which the course is taken. In addition to the five required courses, students must take CLASSGEN 176 Majors Seminar. Courses offered in Latin and Greek that focus on philosophical or literary topics or authors may count toward the minor.

## IV. Classical Studies

Students are required to take a minimum of five courses in Classics (CLASSART, CLASSGEN, CLASSGRK, CLASSHIS, CLASSLAT) plus CLASSGEN 176 Majors Seminar. Students may count up to 4 units of THINK 10, THINK 16, THINK 35, IHUM 39A, IHUM 69A, or SLE towards the breadth requirement; note that IHUM courses are no longer offered.

## Master of Arts in Classics

University requirements for the master's degree are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

### I and II. Language and Literature, and Philosophy Fields of Study

Students who have completed an undergraduate major in Classics (Greek, Latin, or Greek and Latin fields of study) or equivalent may be accepted as candidates for the M.A. degree in Classics and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students with an undergraduate major in Classics (Ancient History or Classical Studies fields of study) or without an undergraduate major in Classics may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing at least 25 units of graduate courses and 20 additional units of work at the 100 level or higher.
2. Completion of one Greek course at the 100 level (if the undergraduate major field of study was Latin) or one Latin course at the 100 level (if the undergraduate major field of study was Greek). This requirement is waived for students with an undergraduate major in Classics (Greek and Latin field of study).
3. Passing an examination testing the candidate's ability to translate into English from a selected list of Greek and/or Latin authors.
4. Completion of the syntax sequence in at least one language (CLASSLAT 175A/CLASSLAT 175B or CLASSGRK 175A/CLASSGRK 175B)
5. Writing a thesis, or passing of an examination on a particular author or topic, or having written work accepted by the graduate committee as an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.
6. A reading examination in French or German; these examinations are administered every quarter.
7. Completion and approval of a Program Proposal for a Master's Degree form before the end of the first quarter of enrollment.

Candidates for the Ph.D. degree may also, on the recommendation of the department, become candidates for the M.A. degree. In this case, requirement 5 above is waived provided that the student has completed some work beyond the course requirements listed under requirements 1 and 2 above.

### III. Classical Archaeology

Students who have completed an undergraduate major in Classics with a Classical Archaeology field of study, or in a closely related field, may be accepted as candidates for the M.A. degree in Classics with a Classical Archaeology field of study, and may expect to complete the program in twelve months (usually three quarters of course work plus three months

study for the thesis or examination). Students without an undergraduate major in Classics with a Classical Archaeology field of study may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing at least 25 units of graduate courses and 20 additional units of work at the 100 level or higher.
2. Completion with a grade of 'B' or higher of at least 15 units of graduate-level courses in classical archaeology, not including CLASSART 302: Classical Archaeology (see 3).
3. Passing an examination designed to test the candidate's ability to translate into English from either ancient Greek or Latin.
4. Completion with a grade of 'B' or higher of CLASSART 302: Classical Archaeology, or an equivalent course on the history of thought in classical archaeology approved by the Classics department's graduate committee.
5. Writing a thesis, or passing an exam on a particular topic, or having written work accepted by the graduate committee as an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.
6. Passing a reading examination in French, German, or Italian. These examinations are administered every quarter.
7. Completion and approval of a Program Proposal for a Master's Degree form before the end of the first quarter of enrollment.

Candidates for the Ph.D. degree may also, on the recommendation of the department, become candidates for the M.A. degree. In their case, requirement 5 above is waived provided that the student has completed some work beyond the course requirements listed under requirements 1 and 2 above.

## IV. Ancient History

Students who have completed an undergraduate major in Classics with a Classical Archaeology field of study, or in a closely related field may be accepted as candidates for the M.A. degree in Classics with an Ancient History field of study, and may expect to complete the program in twelve months (usually three quarters of course work plus three months study for the thesis or examination). Students without an undergraduate major in Classics with a Classical Archaeology field of study may also be accepted as candidates, though they may require a longer period of study before completing the requirements for the degree. These requirements are:

1. Attaining a standard of scholarship such as would be reached by three quarters of study in the department after fulfilling the requirements for an undergraduate major in the department. Normally, this means completing 30 units of graduate courses and 15 additional units of work at the 100 level or higher.
2. Satisfactory completion of 20 units of graduate-level courses in Classics and of 10 units of graduate-level courses in other programs.
3. Satisfactory completion of 15 additional units of courses in either ancient Greek or Latin.
4. Writing a thesis, or passing an exam on a particular topic, or having written work accepted by the Graduate Committee as an equivalent. Three completed and satisfactory seminar papers are normally an acceptable equivalent.
5. Passing a reading examination in French, German, or Italian. These examinations are administered every quarter.
6. Completion and approval of a Program Proposal for a Master's Degree form before the end of the first quarter of enrollment.

Candidates for the Ph.D. degree may also (on the recommendation of the department) become candidates for the M.A. degree. In their case,

requirement 4 above is waived provided that they have completed some work beyond the course requirements listed under requirements 1 and 2 above.

## Coterminal Bachelor's and Master's Degree in Classics

Stanford students in any undergraduate major who are interested in postgraduate work in Classics may apply for Stanford's coterminal master's program. Students considering a co-term are encouraged to consult with the Director of Undergraduate Studies about their plans before filing an application. No courses used to satisfy the undergraduate requirements (either as General Education Requirements or department requirements) may be applied toward the M.A. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree. Applicants must have a minimum GPA of 3.7 in the major, and no incompletes on record. Undergraduate course work in Greek and Latin is normally a prerequisite for graduate-level work.

To apply, students should submit the Application for Admission to Coterminal Master's Program form, two letters of recommendation from Classics faculty, a sealed, official copy of their undergraduate transcript, a 1-3 page statement of purpose and a 10-15 page writing sample. GRE scores are not required. Applications are due in early January of your intended graduation year; please see the departmental website (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/classics/http://classics.stanford.edu>) for the specific deadline.

For University coterminal degree program rules and University application forms, see the Undergraduate Academic Life ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP/choosing\\_coterm/Coterm.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP/choosing_coterm/Coterm.html)) web site. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4874.htm>)" section of this bulletin.

## Doctor of Philosophy in Classics

University requirements for the Ph.D. are described in the "Graduate Degrees" section of this bulletin. There are four specializations within the Classics Ph.D. program: language and literature; classical archaeology; ancient history; and ancient philosophy.

### I. Language and Literature

Candidates for the Ph.D. degree in Classics with specialization in language and literature must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the fourth year. These must include:

		Units
CLASSGEN 207A	Survey of Greek and Latin Literature: Literature of the Roman Republic	3-5
CLASSGEN 207B	Survey of Greek and Latin Literature: Augustan Age Latin	3-5
CLASSGEN 207C	Survey of Greek and Latin Literature: Imperial Latin	4-5
CLASSGEN 208A	Survey of Greek and Latin Literature: Archaic Greek	3-5
CLASSGEN 208B	Survey of Greek and Latin Literature: Classical Greek	3-5
CLASSGEN 208C	Survey of Greek and Latin Literature: Hellenistic and Late Greek	3-5

CLASSGRK 275A	Greek Syntax: Prose Composition (begins halfway through Win Qtr)	2
CLASSGRK 275B	Greek Syntax: Prose Composition	5
CLASSLAT 275A	Latin Syntax	5
CLASSLAT 275B	Latin Syntax (ends halfway through Win Qtr)	2
CLASSGEN 205A	The Semantics of Grammar	2
CLASSGEN 205B	The Semantics of Grammar	2

Twelve graduate seminars, nine of which must be Classics seminars, and one of the remaining three of which must be outside the department. The other two seminars may be in Classics, from other departments (with the graduate director's approval), and/or directed readings.<sup>1,2</sup>

1. No more than two directed readings may be counted towards this requirement.
  2. Classics seminars are generally offered for 4-5 units. In some cases, instructors allow a student to complete a seminar for 4 units without requiring a written paper but with completion of all other requirements.
2. Examinations:
- Students must take Greek and Latin translation exams at the end of each survey sequence (the end of the first and second years). Students are exempted from the final in Spring Quarter Survey in order to prepare for these translations exams. These exams are based on the Greek and Latin reading lists available on the Classics Department (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/classics/http://classics.stanford.edu>) web site. Greek and Latin survey courses cover less than half of the material on which the translation exams test, and students need to prepare much of the work on their own. It is possible to take both exams in the same year if the student chooses. However, students are obligated to take the exam in the language which the survey has covered that year. The exam consists of a choice of six of eight passages, and students are allowed three hours. A grade of 'B-' or higher, on every passage, is required to pass. If a student does not attain a 'B-', the exam must be retaken later in the summer before registering for the Autumn Quarter, in order to continue in the program. In order to retake an exam during Summer Quarter, a student must be registered at Stanford at his or her own expense; the department does not cover tuition in these instances. The exam can only be retaken once.
  - Students must pass modern language translation exams in both German and French; Italian or modern Greek may be substituted in place of French, with consent of the graduate director. Students arrange with the student services officer to take the exam. One modern language exam must be passed by the end of the second year, the other by the end of the third year. These examinations are administered once each quarter.
  - At the beginning of Autumn Quarter of the third year, students take general examinations in four of the following fields: Greek literature, Latin literature, ancient philosophy, Greek history, Roman history, Greek archaeology and Roman archaeology. Students select the fields in consultation with the graduate director no later than June of the second year of graduate study. Candidates must have taken at least one course at Stanford in each of the chosen fields (in the case of ancient philosophy, a seminar or its

equivalent); students need to confer with the professor overseeing the exam. General examinations must be taken by October of the third year.

- The University oral examination, which is a defense of the candidate's dissertation.

3. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.
4. Students are required to undertake the equivalent of four one-quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

## II. Classical Archaeology

Candidates for the Ph.D. degree in Classics with a specialization in classical archaeology must fulfill the requirements following below.

Students are encouraged to enroll in or audit other undergraduate courses that may fill gaps in their undergraduate training. All students are expected to take part in archaeological fieldwork in the classical world areas. At least three consecutive quarters of course work must be taken at Stanford.

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the candidate's fourth year, including:

2.

		<b>Units</b>
CLASSGEN 241	Words and Things in the History of Classical Scholarship <sup>1</sup>	4-5

At least three graduate (200 or 300) level courses in Latin and/or Greek literature<sup>2,3</sup>

CLASSGEN 207A Survey of Greek and Latin Literature: Literature of the Roman Republic

CLASSGEN 207B Survey of Greek and Latin Literature: Augustan Age Latin

CLASSGEN 207C Survey of Greek and Latin Literature: Imperial Latin

CLASSGEN 208A Survey of Greek and Latin Literature: Archaic Greek

CLASSGEN 208B Survey of Greek and Latin Literature: Classical Greek

CLASSGEN 208C Survey of Greek and Latin Literature: Hellenistic and Late Greek

CLASSGEN 217 The Language of Homer

CLASSGEN 229 Classical Epic and the English Renaissance

CLASSGEN 313 Literary and Art Criticism in Greece

CLASSGEN 334 Sallust and Virgil

CLASSGEN 337 Narrative, Persuasion and Emotion in Classical Athens

CLASSGEN 343 The Poetics of the Odyssey

CLASSGEN 352 Ovid's Metamorphoses

The interdepartmental graduate core sequence in archaeology. The Archaeology Center announces the courses which fulfill this requirement. The core sequence currently comprises a seminar in archaeology theory and a course on archaeological methods.

ANTHRO 303 Introduction to Archaeological Theory 5

ANTHRO 307 Archaeological Methods and Research Design 5

At least one further course outside the Classics department.<sup>2</sup> 3-5

At least five graduate seminars in classical archaeology.<sup>2</sup> 15-25

CLASSART 201 Archaic Greek Art

CLASSART 213 Ten Things: An Archaeology of Design

CLASSART 232 Lost and found: Roman Coinage

CLASSART 308 Hispania: The Making of a Roman Province

CLASSART 319 Theory for Arch and Classics

At least three graduate seminars in ancient history<sup>2</sup> 9-15

CLASSHIS 322A Dark Age Greece and the Demise of Godlike Kings

CLASSHIS 322B Dark Age Greece and the Demise of Godlike Kings

CLASSHIS 332 High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests

CLASSHIS 333 Classical Seminar: Origins of Political Thought

CLASSHIS 340A Roman Emperors

1. Must be taken as early as possible in the candidate's Stanford career.
2. Students may petition to count independent study courses in place of up to two required courses, but no more.
3. Students who enter the program with only one ancient language at the level needed for graduate study are strongly encouraged to take additional course work to reach graduate (200 and above) level in another language.

### 3. Examinations:

- As soon as students arrive, they must take a diagnostic exam in either Greek or Latin. Depending on performance, students may be required to enroll in undergraduate language classes in that language to improve their skills to the level required for graduate work.
- Reading examinations in two of the following languages: French, German, Italian, and modern Greek. Candidates may petition to substitute a different modern language for one of these, if their area of specialization requires it. One modern language exam must be passed by the end of the second year, the other by the end of the third year. These examinations are administered once each quarter.
- Students must demonstrate graduate-level competency with an ancient language in one of two ways:

i *Option 1:* A translation examination from Latin or Greek into English. This examination must be taken either at the end of the first year or at the end of the second year. A grade of 'B-' or higher on every passage is required to pass. If a student does not meet that standard, the exam must be retaken later in the summer before registering for Autumn Quarter, in order to continue in the program. In order to retake an exam during Summer Quarter, a student must be registered at Stanford at his or her own expense; the department does not cover tuition in these instances. The exam can only be retaken once.

ii *Option 2:* Students must complete the course and take the final offered at the end of each quarter of Greek or Latin survey. Students must earn a 'B-' or higher on each final to pass.

- General examinations in Greek archaeology and Roman archaeology, and two of the following fields: Greek literature, Latin literature, ancient philosophy, Greek history, Roman history. Candidates select the fields in consultation with the graduate director no later than the first week of Spring Quarter of the second year of graduate study. Candidates must have taken at least one course at Stanford in each of the chosen fields (in the case of ancient philosophy, a seminar or its equivalent). General examinations must be taken by October of the third year.
  - The University oral examination, which is a defense of the candidate's dissertation.
4. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.
5. Students are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

### III. Ancient History

Candidates for the Ph.D. degree in Classics with specialization in ancient history must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the fourth year. These must include:
2. 

	<b>Units</b>
HISTORY 304 Approaches to History	4-5
Two proseminars. These introduce students to primary sources of evidence for ancient history that require special training: papyrology, epigraphy, paleography, numismatics, and archaeology. This year, the department offers the following: <sup>1,2</sup>	8-10
CLASSART Lost and found: Roman Coinage	
232	

Three skills courses relevant to the individual student's chosen research approach. For example, a student could take classes in economics, demography, legal history, or anthropology. Courses can also be used to learn other ancient or modern languages, either by course work or directed reading.<sup>1</sup>

Ten graduate seminars (200-level or above). At least five of these seminars must be taken in the department.<sup>2,3</sup>

- 1 Students must consult their advisers and the graduate director to determine the appropriate coursework.
  - 2 With the approval of their advisers and graduate director, students may take seminars outside of the department or at another university with which Stanford has an exchange agreement to fulfill this requirement.
  - 3 Two of these seminars may be replaced by directed readings with adviser and graduate director approval.
3. The range and sequence of other courses to be taken depend on which of the following two options the student selects within the Ancient History track.

A. Option 1: Students focus more on one ancient language by completing the following courses:

		<b>Units</b>
CLASSGEN 205A	The Semantics of Grammar	2
CLASSGEN 205B	The Semantics of Grammar	2

Take 15 units of one ancient language series, and 5 units of the alternate series:

Latin Series		
CLASSGEN 207A	Survey of Greek and Latin Literature: Literature of the Roman Republic	
CLASSGEN 207B	Survey of Greek and Latin Literature: Augustan Age Latin	
CLASSGEN 207C	Survey of Greek and Latin Literature: Imperial Latin	
Greek Series		
CLASSGEN 208A	Survey of Greek and Latin Literature: Archaic Greek	
CLASSGEN 208B	Survey of Greek and Latin Literature: Classical Greek	
CLASSGEN 208C	Survey of Greek and Latin Literature: Hellenistic and Late Greek	

Select a syntax series that coincides with your 15-unit ancient language survey:

Latin Syntax		
CLASSLAT 275A	Latin Syntax	
CLASSLAT 275B	Latin Syntax	
Greek Syntax		
CLASSGRK 275A	Greek Syntax: Prose Composition	
CLASSGRK 275B	Greek Syntax: Prose Composition	

C. Option 2: Students emphasize broader linguistic skills. This requires students to take both ancient language surveys:

		<b>Units</b>
CLASSGEN 207A	Survey of Greek and Latin Literature: Literature of the Roman Republic	5
CLASSGEN 207B	Survey of Greek and Latin Literature: Augustan Age Latin	5



CLASSGEN 207C	Survey of Greek and Latin Literature: Imperial Latin	5
CLASSGEN 208A	Survey of Greek and Latin Literature: Archaic Greek	5
CLASSGEN 208B	Survey of Greek and Latin Literature: Classical Greek	5
CLASSGEN 208C	Survey of Greek and Latin Literature: Hellenistic and Late Greek	5

4. Examinations:

- As soon as students arrive, they take diagnostic exams in two areas of ancient history. Choices are: Egyptian, Greek, and Roman history. The test is mainly on narrative history, especially important names, dates, and events. Depending on performance, students may be asked to sit in on the undergraduate history courses and take directed reading or a graduate survey if offered. Reading lists are available upon request.
- Students must take the final offered at the end of each quarter of Greek or Latin survey (for Option 1 above) or both Greek and Latin surveys (for Option 2 above). Students must earn a 'B-' or higher on each final to pass.
- Students must pass modern language translation exams in both German and French; Italian or modern Greek may be substituted in place of French with consent of the graduate director. One modern language exam must be passed by the end of the second year, the other by the end of the third year. These examinations are administered once each quarter.
- Students must pass general exams in two areas in history (Egyptian, Greek, or Roman) and two of the following fields: Greek literature, Latin literature, Greek archaeology, Roman archaeology, or ancient philosophy. Students select the fields in consultation with the graduate director no later than June of their second year of graduate study. Candidates must have taken at least one course at Stanford in each of the chosen fields (in the case of ancient philosophy, a seminar or its equivalent). General examinations must be taken by October of the third year. In preparing for the general examinations, candidates are expected to make full use of relevant secondary material in modern languages. They should therefore plan to satisfy the requirements in French and German as soon as possible, preferably before the translation examinations.
- The University oral examination which is a defense of the candidate's dissertation.

5. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.

6. Candidates are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

## IV. Joint Program in Ancient Philosophy

This specialization is jointly administered by the departments of Classics and Philosophy and is overseen by a joint committee composed of members of both departments. It provides students with the training, specialist skills, and knowledge needed for research and teaching in ancient philosophy while producing scholars who are fully trained as either philosophers or classicists.

Graduate students admitted by the Classics department receive their Ph.D. from the Classics department. This specialization includes training in ancient and modern philosophy. Each student in the program is advised by a committee consisting of one professor from each department.

Candidates for the Ph.D. degree in Classics with specialization in ancient philosophy must fulfill the following requirements:

1. Complete 135 units of academic credit or equivalent in study beyond the bachelor's degree at the end of the fourth year. This includes all the requirements listed for the language and literature specialization in the graduate program in Classics (see above). Students must also take the below courses focusing on philosophy. All courses taken in the Philosophy department count for seminar credit (i.e., as contributing to the 12-seminar requirement in the Language and Literature track in the Classics department).

	Units
2. Students must take three courses in the Philosophy department <sup>1</sup>	9-15
One course in logic which can be fulfilled at the 100-level or higher	
One course in aesthetics, ethics, or political philosophy (200-level or higher)	
One course in metaphysics, epistemology, philosophy of mind, or philosophy of science.	

At least three courses in ancient philosophy at the 200 level or above, one of which must be in the Philosophy department. <sup>1</sup>

3. *Examinations:* The requirements are the same as those listed in the language and literature specialization, except that one of the four areas of general examination must be taken in ancient philosophy.
4. The graduate director assigns a dissertation proposal director to each candidate who has passed the general examination. During the third year, the candidate, in consultation with the dissertation proposal director, prepares a dissertation proposal which is examined by the dissertation proposal defense committee (set up by the dissertation proposal director and consisting of the dissertation proposal director and two other faculty members, one of whom may be from outside the department), no later than the end of the first quarter of the fourth year. If the proposal is deemed unsatisfactory, this proposal examination is repeated in the following quarter and must be passed. Subsequently, each candidate, in consultation with the graduate director and the dissertation proposal director, selects a dissertation director who must be a member of the Academic Council. The candidate, the dissertation director, and the graduate committee collaborate to select an appropriate dissertation reading committee. Two of the three members of the reading committee, including the chair, must be members of the Academic Council.

5. Students are required to undertake the equivalent of four one quarter courses of teaching under department supervision. This teaching requirement is normally completed during the second and third years of study. Summer teaching does not satisfy this requirement.

## Classics and a Minor Field

The Ph.D. in Classics may be combined with a minor in another field, such as anthropology, history, humanities, or classical linguistics. Requirements for the minor field vary, but might be expected to involve about six graduate-level courses in the field and one written examination, plus a portion of the University oral exam (dissertation defense). Such a program is expected to take five years. The department encourages such programs for especially able and well prepared students. See the department *Graduate Handbook* for more information. The following timetable would be typical for a five-year program:

- First Year: course work, almost entirely in Classics. One translation exam taken in June. One or both modern language exams taken.
- Second Year: course work, both in Classics and the minor field. Second translation exam completed. French and German exams completed.
- Third Year: course work, both in Classics and the minor field. General examinations in Classics.
- Fourth Year: remaining course work, both in Classics and the minor field. General examination in the minor field. Preparation for dissertation.
- Fifth Year: dissertation, University oral examination.

## Ph.D. Minor in Classics

For a graduate minor, the department recommends at least 20 units in Latin or Greek at the 100 level or above, and at least one course at the graduate (200) level.

*Emeriti: (Professors)* Mark W. Edwards, Marsh H. McCall, Jr.,\* Susan Treggiari, Michael Wigodsky, Edward Spofford

*Chair:* Walter Scheidel

*Graduate Director:* Grant Parker

*Undergraduate Director:* Maud Gleason

*Professors:* Alessandro Barchiesi, Andrew M. Devine, Richard P. Martin, Ian Morris (Classics, History), Reviel Netz, Andrea Nightingale, Josiah Ober (Classics, Political Science), Anastasia-Erasmia Peponi, M. Rush Rehm (Classics, Drama), Richard Saller (Classics, History), Walter Scheidel (Classics, History), Michael Shanks, Susan A. Stephens

*Associate Professors:* Giovanna Ceserani (on leave), Christopher Krebs, Jody Maxmin (Art and Art History, Classics), Grant Parker, Jennifer Trimble (on leave)

*Courtesy Professors:* Chris Bobonich (Philosophy), Alan Code (Philosophy), Charlotte Fonrobert (Religious Studies), Ian Hodder (Anthropology), Bissera Pentcheva (Art and Art History), Steven P. Weitzman (Religious Studies), Caroline Winterer (History), Yiqun Zhou (East Asian Languages and Cultures)

*Visiting Professor:* Andrew Laird

*Acting Assistant Professor:* Alicia Jiménez

*Lecturers:* Maud Gleason, John Klopacz, Peter O'Connell (Mellon Fellow)

\* Recalled to active duty.

# Communication

Courses offered by the Department of Communication are listed under the subject code COMM on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMM&filter-catalognumber-COMM=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMM&filter-catalognumber-COMM=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMM&filter-catalognumber-COMM=on>).

Stanford's Department of Communication focuses on media in all its forms. The department studies the processes and effects of mass communication: the nature and social role of the various media; their structure, function, and ethics; and their impact on the political system, culture, and society. In this context, it considers not only traditional mass media, such as newspapers, magazines, radio, television, and film, but also information technology, online media, virtual reality, and the Internet. Students are trained as social scientists who can study the media and as potential practitioners in the use of the media in journalism, mass communications, and digital media. The department combines theory and practice and fosters individual research opportunities for its students, employing both quantitative and qualitative approaches.

The Department of Communication engages in research in communication and offers curricula leading to the B.A., M.A., and Ph.D. degrees. The M.A. degree prepares students for a career in journalism. The department also offers current Stanford University undergraduates a coterminal program with an M.A. emphasis in Media Studies. The Ph.D. degree leads to careers in university teaching and research-related specialties.

The John S. Knight Journalism Fellowships Program brings outstanding journalists and journalism entrepreneurs to the university for an academic year. While here, they develop their proposals for improving journalism through innovation, entrepreneurship and leadership. The John S. and James L. Knight Foundation sponsors twelve U.S. journalists. They are joined by eight International Fellows sponsored by the Lyle and Corrine Nelson International Fellowship Fund, the Knight Foundation, Yahoo! Inc., the Enlight Foundation and others.

## Mission of the Undergraduate Program in Communication

The mission of the undergraduate program in Communication is to expose students to a broad-based understanding of communication theory and research. Students in this major are expected to become familiar with the fundamental concerns, theoretical approaches, and methods of the field, and to acquire advanced knowledge in one or more sub-areas of the discipline. This is accomplished by several levels of study: a core curriculum; intermediate-level electives; and optional internships. Majors also have the opportunity to do advanced research projects. The department is committed to providing students with analytical and critical skills needed for success in graduate programs, professional schools, or immediate career entry.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are

used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of communication.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of communication.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Communication and to prepare students for professional careers or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Communication. Through completion of advanced course work and rigorous training in research, the doctoral program prepares students to make original contributions to the knowledge of Communication and to interpret and present the results of such research.

## Admission

*Prospective Undergraduates:* Applications are available at Undergraduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/communication/http://admission.stanford.edu>).

*Prospective Coterminal Students:* Applications are available on the University Registrar's (<http://studentaffairs.stanford.edu/registrar/forms/coterm>) web site.

*Prospective Graduate Students:* Applications are available online at Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/communication/http://gradadmissions.stanford.edu>).

The department requires that applicants for graduate admission submit verbal, quantitative, and analytic scores from the Graduate Record Examination (GRE). Admission to each graduate degree program is competitive, based on the pool of applicants each year rather than on standard criteria that can be stated in advance. For detailed information about the Communication Department admission procedures and requirements, see <http://comm/phd/general/commdeptapplicationguide.pdf>.

## Bachelor of Arts in Communication

### Preparation

Before declaring the major, students must have completed or be concurrently enrolled in one of the following:

		Units
COMM 1A	Media Technologies, People, and Society	5
COMM 1B	Media, Culture, and Society	5
COMM 106	Communication Research Methods	5
COMM 108	Media Processes and Effects	5

Students interested in declaring the major should apply via Axess and meet with the student services administrator in Building 120, Room 110A, during scheduled office hours. Students are required to take at least 60 units (approximately 12 courses), not counting statistics, to complete the major.

## Program of Study

The undergraduate curriculum is intended for liberal arts students who wish to develop an understanding of communication in society, drawing on the perspective of the social sciences. Undergraduates majoring in Communication are expected to become acquainted with the fundamental concerns, theoretical approaches and methods of the field, and to acquire advanced knowledge in one or more of the sub-areas of communication: institutions, processes, and effects.

While the department does not attempt to provide comprehensive practical training at the undergraduate level, the curriculum provides a diverse range of internship opportunities including professional print journalism, some of which are funded by the department's Rebele Internship Program. The department is committed to providing students with analytical and critical skills for future success in graduate programs, professional schools, or immediate career entry.

The major is structured to provide several levels of study: a core curriculum, intended to expose students to a broad-based understanding of communication theory and research, and a number of intermediate-level options and electives. Majors also have the opportunity to do advanced research in the form of senior projects and honors theses.

All undergraduate majors are required to complete a set of core communication courses which include:

		Units
COMM 1A	Media Technologies, People, and Society	5
or COMM 1B	Media, Culture, and Society	
COMM 106	Communication Research Methods	5
COMM 108	Media Processes and Effects	5
COMM 104W	Reporting, Writing, and Understanding the News (WIM)	5
or COMM 120W	Digital Media in Society	
or COMM 137W	The Dialogue of Democracy	

Core courses are usually given only once each year.

The department also requires completion of or concurrent registration in an introductory statistics course (STATS 60 Introduction to Statistical Methods: Precalculus) when registering for COMM 106 Communication Research Methods in preparation for courses in methodology and advanced courses in communication processes and effects. It is recommended that this be done as soon as possible so as not to prevent registration in a course requiring statistical understanding. The statistics course does not count toward the 60 units to complete the Communication major.

In addition to the core courses and the statistics requirement, undergraduate majors select courses from the areas described below. Many of the courses require core courses as prerequisites. Majors select a total of four area courses, taking at least one from each area.

## Area I: Communication Processes and Effects

Area I emphasizes the ways in which communication scholars conduct research in, and consider the issues of, human communication. These studies aim to provide expert guidance for social policy makers and media professionals and include the following courses:

		Units
COMM 122	Content Analysis: Studying Communication Artifacts	5
COMM 123	Argumentation and Persuasion	5
COMM 135	Deliberative Democracy and its Critics	3-5

COMM 137W	The Dialogue of Democracy	5
COMM 160	The Press and the Political Process	5
COMM 162	Campaigns, Voting, Media, and Elections	5
COMM 164	The Psychology of Communication About Politics in America	4
COMM 166	Virtual People	5
COMM 168	Experimental Research in Advanced User Interfaces	1-5
COMM 169	Computers and Interfaces	5
COMM 172	Media Psychology	5
COMM 183	Social Media Literacies	5
COMM 326	Advanced Topics in Human Virtual Representation	1-5

## Area II: Communication Systems and Institutions

Area II considers the roles and interaction of institutions such as broadcasting, journalism, constitutional law, and business within communication and mass communication contexts and includes the following courses:

		Units
COMM 104W	Reporting, Writing, and Understanding the News	5
COMM 116	Journalism Law	5
COMM 117	Digital Journalism	5
COMM 120W	Digital Media in Society	5
COMM 125	Perspectives on American Journalism	5
COMM 131	Media Ethics and Responsibility	5
COMM 140	Digital Media Entrepreneurship	3-5
COMM 147	Modern History and Future of Journalism	5
COMM 182	Virtual Communities and Social Media	5
COMM 212	Models of Democracy	3-5

The remainder of the 60 required units may be fulfilled with any elective Communication courses or cross listed courses in other departments.

To be recommended for the B.A. degree in Communication, the student must complete at least 60 units (approximately 12 courses) in the department. No more than 10 units of course work outside of the department or transfer credit may be applied to meet department requirements. Communication majors must receive a letter grade for all Communication courses unless they are offered only for satisfactory/no credit (S/NC), and must maintain a grade point average (GPA) of 2.0 (C) in courses towards the major. Only courses with a grade of C- or above count towards the major.

## Honors Program

The honors program provides undergraduates the opportunity to undertake a significant program of research in an individual professor/student mentoring relationship. The aim is to guide students through the process of research, analysis, drafting, rethinking, and redrafting, which is essential to excellence in scholarship. Working one-on-one with a faculty adviser, seniors earn 15 Communication units, culminating in an honors thesis. In order to be eligible for the honors program, interested majors must have completed the following requirements:

- Complete the following core requirements:

		Units
COMM 1A or COMM 1B	Media Technologies, People, and Society	5
COMM 106	Communication Research Methods (receive a grade of B+ or better)	5

COMM 108	Media Processes and Effects	5
STATS 60/ PSYCH 10	Introduction to Statistical Methods: Precalculus	5

- Select an adviser; and
- Submit an application to the department by the end of their junior year. An application may be picked up from the student services administrator in room 110, building 120.

Students are expected to make steady progress on their honors thesis throughout the year.

A final copy of the honors thesis must be read and approved by the adviser and submitted to the department by the eighth week of Spring Quarter (exact date to be arranged). It becomes part of a permanent record held by the department. Honors work may be used to fulfill Communication elective credit but must be completed and a letter grade submitted prior to graduation. A student failing to fulfill all honors requirements may still receive independent study credit for work completed, which may be applied toward fulfilling major requirements.

The designation "with honors" is awarded by the Department of Communication to those graduating seniors who, in addition to having completed all requirements for the Communication major:

- complete an honors thesis;
- maintain a distinguished GPA in all Communication course work;
- are recommended by the Communication faculty.

## Minor in Communication Preperation

Before declaring the minor, students must have completed or be concurrently enrolled in one of the following:

		Units
COMM 1A	Media Technologies, People, and Society	5
COMM 1B	Media, Culture, and Society	5
COMM 106	Communication Research Methods	5
COMM 108	Media Processes and Effects	5

Students interested in declaring the minor should do so no later than Spring Quarter of their junior year by applying via Axxess and meeting with the student services administrator in building 120, room 110A, during scheduled office hours.

## Program of Study

The minor is structured to provide a foundation for advanced course work in communication through a broad-based understanding of communication theory and research.

Students are required to take 35 units (approximately 7 courses), not counting statistics, to complete the minor. The curriculum consists of three introductory communication core courses that include:

		Units
COMM 1A or COMM 1B	Media Technologies, People, and Society	5
COMM 106	Media, Culture, and Society	5
COMM 106	Communication Research Methods	5
COMM 108	Communication Research Methods	5
COMM 108	Media Processes and Effects	5

The department also requires completion of or concurrent registration in an introductory statistics course (STATS 60 Introduction to Statistical Methods: Precalculus) when registering for COMM 106 Communication Research Methods, Communication Research Methods in preparation for courses in methodology and advanced courses in communication processes and effects. It is recommended that this be done as soon as possible so as

not to prevent registration in a course requiring statistical understanding. The statistics course does not count toward the 35 units to complete the Communication minor.

The remainder of the 35 required units may be fulfilled with any intermediate-level elective Communication courses or crosslisted courses in other departments. No more than 5 units of course work outside of the department or transfer credit may be applied to meet department requirements. Communication minors must receive a letter grade for all Communication courses unless they are offered only for satisfactory/no credit (S/NC), and must maintain a grade point average (GPA) of 2.0 (C) in courses towards the minor. Only courses with a grade of C- or above count towards the minor. Some courses are not given every year. Refer to ExploreCourses (<http://explorecourses.stanford.edu>) for details.

*Prerequisite:* introductory statistics course (for example, STATS 60 Introduction to Statistical Methods: Precalculus)

## Core Courses

Core courses are usually offered only once annually.

		Units
COMM 1A	Media Technologies, People, and Society	5
or COMM 1B	Media, Culture, and Society	
COMM 106	Communication Research Methods	5
COMM 108	Media Processes and Effects	5

## Area I: Communication Processes and Effects

Select one of the following:

		Units
COMM 122	Content Analysis: Studying Communication Artifacts	
COMM 123	Argumentation and Persuasion	
COMM 135	Deliberative Democracy and its Critics	
COMM 137W	The Dialogue of Democracy	
COMM 160	The Press and the Political Process	
COMM 162	Campaigns, Voting, Media, and Elections	
COMM 164	The Psychology of Communication About Politics in America	
COMM 166	Virtual People	
COMM 168	Experimental Research in Advanced User Interfaces	
COMM 169	Computers and Interfaces	
COMM 172	Media Psychology	
COMM 183	Social Media Literacies	
COMM 326	Advanced Topics in Human Virtual Representation	

## Area II: Communication Systems/Institutions

Select one of the following:

		Units
COMM 104W	Reporting, Writing, and Understanding the News	
COMM 116	Journalism Law	
COMM 117	Digital Journalism	
COMM 120W	Digital Media in Society	
COMM 125	Perspectives on American Journalism	
COMM 131	Media Ethics and Responsibility	
COMM 140	Digital Media Entrepreneurship	
COMM 147	Modern History and Future of Journalism	

COMM 182	Virtual Communities and Social Media
COMM 212	Models of Democracy

## Elective courses

Totaling 10 units.

## Master of Arts in Communication / Graduate Program in Journalism

University requirements for the master's degree are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

The department awards a terminal M.A. degree in Communication with a field of study in Journalism. Applicants for this program are evaluated for admission on different criteria. Work to fulfill graduate degree requirements must be in courses numbered 100 or above.

Stanford students who are completing an M.A. degree and who desire entry into the Ph.D. program must file a Graduate Program Authorization Petition (<http://studentaffairs.stanford.edu/registrar/students/grad-auth-pet>) in Axess. Such students are considered alongside all other doctoral applicants.

## Journalism

Stanford's graduate program in Journalism focuses on the knowledge and skills required to report, analyze, and write authoritatively about public issues and digital media. The curriculum combines a sequence of specialized reporting and writing courses with seminars and courses devoted to deepening the students' understanding of the roles and responsibilities of American news media in their coverage of public issues.

The program emphasizes preparation for the practice of journalism and a critical perspective from which to understand it. The program's objective is twofold:

1. to graduate talented reporters and writers to foster public understanding of the significance and consequences of public issues and the debates they engender; and
2. to graduate thoughtful journalists to respond openly and eloquently when called on to explain and defend the methods and quality of their reporting and writing.

## Curriculum

The curriculum includes several required courses as shown below, and a master's project:

		Units
COMM 216	Journalism Law	4
COMM 217	Digital Journalism	4
COMM 225	Perspectives on American Journalism	4
COMM 240	Digital Media Entrepreneurship	3-5
COMM 273	Public Issues Reporting I	3-4
COMM 274	Public Issues Reporting II	3-4
COMM 275	Multimedia Storytelling: Reporting and Production Using Audio, Still Images, and Video	4
COMM 289	Journalism Master's Project	2
COMM 289C	Projects for Publication	2
COMM 291	Graduate Journalism Seminar	1

Additionally, students are usually required to take two specialized writing courses, chosen from a list of seven or eight, and two approved electives from among graduate-level courses in the Department of Communication,

or from among courses on campus that deal substantively with issues of public importance. The M.A. degree in Communication (Journalism) requires a minimum of 45 units.

Except for the Graduate Journalism Seminar, COMM 289C Projects for Publication, and COMM 289 Journalism Master's Project, all courses must be taken for a letter grade. To remain in good academic standing, students must maintain a grade point average (GPA) of 3.0 or better. Graduation requires a GPA of 3.0 or better.

## Journalism Project

The Journalism master's project, a requirement for graduation, is intended as an opportunity for students to showcase their talents as writers and reporters. It is also an opportunity to undertake an in-depth critique of an area of journalism in which the author has a special interest. Work on the project usually begins during Winter Quarter and continues through Spring Quarter. Completed master's projects must be submitted to the project adviser no later than the last day of classes in the Spring Quarter. The project represents a major commitment of time, research, and writing. Although it is not a requirement that the project be published, it must be judged by a member of the faculty to be of a quality acceptable for publication. At a minimum, the project should demonstrate the rigor and discipline required of good scholarship and good journalism; it should offer ample evidence of students' ability to gather, analyze, and synthesize information in a manner that goes beyond what ordinarily appears in daily news media.

## Media Studies Coterminal Master's Program

The Department of Communication offers current Stanford University undergraduates a one-year coterminal program with an M.A. emphasis in Media Studies specializing in either social sciences or journalism. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Admission

Applications for coterminal study must be submitted at least four quarters in advance of the expected master's degree conferral date. Applicants must have earned a minimum of 120 units toward graduation (UTG) as shown on the undergraduate unofficial transcript. This includes allowable advanced placement (AP) and transfer credit. Applications must be submitted no later than November 14, 2012 for admission beginning in either Winter or Spring Quarter 2012-13 or Autumn Quarter 2013-14. Journalism track students may begin the program only in Spring Quarter of their senior year. Requirements include: Application for Admission to Coterminal Master's Program form, preliminary program proposal, statement of purpose, three letters of recommendation from Stanford professors, a written statement from a Communication professor agreeing to act as a graduate adviser (social sciences track only), three samples of writing (journalism track only), and a current unofficial Stanford transcript. GRE scores are not required. Coterminal applications are submitted directly to the department. Review procedures and the Graduate Admissions Committee determine criteria.

## Degree Requirements

The Media Studies coterminal master's program provides a broad introduction to scholarly literature in mass communication and offers a social sciences or journalism track. Journalism track students may begin the program only in Spring Quarter of their senior year during which time one elective course is taken towards the master's program and any remaining requirements for the undergraduate degree are completed. In the following

academic year journalism track students follow the same curriculum as students in the Graduate Program in Journalism (see Master of Arts-Journalism section), less one elective course. Journalism track students may be required to complete more than 45 units. Social Science track students need to satisfy the following four basic requirements:

1. **Required Units and GPA:** students must complete a minimum of 45 units in Communication and related areas, including items 2 and 3 below. Courses must be taken for a letter grade if offered. Courses in related areas outside the department must be approved by the student's adviser. A minimum of 36 units must be in the Communication department. No more than two courses (not including the statistics prerequisite) may be below the 200 level. To remain in good academic standing students must maintain a grade point average (GPA) of 3.0 or better. Graduation requires a GPA of 3.0 or better.
2. **Core Requirements:** students must complete COMM 206 Communication Research Methods, COMM 208 Media Processes and Effects and an approved statistics course such as STATS 160 Introduction to Statistical Methods: Precalculus. Other courses occasionally are approved as a substitute before the student is admitted to the program. The statistics course does not count toward the 45 units.

3.	Six Media Studies Courses	<b>Units</b>
	Students must complete a minimum of six additional Communication courses concerned with the study of media from the following list.	
	Not all the listed courses are offered every year, and the list may be updated from one year to the next. In addition to the core requirements and a minimum of six courses listed below, students may choose additional courses from the list and any related course approved by the student's adviser.	
	COMM 211 Media Technologies, People, and Society	4
	COMM 216 Journalism Law	4
	COMM 217 Digital Journalism	4
	COMM 220 Digital Media in Society	4
	COMM 222 Content Analysis: Studying Communication Artifacts	4
	COMM 223 Argumentation and Persuasion	4
	COMM 225 Perspectives on American Journalism	4
	COMM 231 Media Ethics and Responsibility	4
	COMM 235 Deliberative Democracy and its Critics	3-5
	COMM 237 The Dialogue of Democracy	4
	COMM 240 Digital Media Entrepreneurship	3-5
	COMM 247 Modern History and Future of Journalism	4
	COMM 260 The Press and the Political Process	4
	COMM 262 Campaigns, Voting, Media, and Elections	4
	COMM 264 The Psychology of Communication About Politics in America	4
	COMM 266 Virtual People	4
	COMM 268 Experimental Research in Advanced User Interfaces	1-5
	COMM 269 Computers and Interfaces	4
	COMM 272 Media Psychology	4
	COMM 277C Specialized Writing and Reporting: Environmental Journalism	4
	or COMM 277D Specialized Writing and Reporting: Magazine Journalism	
	or COMM 277G Specialized Writing and Reporting: Covering Silicon Valley	
	or COMM 277S Specialized Writing and Reporting: Sports Journalism	

or COMM 277Y	Specialized Writing and Reporting: Foreign Correspondence in the Middle East and Asia	
or COMM 271	Moving Pictures: How the Web, Mobile and Tablets are Revolutionizing Video Journalism	
or COMM 275	Multimedia Storytelling: Reporting and Production Using Audio, Still Images, and Video	
or COMM 276	Advanced Digital Media Production	
COMM 282	Virtual Communities and Social Media	4
COMM 283	Social Media Literacies	4
COMM 326	Advanced Topics in Human Virtual Representation	1-5

4. *The Media Studies M.A. Project*: students following the social sciences track enroll in COMM 290 Media Studies M.A. Project to complete a project over two consecutive quarters that must be pre-approved and supervised by the adviser. The completed M.A. project must be submitted to the adviser no later than the last day of classes of the second consecutive quarter.

Additional courses are chosen in consultation with an academic adviser.

## Doctor of Philosophy in Communication

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin. The minimum number of academic units required for the Ph.D. at Stanford is 135, up to 45 of which can be transferred either from a master's degree at the University or from another accredited institution.

The department offers a Ph.D. in Communication Theory and Research. First-year students are required to complete introductory courses in communication theory and research, research methods, and statistics. These core courses, grounded in the social science literature, emphasize how people respond to media and how media institutions function. In addition, Ph.D. students must complete a minimum of three literature survey courses and related advanced seminars in Communication. Students also take significant course work outside the department in their area of interest. Each student builds a research specialty relating communication to current faculty interests in such areas as ethics, human-computer interactions, information processing, information technology, law, online communities, politics and voting, and virtual reality. Regardless of the area of specialization, the Ph.D. program is designed primarily for students interested in university research and teaching or other research or analyst positions.

The Ph.D. program encompasses four to five years of graduate study (subsequent to completion of the Bachelor's degree) during which, in addition to fulfilling University residency requirements, Ph.D. candidates are required to:

1. **Units**  
Complete all departmental course requirements, listed below, with grades of 'B+' or above, with the exception of STATS 160 ('B' minimum) and an advanced methods course ('B-' minimum). Required courses:

COMM 206	Communication Research Methods	4
COMM 208	Media Processes and Effects	4
COMM 301	Communication Research, Curriculum Development and Pedagogy	1
COMM 311	Theory of Communication	1-5
COMM 314	Qualitative Social Science Research Methods	1-5
COMM 317	The Philosophy of Social Science	1-5
COMM 318	Quantitative Social Science Research Methods	1-5

STATS 160 Introduction to Statistical Methods: Precalculus 5  
One advanced methods course.

2. Pass the general qualifying examinations by the end of the second academic year of study and pass a specialized area examination by the end of the third academic year of study.
3. Demonstrate proficiency in tools required in the area of research specialization. Identified with the advice of the faculty, such tools may include detailed theoretical knowledge, advanced statistical methods, a foreign language, computer programming, or other technical skills.
4. Complete at least two pre-dissertation research projects (the Major Project and the Minor Project).

### Units

5. Teach or assist in teaching at least two courses, preferably two different courses, at least one of which is ideally a core undergraduate course:

COMM 1A	Media Technologies, People, and Society
COMM 1B	Media, Culture, and Society
COMM 106	Communication Research Methods
COMM 108	Media Processes and Effects

6. Complete a dissertation proposal and proposal meeting approved by the dissertation committee.
7. Apply for candidacy by the end of the second year of graduate study.
8. Complete a dissertation satisfactory to a reading committee of three or more faculty members in the Department of Communication and one faculty member outside of the Department of Communication.
9. Pass the University oral examination, which is a defense of the dissertation.

Because the multifaceted nature of the department makes it possible for the Ph.D. student to specialize in areas that draw on different related disciplines, the plan of study is individualized and developed between the faculty adviser and the student.

Ph.D. candidacy is valid for five years.

Other requirements and details can be found on the Ph.D. program page (<http://comm.stanford.edu/phd/rules>) of the department web site.

## Ph.D. Minor in Communication

Candidates for the Ph.D. degree in other departments who elect a minor in Communication are required to complete a minimum of 20 units of graduate courses in the Department of Communication, including a total of three theory or research methods courses, and are examined by a representative of the department. A department adviser in consultation with the individual student determines the particular communication theory and methods courses.

*Emeriti*: (Professors) Henry S. Breitrose, Donald F. Roberts; (Professor, Teaching) Marion Lewenstein

*Chair*: James S. Fishkin

*Director, Doctoral Program in Communication*: Jeremy Bailenson

*Director, John S. Knight Fellowships for Professional Journalists*: James R. Bettinger

*Director, Media Studies*: Byron Reeves

*Director, Undergraduate Studies*: Fred Turner

*Deputy Director, John S. Knight Fellowships for Professional Journalists*: Dawn E. Garcia

*Director, Journalism*: Ann Grimes

*Professors:* James S. Fishkin, Theodore L. Glasser, Shanto Iyengar, Jon Krosnick, Clifford Nass, Byron B. Reeves

*Associate Professors:* Jeremy Bailenson, Fred Turner

*Courtesy Professors:* Jan Krawitz, Kristine M. Samuelson

*Lorry I. Lokey Professor of the Practice:* Ann Grimes

*Visiting Hearst Professional in Residence:* Joel Brinkley

*Lorry I. Lokey Visiting Professor in Professional Journalism:* Geri Migielicz

*Carlos Kelly McClatchy Visiting Lecturer:* Janine Zacharia

*Lecturers:* R.B. Brenner, Thomas Hayden, Jennifer Kahn, Gary Pomerantz, Howard Rheingold, Philip Taubman, David Voelker, James Wheaton

## Overseas Studies Courses in Communication

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/communication/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/communication/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/communication/http://bosp.stanford.edu>).

		Units
OSPBEIJ 20	Communication, Culture, and Society: The Chinese Way	4
OSPBEIJ 42	Chinese Media Studies	4
OSPFLO 49	The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema	5

## Comparative Literature

Courses offered by the Department of Comparative Literature are listed under the subject code COMPLIT on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMPLIT&filter-catalognumber-COMPLIT=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMPLIT&filter-catalognumber-COMPLIT=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMPLIT&filter-catalognumber-COMPLIT=on>).

The Department of Comparative Literature offers courses in the history and theory of literature through comparative approaches. The department accepts candidates for the degrees of Bachelor of Arts and Doctor of Philosophy.

The field of Comparative Literature provides students the opportunity to study imaginative literature in all its forms. While other literary disciplines

focus on works of literature as parts of specific national or linguistic traditions, Comparative Literature draws on literature from multiple contexts in order to examine the nature of literary phenomena from around the globe and from different historical moments, while exploring how literature interacts with other elements of culture and society. We study literary forms such as fictional narratives, performance and poetry, as well as cinema, music, and emerging aesthetic media.

Along with the traditional model of comparative literature that juxtaposes two or more national literary cultures, the department supports teaching and research that examine literary phenomena with additional tools of inquiry such as literary theory, the relationship between literature and philosophy, and the enrichment of literary study with other disciplinary methodologies. Comparative Literature also encourages the study of aspects of literature that surpass national boundaries, such as transnational literary movements or the creative adaptation of particular genres to local cultures. In each case, students emerge from the program with enhanced verbal and writing skills, a command of literary studies, the ability to read analytically and critically, and a more global knowledge of literature.

## Mission of the Undergraduate Program in Comparative Literature

The mission of the undergraduate program in Comparative Literature is to enhance students' verbal and written communication skills, their ability to read analytically and critically as well as to develop their global knowledge of literary cultures and the specific properties of literary texts. The program provides students with the opportunity to study imaginative literature in all of its forms, investigating the complex interplay of the literary imagination and historical and social experience.

Along with providing core courses that introduce students to major literary forms in a comparative frame, our program of study is flexible in order to accommodate student interest in areas such as specific geographic regions, historical periods, and interdisciplinary connections between literature and other fields such as philosophy, music, the visual arts, gender and queer theory, studies in race and ethnicity. A Comparative Literature major prepares a student to become a better reader and interpreter of literature, through enhanced examination of texts and the development of a critical vocabulary with which to discuss them. Attention to verbal expression and interpretive argument serves students who plan to proceed into careers requiring strong language and communication skills, as well as deeper cross-cultural knowledge of the world.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to interpret a literary text in a non-native language or to compare literary texts from different linguistic traditions, which may be read in translation.
2. a self-reflective understanding of the critical process necessary to read and understand texts.
3. skills in writing effectively about literature.
4. skills in oral communication and public speaking about literature.



# Graduate Programs in Comparative Literature

The department offers a Doctor of Philosophy and a Ph.D. minor in Comparative Literature.

## Learning Outcomes (Graduate)

Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to (1) make original contributions to the knowledge of Comparative Literature and to interpret and present the results of such research, (2) to teach literary analysis and interpretation at all levels with broad historical, cultural and linguistic understanding, and (3) to apply such analysis, interpretation and understanding to a range of fields and vocations.

## Bachelor of Arts in Comparative Literature

The major in Comparative Literature requires students to enroll in a set of core courses offered by the department, to complete electives in the department, and to enroll in additional literature courses, or other courses approved by the Chair of Undergraduate Studies, offered by other departments. This flexibility to combine literature courses from several departments and to address literature from multiple traditions is the hallmark of the Comparative Literature major. Students may count courses which read literature in translation; however, students, and especially those planning to pursue graduate study in Comparative Literature, are encouraged to develop a command of non-native languages.

### Declaring the Major

Students declare the major in Comparative Literature through Axess. Students should meet with the Chair of Undergraduate Studies to discuss appropriate courses and options within the major, and to plan the course of study. Majors are also urged to attend department events such as public talks and conferences.

### Advising

Students majoring in Comparative Literature should consult with the Chair of Undergraduate Studies at least once a quarter. The chair monitors progress to completion of the degree. Students are also encouraged to develop relationships with other faculty members who may act as mentors.

### Overseas Campuses and Abroad Programs

The Department of Comparative Literature encourages time abroad, both for increased proficiency in language and the opportunity for advanced course work. Course work done at campuses other than Stanford is counted toward the major at the discretion of the Chair of Undergraduate Studies and is contingent upon the Office of the University Registrar's approval of transfer credit. To that end, students abroad are advised to save syllabi, notes, papers, and correspondence.

### Degree Requirements

All majors in Comparative Literature (including honors) are required to complete the following requirements. All courses applied to the major must be taken for a letter grade, and a grade point average (GPA) of 2.0 or better must be achieved in each core course.

1. **COMPLIT 101** What is Comparative Literature?. This gateway to the major is normally taken by the end of sophomore year. It provides an introduction to literature and its distinctions from other modes of linguistic expression, and a fundamental set of interpretive skills. This course fulfills the Writing in the Major requirement.
2. **Core Courses (5 units each)**  
Students should complete these courses as soon as possible. Each course draws on examples from multiple traditions to ask questions about the logic of the individual genres.

		Units
COMPLIT 121	Poems, Poetry, Worlds: The Origins, Evolution, and Migration of the Ghazal	5
COMPLIT 122	Literature as Performance	5
COMPLIT 123	The Novel, The World	5

3. **COMPLIT 199** Senior Seminar. This senior seminar is designed as a culmination to the course of study while providing reflection on the nature of the discipline. Topics vary.
4. **Electives:** Majors must complete at least 40 units of electives. Three of these electives must be Comparative Literature courses. The remaining courses may be drawn from Comparative Literature offerings, from other literature departments, or from other fields of interdisciplinary relevance to the student's interest. Up to 10 units of IHUM or SLE courses may be counted towards the elective requirement; note that IHUM courses are no longer offered. Approval of electives are subject to consultation with the Chair of Undergraduate Studies.
5. **Total unit load:** Students must complete course work for a total of at least 65 units.

## Philosophical and Literary Thought

Undergraduates may major in Comparative Literature and Philosophy. The Philosophy specification is not declared in Axess and does not appear on either the transcript or the diploma. Students in this option take courses alongside students from other departments that also have specialized options associated with the program for the study of Philosophical and Literary Thought. Each student in this option is assigned an adviser in Comparative Literature, and student schedules and courses of study must be approved in writing by the advisor, the Chair of Undergraduate Studies of Comparative Literature, and the Chair of Undergraduate Studies of the program. See the Philosophy + Literature @ Stanford (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/comparativeliterature/http://philil.stanford.edu>) web site.

A total of 65 units must be completed for this option, including the following requirements:

1. Seven courses taught by Comparative Literature faculty. Of the seven, the following five (5 units each) are required courses:

		Units
COMPLIT 101	What is Comparative Literature?	5
COMPLIT 121	Poems, Poetry, Worlds: The Origins, Evolution, and Migration of the Ghazal	5
COMPLIT 122	Literature as Performance	5
COMPLIT 123	The Novel, The World	5
COMPLIT 199	Senior Seminar	5

The remaining two courses must be instructed by Comparative Literature faculty and approved by the Chair of Undergraduate Studies.

2. **Philosophy and Literature Gateway Course (4 units):** COMPLIT 181 Philosophy and Literature. This course should be taken as early as possible in the student's career, normally in the sophomore year.

3. *Philosophy Writing in the Major (5 units)*: PHIL 80 Mind, Matter, and Meaning. Prerequisite: introductory philosophy class.
4. *Aesthetics, Ethics, Political Philosophy (ca. 4 units)*: One course from the PHIL 170 series.
5. *Language, Mind, Metaphysics, and Epistemology (ca. 4 units)*: One course from the PHIL 180 series.
6. *History of Philosophy (ca. 8 units)*: Two courses in the history of philosophy, numbered above PHIL 100.
7. *Related Courses (ca. 8 units)*: Two upper division courses relevant to the study of philosophy and literature as identified by the committee in charge of the program. A list of approved courses is available from the undergraduate advisor of the program in philosophical and literary thought.
8. One course, typically in translation, in a literature distant from that of the student's concentration and offering an outside perspective on that literary tradition.
9. *Capstone Seminar (ca. 4 units)*: In addition to COMPLIT 199 Senior Seminar, students take a capstone seminar of relevance to philosophy and literature approved by the undergraduate adviser of the program in philosophical and literary thought. The student's choice of a capstone seminar must be approved in writing by the Chair of Undergraduate Studies of Comparative Literature and by the Chair of Undergraduate Studies of the program. Offered this year is: ENGLISH 117A Irony: From Socrates to David Foster Wallace, COMPLIT 213A Martin Heidegger.
10. *Seminar Paper Requirement*: Students must write at least one seminar paper that is interdisciplinary in nature. This paper brings together material from courses taken in philosophy and literature, and may be an honors paper (see below), an individual research paper (developed through independent work with a faculty member), or a paper integrating materials developed for two separate courses (by arrangement with the two instructors). Though it may draw on previous course work, the paper must be an original composition, 18-20 pages in length. It must be submitted to the Chair of Undergraduate Studies and receive approval no later than the end of Winter Quarter in the fourth year of study.

At least two of the courses counted toward requirements 1, 2, 7, 8, and 9 must be taught by Comparative Literature faculty. Transfer units may not normally be used to satisfy requirements 2, 3, 4, 5, 6 and 9. Units devoted to acquiring language proficiency are not counted toward the 65-unit requirement.

## Honors Program

Comparative Literature majors with an overall grade point average (GPA) of 3.3 or above, and who maintain a 3.5 (GPA) in major courses, are eligible to participate in the DLCL's honors program. Prospective honors students must choose a senior thesis adviser from among their home department's regular faculty, in their junior year, preferably by March 1, but no later than May 1.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Honors theses range from 40-90 pages not including bibliography and notes.

During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies of their home department to submit a thesis proposal (2-5 pages), DLCL Honors application and an outline of planned course work for their senior year. During this quarter, students may enroll for 2 units in DLCL 189C Honors Thesis Seminar for the drafting or revision of the thesis proposal. The proposal is reviewed by the Chair of Undergraduate Studies and the Director of the department and will be approved or returned for submission.

Honors students are encouraged to participate in the honors college hosted by Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) and coordinated by the Division of Literatures, Cultures, and Languages. The honors college is offered at the end of the summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted through the Bing program. For more information, view the Bing Honors website.

In Autumn Quarter of the senior year, the students must enroll in DLCL 189A Honors Thesis Seminar, a 5 unit seminar that focuses on researching and writing the honors thesis. During Winter Quarter students then enroll for 5 units in DLCL 189B Honors Thesis Seminar while composing their thesis. Students who did not enroll in DLCL 189C Honors Thesis Seminar during their Spring Quarter junior year may do so in the Spring Quarter of their senior year while revising the thesis, if approved by the thesis supervisor. A total of 10-12 units will be awarded for completion of honors course work, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15th of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

## Minor in Comparative Literature

The undergraduate minor in Comparative Literature represents an abbreviated version of the major. It is designed for students who are unable to pursue the major but who nonetheless seek an opportunity to gain a deeper understanding of literature. Plans for the minor should be discussed with the Chair of Undergraduate Studies. The minimum number of units required for a minor at Stanford is 20, and all courses must be taken for a letter grade. Requirements for the minor in Comparative Literature include:

	Units
COMPLIT 101 What is Comparative Literature?	5
Select one of the following:	5
COMPLIT 121 Poems, Poetry, Worlds: The Origins, Evolution, and Migration of the Ghazal	
COMPLIT 122 Literature as Performance	
COMPLIT 123 The Novel, The World	
At least two other Comparative Literature courses.	10

## Minor in Modern Languages

The Division of Literatures, Cultures, and Languages offers an undergraduate minor in Modern Languages. This minor draws on literature and language courses offered in this and other literature departments. See the "Literatures, Cultures, and Languages (p. 356)" section of this bulletin for requirements.

## Doctor of Philosophy in Comparative Literature

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The Ph.D. program is designed for students whose linguistic background, breadth of interest in literature, and curiosity about the problems of literary scholarship and theory (including the relation of literature to other

disciplines) make this program more appropriate to their needs than the Ph.D. in one of the individual literatures. Students take courses in at least three literatures (one may be that of the native language), to be studied in the original. The program is designed to encourage familiarity with the major approaches to literary study prevailing today.

Before starting graduate work at Stanford, students should have completed an undergraduate program with a strong background in one literature and some work in a second literature studied in the original language. Since the program demands an advanced knowledge of two non-native languages and a reading knowledge of a third non-native language, students should at the time of application have an advanced enough knowledge of one of the three to take graduate-level courses in that language when they enter the program. They should be making enough progress in the study of a second language to enable them to take graduate courses in that language not later than the beginning of the second year, and earlier if possible. Language courses at the 100- or 200- level may be taken with approval from the Chair of the department or the Chair of Graduate Studies. Applicants are expected to take an intensive course in the third language before entrance.

Students are admitted under a financial plan which attempts to integrate financial support and completion of residence requirements with their training as prospective university teachers. Tenure as a Ph.D. student, assuming satisfactory academic progress, is for a maximum of five years.

## Application Procedures

Competition for entrance into the program is extremely keen. The program is kept small so that students have as much opportunity as possible to work closely with faculty throughout the period of study. Applicants should review all course and exam requirements, advancement requirements, and teaching obligations carefully before applying to the program. Because of the special nature of comparative literary studies, the statement of purpose included in the application for admission must contain the following information:

1. A detailed description of the applicant's present degree of proficiency in each of the languages studied, indicating the languages in which the applicant is prepared to do graduate work at present and outlining plans to meet additional language requirements of the program.
2. A description of the applicant's area of interest (for instance, theoretical problems, genres, periods) within literary study and the reasons for finding comparative literature more suitable to his or her needs than the study of a single literature. Applicants should also indicate their most likely prospective primary field, including the literatures on which they intend to concentrate.
3. An explanation of how the applicant's undergraduate education has prepared them for work in our program. If there are any gaps in the applicant's preparation, they should explain how they plan to address those gaps.
4. The applicant's specific reasons for wishing to study in our department of Comparative Literature.
5. All applicants should arrange to have the results of the general section of the Graduate Record Examination sent to Stanford University, ETS code 4704.
6. A letter of recommendation that focuses on the applicant's language skills, or a current ACTFL Oral Proficiency Interview (OPI) certificate, or a critical paper written in a non-native language.
7. Recommendations should, if possible, come from faculty in at least two of the literatures in which the student proposes to work.
8. Applicants must submit a copy of an undergraduate term paper which they consider representative of their best work, preferably containing a comparative analysis.

For further information see the Graduate Admissions (<http://gradadmissions.stanford.edu>) web site.

## Degree Requirements

### Residence

A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the B.A. degree. The student must take 135 units of graduate work, in addition to the doctoral dissertation. At least three consecutive quarters of course work must be taken at Stanford.

### Languages

Students must know three non-native languages, two of them sufficiently to qualify for graduate courses in these languages and the third sufficiently to demonstrate the ability to read a major author in this language. Only the third language may be certified by examination. The other two are certified by graduate-level course work specified below. Language preparation must be sufficient to support graduate-level course work in at least one language during the first year and in the second language during the second year. Students must demonstrate a reading knowledge of the third non-native language no later than the beginning of the third year.

Literatures made up of works written in the same language (such as Spanish and Latin American) are counted as one. One of the student's three literatures usually is designated as the primary field, the other two as secondary fields, although some students may offer two literatures at the primary level (six or more graduate courses).

### Teaching

Students, whatever their sources of financial support, are ordinarily required to undertake a total of five quarters of supervised apprenticeships and teaching at half time. Students must complete whatever pedagogy courses are required by the departments in which they teach. The department's minimum teaching requirement is a total of three quarters.

## Minimum Course Requirements

Students are advised that the range and depth of preparation necessary to support quality work on the dissertation, as well as demands in the present professional marketplace for coverage of both traditional and interdisciplinary areas of knowledge, render these requirements as bare minimums. The following are required:

1. Required Courses:

	<b>Units</b>
COMPLIT 369 Introduction to Graduate Studies: Criticism as Profession	5
COMPLIT 396L Pedagogy Seminar I	2

2. A sufficient number of courses (six or more) in the student's primary field to assure knowledge of the basic works in one national literature from its beginnings until the present.
3. At least two additional complementary courses, with most of the reading in the original, in each of two different national literatures. Students whose primary field is a non-native language are required to take two courses in one additional literature not their own.

Minimum course requirements must be completed before the student is scheduled to take the University oral examination. These requirements are kept to a minimum so that students have sufficient opportunity to seek out new areas of interest. A course is an offering of 3-5 units. Independent study may take the place of up to two of the required courses, but no more; classroom work with faculty and other students is central to the program. The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the university, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements results in corrective

measures which may include a written warning, academic probation, and/or the possible release from the program.

## Examinations

Three examinations are required. The first two are one-hour exams. The first of these two is taken at the end of the student's first year of study; the second is taken at the start of the second year. Students should meet with the members of the exam committee to discuss their plans for the exams. The first of these is on literary genre, designed to demonstrate the student's knowledge of a substantial number of literary works in a single genre, ranged over several centuries and over at least three national literatures. This exam is also designed to demonstrate the student's grasp of the theoretical problems involved in his or her choice of genre and in the matter of genre in general. The second of these examinations is on literary theory and criticism, designed to demonstrate the student's knowledge of a particular problem in the history of literary theory and criticism, or the student's ability to develop a particular theoretical position. In either case, this exam should demonstrate wide reading in theoretical and critical texts from a variety of periods. The third and last is the University oral examination, which covers a literary period, to consist of in-depth knowledge of a period of approximately a century in three or more literatures with primary emphasis on a single national literature or, in occasional cases, two national literatures.

1. *First One-Hour Examination:* The genre exam is generally administered the second week of April of the student's first year. All first-year students take the exam during the same period, with an examination committee established by the department. Exam lists should be approved by the Chair of Graduate Studies well in advance of the exam. Students are urged to focus on poetry, drama, or the novel or narrative, combining core recommendations from the department with selections from their individual areas of concentration. Any student who does not pass the exam has the opportunity to retake the exam the second week of May of the same quarter. Students who do not pass this exam a second time may be dismissed from the program.
2. *Second One-Hour Examination:* The theory exam is administered the Autumn Quarter of the student's second year. All second-year students take the exam during the same period, with an examination committee established by the department. Exam lists should be approved by the Chair of Graduate Studies well in advance of the exam. Any student who does not pass the exam has the opportunity to retake the exam the second week of the Winter Quarter. Students who do not pass this exam a second time may be dismissed from the program.
3. *University Oral Examination:* Students are required to take this exam during the Autumn Quarter of their third year. The oral exam is individually scheduled, with a committee established by the student in consultation with the Chair of Graduate Studies. The reading list covers chiefly the major literary texts of a period of approximately one hundred years but may also include some studies of intellectual backgrounds and modern critical discussions of the period. Students must demonstrate a grasp of how to discuss and define this period as well as the concept of periods in general. This examination is not to be on the dissertation topic, on a single genre, or on current criticism, but rather on a multiplicity of texts from the period. Students whose course work combines an ancient with a modern literature have the option of dividing the period sections into two wholly separate periods.

## Qualifying Procedures

The department meets at the end of each year to review all graduate student progress. Students may be admitted to candidacy for the Ph.D. upon successful completion of the first year examination and a thorough review of the student's academic record, after which the faculty will vote on whether or not to advance the student to candidacy. A student

will only advance to candidacy if, in addition to the student's fulfilling departmental prerequisites, the faculty makes the judgment that the student has the potential to successfully complete all the requirements of the degree program in a timely fashion. Should a student not be admitted to candidacy, s/he will be dismissed from the doctoral program. In unusual cases, the faculty may decide to extend the pre-candidacy period and require the student to complete specific steps in a predetermined time period prior to evaluating the student for advancement to candidacy.

## Prospectus Colloquium

The prospectus colloquium normally takes place during the spring of the third year. The student should furnish the committee with a five-page prospectus, 20-page draft of a chapter, and working bibliography well before the colloquium. The colloquium lasts one hour, begins with a brief introduction to the dissertation prospectus by the student lasting no more than five minutes, and consists of a discussion of the prospectus by the student and the three readers of the dissertation. At the end of the hour, the faculty readers vote on the outcome of the colloquium. If the outcome is favorable (by majority vote), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory (by majority vote), the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second colloquium.

The prospectus must be prepared in close consultation with the dissertation adviser during the months preceding the colloquium. It must be submitted in its final form to the readers no later than one week before the colloquium. A prospectus should not exceed ten double spaced pages, in addition to which it should include a working bibliography of primary and secondary sources. It should offer a synthetic overview of the dissertation, describe its methodology and the project's relation to prior scholarship on the topic, and lay out a complete chapter by chapter plan.

It is the student's responsibility to schedule the colloquium no later than the first half of the quarter after that quarter in which the student passed the University Oral Examination. The student should arrange the date and time in consultation with the department administrator and with the three examiners. The department administrator schedules an appropriate room for the colloquium.

Members of the dissertation reading committee are ordinarily drawn from the University oral examination committee.

## Ph.D. Minor in Comparative Literature

This minor is designed for students working toward the Ph.D. in the various foreign language departments. Students working toward the Ph.D. in English are directed to the program in English and Comparative Literature described among the Department of English offerings. Students must have:

1. A knowledge of at least two foreign languages, one of them sufficient to qualify for graduate-level courses in that language, the second sufficient to read a major author in the original language.
2. A minimum of six graduate courses, of which three must be in the department of the second literature and three in the Department of Comparative Literature, the latter to include a seminar in literary theory or criticism. At least two of the three courses in comparative literature should originate in a department other than the one in which the student is completing the degree. Except for students in the Asian languages, students must choose a second literature outside the department of their major literature.

*Emeriti:* (Professors) Joseph Frank, John Freccero, René Girard, Herbert Lindenberger, Elisabeth Mudimbe-Boyi (French and Italian), Mary Pratt; (Courtesy Professors) W. B. Carnochan, Gerald Gillespie, David G. Halliburton, Marjorie G. Perloff

*Director:* David Palumbo-Liu

*Chair of Graduate Admissions:* Russell Berman

*Chair of Graduate Studies:* David Palumbo-Liu

*Chair of Undergraduate Studies:* Margaret Cohen

*Professors:* John Bender (English, Comparative Literature), Russell Berman (German Studies, Comparative Literature), Margaret Cohen (Comparative Literature), Amir Eshel (German Studies, Comparative Literature), Roland Greene (English, Comparative Literature), Hans U. Gumbrecht (French and Italian, Iberian and Latin American Cultures, Comparative Literature), Franco Moretti (English, Comparative Literature) (on leave), David Palumbo-Liu (Comparative Literature), Patricia Parker (English, Comparative Literature), Joan Ramón Resina (Iberian and Latin American Cultures, Comparative Literature), José David Saldívar (Comparative Literature), Ramón Saldívar (English, Comparative Literature), Ban Wang (East Asian Languages and Cultures, Comparative Literature)

*Associate Professors:* Monika Greenleaf (Slavic Languages and Literatures, Comparative Literature), Haiyan Lee (East Asian Languages and Cultures, Comparative Literature)

*Assistant Professors:* Dominic Brookshaw (Persian and Comparative Literature), Alexander Key (Arabic and Comparative Literature)

*Courtesy Professor:* Nancy Ruttenburg

*Lecturers:* Petra Dierkes-Thrun, Burcu Karahan (Turkish), Kimberly Lewis (Humanities Fellow), Vered K. Shemtov (Hebrew), Bulbul Tawari (Humanities Fellow)

# Comparative Studies in Race and Ethnicity (CSRE)

The Undergraduate Program in Comparative Studies in Race and Ethnicity is home to five areas of study:

- Asian American Studies (courses listed as ASNAMST (<https://explorecourses.stanford.edu/search?q=ASNAMST&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-ASNAMST=on&filter-catalognumber-ASNAMST=on>) on ExploreCourses)
- Chicana/o-Latina/o Studies (courses listed as CHILATST ([https://explorecourses.stanford.edu/search?q=CHILATST&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=\) on ExploreCourses](https://explorecourses.stanford.edu/search?q=CHILATST&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=) on ExploreCourses))
- Comparative Studies (courses listed as CSRE ([https://explorecourses.stanford.edu/search?q=CSRE&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-CSRE=on&filter-catalognumber-CSRE=on](https://explorecourses.stanford.edu/search?q=CSRE&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-CSRE=on&filter-catalognumber-CSRE=on) on ExploreCourses)) on ExploreCourses)
- Jewish Studies (courses listed as JEWISHST ([https://explorecourses.stanford.edu/search?q=JEWISHST&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-JEWISHST=on&filter-catalognumber-JEWISHST=on](https://explorecourses.stanford.edu/search?q=JEWISHST&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-JEWISHST=on&filter-catalognumber-JEWISHST=on) on ExploreCourses)) on ExploreCourses)

- Native American Studies (courses listed as NATIVEAM ([https://explorecourses.stanford.edu/search?q=NATIVEAM&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-NATIVEAM=on&filter-catalognumber-NATIVEAM=on](https://explorecourses.stanford.edu/search?q=NATIVEAM&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-NATIVEAM=on&filter-catalognumber-NATIVEAM=on) on ExploreCourses)) on ExploreCourses)

Students can pursue a major or minor in any of these five areas, and are encouraged to build their interdisciplinary study around a focus or theme. Students can then select from more than 150 course options from across departments and schools to customize a curriculum. The major requires 60 units of study and a culminating research project (either a senior paper or honors thesis).

## Mission of the Undergraduate Program in Comparative Studies in Race and Ethnicity

The Interdepartmental Program in Comparative Studies in Race and Ethnicity (CSRE) is an interdisciplinary program offering students the opportunity to investigate the significance of race and ethnicity in all areas of human life.

Devoted to a rigorous analysis of race and ethnicity and using a comparative and interdisciplinary approach, CSRE is committed to promoting and deepening students' understanding of the multiple meanings of racial diversity in the United States and abroad in ways that prepare students for living and working effectively in a multicultural society.

The interdisciplinary and integrated nature of our academic programs means that students take courses from across the university including: anthropology, art, communication, economics, education, history, languages, linguistics, literature, music, philosophy, political science, psychology, religion, sociology, theater and performance, among others.

## Learning Outcomes (Undergraduate)

The Program in Comparative Studies in Race and Ethnicity expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the undergraduate program. Students are expected to:

1. demonstrate an understanding of interdisciplinary approaches to the knowledge of experiences related to race and ethnicity in the United States.
2. demonstrate the ability to employ diverse analytical resources and comparative modes of study as tools to frame and address research questions.
3. be critical readers of both primary and secondary sources, who can use and properly cite both types of evidence in their written work.
4. actively and critically engage in verbal and/or written discussion of issues.
5. demonstrate analytical writing skills that convey their understanding of the topic.
6. expand their ability to think critically about issues in political, social, scientific, economic and cultural life stemming from the diversity of experiences related to race and ethnicity.

# Undergraduate Program in Comparative Studies in Race and Ethnicity

## Majors: Core Curriculum

The Interdepartmental Program in Comparative Studies in Race and Ethnicity (CSRE) provides students the opportunity to structure a major or minor in comparative ethnic studies or to focus their course work in a single ethnic studies area. Five majors and minors (Asian American Studies, Chicana/o-Latina/o Studies, Comparative Studies, Jewish Studies, and Native American Studies) are offered as part of the the IDP in CSRE. All core courses taken for the major must be taken for a letter grade. The directors of the program and of each major constitute the CSRE curriculum committee, the policy making body for the interdisciplinary program.

Students who declare any of the five majors participate in a common curriculum consisting of at least two core courses and a senior seminar.

There are two types of introductory courses taught by senior CSRE affiliated faculty: core courses that are interdisciplinary and compare across racial and ethnic groups; and foundational courses that focus on a specific racial or ethnic group. These requirements illustrate how different disciplines approach the study and interpretation of race and ethnicity and provide a foundation for the student's program of study.

## Minors

Students who wish to minor in the study areas must complete a minimum of 30 units from the approved course list, one of which must be a core course and a second that is foundational to the area of study. Proposals for the minor must be approved by the director of each study area.

## Directed Reading and Research

Directed reading and research allows students to focus on a special topic of interest. In organizing a reading or research plan, the student consults with the director of the major and one or more faculty members specializing in the area or discipline.

Courses that fulfill directed reading and research requirements:

		Units
ASNAMST 200R	Directed Research	1-5
ASNAMST 200W	Directed Reading	1-5
CHILATST 200R	Directed Research	1-5
CHILATST 200W	Directed Reading	1-5
CSRE 200R	Directed Research	1-5
CSRE 200W	Directed Reading	1-5
NATIVEAM 200R	Directed Research	1-5
NATIVEAM 200W	Directed Reading	1-5

## Senior Seminar

Research and writing of the senior honors thesis or senior paper is under the supervision of a faculty project adviser. All majors in the IDP in CSRE, even those who opt to write honors theses in other departments and programs, must enroll in CSRE 200X CSRE Senior Seminar, offered in Autumn Quarter. The course takes students through the process of research including conceptualization, development of prospectus, development of

theses, research, analysis, and writing. This course meets the Writing in the Major requirement (WIM). Those who opt to write senior papers are organized into tutorial groups in Autumn Quarter.

## Special Programs

CSRE majors have several unique opportunities available to them. The program supports full-time paid summer research internships for those who apply to complete a self-designed research project in collaboration with a community agency. The Public Policy Institute is a two week, pre-Autumn Quarter seminar that provides exposure to critical public policy issues. The residence-based institute provides room and board and all seminar materials for participants, including a visit to Sacramento to meet with policy makers. CSRE also sponsors quarterly luncheons and community programs for all majors and minors.

## Murray House

Murray House, 566 Governor's Avenue, is an undergraduate residence with a CSRE focus that is devoted to developing an intellectual community amongst students interested in the study of race and ethnicity. Programs, including an in-house seminar, are developed with the guidance of CSRE faculty to increase the understanding of issues of race and ethnicity amongst its residents through social events and discussions. Students may apply for pre-assignment to Murray House to participate in the CSRE Focus. Contact Residential Education for more information.

## Honors Program in Comparative Studies in Race and Ethnicity

### For Majors in Comparative Studies in Race and Ethnicity

The Interdepartmental Program in Comparative Studies in Race and Ethnicity offers a program leading to honors for majors in:

- Asian American Studies
- Chicana/o-Latina/o Studies
- Comparative Studies
- Jewish Studies
- Native American Studies

The honors program offers an opportunity to do independent research for a senior thesis. It is open to majors who have maintained a grade point average (GPA) of at least 3.5 in the major and 3.3 overall. The honors thesis is intended to enable students to synthesize skills to produce a document or project demonstrating a measure of competence in their specialty.

Majors interested in honors are encouraged to enroll in CSRE 199 Pre-Honors Seminar, in Autumn Quarter of the junior year. This course is preparation for the honors thesis and allows the student to work with a mentor to select a topic, construct a research question, and develop a research plan.

The application for honors must be submitted by June 1 of the junior year, but students are encouraged to apply earlier. The application includes a proposal describing the project that is approved by the faculty adviser and director of the undergraduate program. Students are required to identify both a faculty adviser and a second reader for the thesis project. The faculty adviser for the honors thesis must be an academic council faculty member and affiliated faculty of the student's major.

Honors students take CSRE 200X CSRE Senior Seminar, which fulfills the program's WIM requirement, and also enroll in CSRE 200Y CSRE Senior Honors Research and CSRE 200Z CSRE Senior Honors Research, in Winter and Spring quarters to continue to access peer and faculty support as

they write their theses. Students must complete their theses with a grade of 'B+' to receive honors in CSRE.

An honors colloquium held near the end of Spring Quarter affords students an opportunity to present their research formally. Prizes for best undergraduate honors thesis are awarded annually by the CSRE curriculum committee.

Applications are available in the CSRE Undergraduate Program office and on the program web site (<http://csre.stanford.edu/honors.php>).

## For Majors in Other Departments

The Interdisciplinary Honors Program for Non-Majors in Comparative Studies in Race and Ethnicity is intended to complement study in any major. Students who participate in the honors program receive their degree from their program of study with departmental honors in Comparative Studies in Race and Ethnicity.

Honors certification will be open to students majoring in any field with a GPA in their chosen major of 3.5 and an overall GPA of 3.3. As a prerequisite, students apply for entry by Spring Quarter of the junior year (deadline June 1), but students are encouraged to begin earlier. During the application process, students outline a plan for course work and design an honors project in consultation with their proposed thesis adviser and the CSRE senior seminar coordinator.

The application describes how the student may fulfill the course requirements for interdisciplinary honors in CSRE and includes a proposal describing the project that is approved by the faculty adviser and director of the undergraduate program. Students are required to identify both a faculty adviser and a second reader for the thesis project. The faculty adviser for the honors thesis must be an academic council faculty member and affiliated faculty of the Center for Comparative Studies in Race and Ethnicity. Applications are available in the CSRE undergraduate program office and on the program web site (<http://csre.stanford.edu/honors.php>).

Students pursuing a minor in Asian American Studies, Chicana/o-Latina/o Studies, Comparative Studies in Race and Ethnicity, Jewish Studies or Native American Studies who wish to pursue honors in their area of study, apply through the process for non-majors. Students may use their course work for the minor toward the requirements of the interdisciplinary honors program.

## Requirements:

Students applying for the interdisciplinary honors program in CSRE are required to take the following courses:

		Units
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5

And a second course identified as core or foundational to CSRE.

## Core Courses

		Units
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 226	Race and Racism in American Politics	5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
CSRE 255D	Racial Identity in the American Imagination	4-5
PSYCH 75	Introduction to Cultural Psychology	5

## Foundational Courses

		Units
ASNAMST 146S	Asian American Culture and Community	3-5

AFRICAAM 105	Introduction to African and African American Studies	5
NATIVEAM 138	American Indians in Comparative Historical Perspective	5
NATIVEAM 139	American Indians in Contemporary Society	5

These courses must be completed with a grade of 'B+' or better for the honors program.

In addition, students are required to take:

		Units
CSRE 200X	CSRE Senior Seminar	5
CSRE 200Y	CSRE Senior Honors Research (in Winter and Spring quarters)	1-10
CSRE 200Z	CSRE Senior Honors Research (in Winter and Spring quarters)	1-10

These courses must be completed with a minimum grade of 'B+'.

Throughout the year, students work with faculty adviser and the senior seminar coordinator to complete their theses. Students must complete their theses with a grade of 'B+' to receive honors in CSRE.

An honors colloquium held near the end of Spring Quarter affords students an opportunity to present their research formally. Prizes for best undergraduate honors thesis are awarded annually by the CSRE curriculum committee.

## Asian American Studies

*Director:* David Palumbo-Liu

Asian American Studies (AAS) provides an interdisciplinary approach to understanding the historical and current experiences of persons of Asian ancestry in the United States. In using the term Asian American, the AAS faculty recognize that the term seeks to name a rapidly developing, complex, and heterogeneous population and that there is neither a single Asian American identity nor one community that comprises all Asian Americans. Asian Americans include those with ancestral ties to countries or regions in East Asia, South Asia, Southeast Asia, or the Philippines, among others.

AAS brings together courses that address the artistic, historical, humanistic, political, and social dimensions of Asian Americans and is an appropriate course of study for students interested in a variety of concerns related to Asian Americans, including: artistic and cultural contributions; current social significance; historical experiences; immigration, intellectual, and policy issues; relationships with other social groups; and the construction of the notion of Asian American as it addresses important theoretical and practical issues.

## Bachelor of Arts in Asian American Studies

A total of 60 units of course work is required for the major.

### 1. Core Curriculum

Asian American majors must take the 15-unit CSRE core curriculum including two core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course that focuses on a non-Asian ethnic group may be counted toward the 15-unit core requirement.

## 2. Foundational Course

Majors are required to take one foundational course in Asian American Studies. Students who completed ASNAMST 159/ HISTORY 159 or ENGLISH 43C/143C last year may count this toward their Foundational Course Requirement. These courses are not offered in 2012-13.

3.		<b>Units</b>
	ASNAMST Asian American Culture and Community 146S/ COMPLIT 146/ CSRE 146S	5

## 4. Area Study

Majors must complete an additional 35 units of course work from an approved list. One course must have an international dimension, preferably a focus on Asia. One course should have a comparative focus, not restricted to Asian American identity. The remaining courses must have an Asian American focus and must be selected from social science and humanities departments.

## 5. Language Study (optional)

Students may obtain credit for their study of a related Asian language towards their degree. If students take 15 or more units of an Asian language relevant to Asian American Studies, they may apply 5 of those units toward their Asian American Studies degree.

## 6. Research/Methodology Requirement

Majors are required to complete 5 units of course work focused on research methods relevant to their disciplinary approach as a student in Asian American Studies. Students select the research and/or methodology course in consultation with their faculty adviser.

## 7. Senior Paper or Honors Thesis

All Asian American Studies majors complete a culminating research paper under the supervision of a faculty adviser.

# Chicana/o-Latina/o Studies

*Director:* Gary Segura

Chicana/o-Latina/o Studies is an interdisciplinary major focusing on the U.S. population with origins in the countries of Mexico, Latin America, and/or South America. Students who major or minor in Chicana/o-Latina/o Studies have an opportunity to select from courses in the humanities, social sciences, and courses offered by affiliated faculty in the School of Education. The Chicana/o-Latina/o Studies program affords students an opportunity to explore the culture, society, economy, and politics of this important and growing segment of our national population.

# Bachelor of Arts in Chicana/o-Latina/o Studies

A total of 60 units of course work are required for the major.

## 1. Core Curriculum

Chicana/o-Latina/o Studies majors must take the 15-unit CSRE core curriculum including two core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course that focuses on a non-Latino origin group may be counted toward the 15-unit core requirement.

## 2. Foundational Courses

Majors are required to take one foundational course in Chicana/o-Latina/o Studies. Students who completed CHICANST 180E or CHICANST/SOC 166 may count this toward their foundational course requirement. These courses are not offered in 2012-13.

## 3. Thematic Concentration

Chicana/o-Latina/o Studies majors select a thematic concentration which allows students to customize their curriculum and to synthesize course work taken across various departments into a coherent focus. Majors complete an additional 35 units of courses relevant to the thematic concentration and approved by the adviser.

## 4. Language Study (optional)

Students may obtain credit for the study of the Spanish language towards their degree. If students take 15 or more units of Spanish language relevant to Chicana/o-Latina/o Studies, they may apply 5 of those units toward their Chicana/o-Latina/o Studies degree.

## 5. Research/Methodology Requirement

Majors are required to complete 5 units of course work focused on research methods relevant to their disciplinary approach as a student in Chicana/o-Latina/o Studies. Students select the research and/or methodology course in consultation with their faculty adviser.

## 6. Senior Paper or Honors Thesis

All Chicana/o-Latina/o Studies majors complete a culminating research paper under the supervision of a faculty adviser.

# Comparative Studies in Race and Ethnicity

*Director:* David Palumbo-Liu

Comparative Studies in Race and Ethnicity does not focus on a particular ethnic group. Rather, a student in consultation with the adviser designs a curriculum in relation to a thematic concentration that compares various ethnic groups or explores topics that cut across group experiences in the United States and elsewhere in the world. For example, students may compare groups within the U.S., or compare groups in the U.S. to ethnic groups elsewhere, or study the diaspora of a single group or the sovereignty of indigenous peoples within and across different national contexts. Students in this major are able to take advantage of courses in over 22 fields offered by the affiliated faculty of CSRE.

# Bachelor of Arts in Comparative Studies in Race and Ethnicity

A total of 60 units of course work are required for the major.

## 1. Core Curriculum

All CSRE majors enroll in the 15-unit core curriculum, which consists of two core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course may be counted toward the 15-unit core requirement.



## 2. Thematic Concentration

Comparative Studies majors complete another 40 units of course work relevant to the thematic concentration they have chosen in consultation with the adviser.

## 3. Research/Methodology Requirement

Majors are required to complete 5 units of coursework focused on research methods relevant to their disciplinary approach as a student in Comparative Studies. Students select the research and/or methodology course in consultation with their faculty adviser.

## 4. Senior Paper or Honors Thesis

All CSRE majors complete a culminating research paper under the supervision of a faculty adviser.

complete at least 20 units of courses at the 100 level or above relevant to the thematic concentration as approved by the Jewish Studies director.

## 5. Language

One year of Hebrew or another approved Jewish language. Students able to satisfy the first year Hebrew requirement through a proficiency exam are still expected to take an additional year of Hebrew at a higher level or a first year in an additional Jewish language. A maximum of 15 units of language may be counted toward the 60 unit total required for the major.

## 6. Research/Methodology Requirement

Majors are required to complete 5 units of coursework focused on research methods relevant to their disciplinary approach as a student in Jewish Studies. Students select the methodology course(s) in consultation with their faculty adviser.

## 7. Senior Paper or Honors Thesis

All Jewish Studies majors complete a culminating research paper under the supervision of a faculty adviser.

# Jewish Studies

*Director:* Steven Weitzman

The Jewish Studies major provides students with an understanding of Jewish history, language, literature, religion, thought and politics. Jewish culture originated in the ancient Near East and continues today in many different forms across the globe. Drawing from the Humanities, the Social Sciences and from courses offered by affiliated faculty in the School of Education, the Jewish Studies major seeks to help students understand Jewish identity, thought and self-expression within larger historical and social contexts, and to develop their ability to analyze human experience from different disciplinary perspectives.

In addition to the undergraduate major and minor offered through the interdepartmental program in CSRE, the Taube Center for Jewish Studies offers a full range of guest lectures, conferences, and symposia. Graduate students interested in Jewish Studies should see the separate Jewish Studies (p. 459) section of this bulletin for program information, opportunities, and additional course descriptions.

# Bachelor of Arts in Jewish Studies

A total of 60 units of course work are required for the major.

## 1. Core Curriculum

Jewish Studies majors must take the 15-unit CSRE core curriculum including two core courses and a senior seminar taken in Autumn Quarter of the senior year.

## 2. Foundational Courses

Majors are required to take one foundational course in Jewish Studies. Courses offered this year include:

	Units
3. RELIGST 23 Exploring Judaism	4
JEWISHST/COMPLIT 140 Introduction to Hebrew Literature	3-5

## 4. Thematic Concentration

Jewish Studies majors select a thematic concentration which allows students to customize their curriculum and to synthesize course work taken across various departments into a coherent focus. Majors

# Native American Studies

*Director:* C. Matthew Snipp

Native American Studies (NAS) provides an intensive approach to understanding the historical and contemporary experiences of Native American people. Attention is paid not only to the special relationship between tribes and the federal government, but to issues across national boundaries, including tribal nations within Canada, and North, Central, and South America. In using the term Native American, the NAS faculty recognize the heterogeneous nature of this population. Native Americans include the Alaska Native population, which comprises Aleuts, Eskimo, and other Native American people residing in Alaska, as well as Native Hawaiian communities.

The purpose of the Native American Studies major and minor is to introduce students to approaches in the academic study of Native American people, history, and culture. Students who major in Native American Studies have the opportunity of doing advanced work in related fields, including literature, sociology, education, and law. In addition to specialized course work on Native American issues, students also are expected to concentrate in a traditional discipline such as anthropology, history, or psychology to ensure a well rounded educational experience. The area of concentration and related course work should be chosen in consultation with a faculty adviser in Native American Studies. All courses in the program promote the discussion of how academic knowledge about Native Americans relates to the historical and contemporary experiences of Native American people and communities.

# Bachelor of Arts in Native American Studies

A total of 60 units of course work are required for the major.

## 1. Core Curriculum

Native American Studies majors must take the 15-unit CSRE core curriculum, including two core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course that focuses on a non-Native American group may be counted toward the 15-unit core requirement.

## 2. Foundational Courses

Majors are required to take one foundational course in Native American Studies. Students who completed NATIVEAM/ANTHRO 16 may count this course toward their Foundational Course requirement. This course is not offered in 2012-13.

3. Units  
Select one of the following:

NATIVEAM 138	American Indians in Comparative Historical Perspective	5
NATIVEAM 139	American Indians in Contemporary Society	5

## 4. Area Study

Majors complete an additional 40 units of course work that satisfy three categories in their area of study: Native American focus, comparative focus, and a methodology/research course.

## 5. Language Study (optional)

Students may obtain credit for their study of a related native language towards their degree. If students take 15 or more units of a native language relevant to Native American Studies, they may apply 5 of those units toward their Native American Studies degree.

## 6. Research/Methodology Requirement

Majors are required to complete 5 units of coursework focused on research methods relevant to their disciplinary approach as a student in Native American Studies. Students select the research and/or methodology course in consultation with their faculty adviser.

## 7. Senior Paper or Honors Thesis

All Native American Studies majors complete a culminating research paper under the supervision of a faculty adviser.

## Thematic Concentration in American Diversity

The American Diversity concentration is designed for students who wish to explore how the United States was and is constituted with relation to issues of race and ethnicity. The concentration investigates how American domestic and foreign policy, law, history, culture, and society are formed within conversations, debates, policies and studies regarding race and ethnicity. Issues of immigration, citizenship, empire and expansion, defense, diplomacy, human rights, public welfare, social justice and law, educational rights and other topics are explored from the angle of how racial and ethnic difference impacts debate and policy.

The concentration is not declared on ACESS; it does not appear on the transcript or diploma. Students interested in the American Diversity thematic concentration should contact the CSRE undergraduate program office.

The American Diversity concentration requires 15 units including two approved CSRE core courses and CSRE 200X CSRE Senior Seminar (WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. In addition to the core curriculum, students complete a Research/Methodology requirement (5 units). The remaining 40 units of course work should be relevant to the thematic concentration and selected in consultation with the faculty adviser.

Students may find the following courses useful in fulfilling requirements in the American Diversity thematic concentration.

		Units
AFRICAAM 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
AMSTUD 143	Introduction to African American Literature	3-5
AMSTUD 183	Border Crossings and American Identities	5
ASNAMST 161	Asian American Immigration and Health	3-5
CSRE 14N	Growing Up Bilingual	3
CSRE 45Q	Understanding Race and Ethnicity in American Society	5
CSRE 55R	Race and Upward Mobility in U.S. Cultural Production	3
CSRE 108	Introduction to Feminist Studies	4-5
CSRE 127A	Can't Stop Won't Stop: A History Of The Hip-Hop Arts	4
CSRE 201B	From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era	5
CSRE 203A	The Changing Face of America: Civil Rights and Education Strategies for the 21st Century	5
EDUC 114N	Growing Up Bilingual	3
EDUC 201	History of Education in the United States	3-5
HISTORY 50B	19th Century America	3
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
POLISCI 120B	Campaigns, Voting, Media, and Elections	4-5
SOC 135	Poverty, Inequality, and Social Policy in the United States	5
SOC 140	Introduction to Social Stratification	5
SOC 155	The Changing American Family	5

## Thematic Concentration in Education, Access, and Equity

The concentration in Education, Access, and Equity explores history, policy, and practice in education to understand how educational opportunity is shaped by issues of race, ethnicity, and difference. The goal of the concentration is to develop an understanding of the core issues facing educators and policy makers so that students may learn how they can contribute to the social and political discourse surrounding issues of education and opportunity policy in the U.S.

The concentration is not declared on ACESS; it does not appear on the transcript or diploma. Students interested in the Education, Access, and Equity concentration should contact the CSRE undergraduate program office.

The Education, Access, and Equity concentration requires 15 units including two approved CSRE core courses and CSRE 200X CSRE Senior Seminar(WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. In addition to the core curriculum, students complete a Research/Methodology requirement (5 units). The remaining 40 units of course work should be relevant to the thematic concentration and selected in consultation with the faculty adviser.

Students may find the following courses useful in fulfilling requirements in the Education, Access, and Equity thematic concentration.

		Units
AFRICAAM 112	Urban Education	3-4
CSRE 121X	Hip Hop, Youth Identities, and the Politics of Language	3-4
CSRE 203A	The Changing Face of America: Civil Rights and Education Strategies for the 21st Century	5

CSRE 216X	Education, Race, and Inequality in African American History, 1880-1990	3-5
CSRE 233A	Counseling Theories and Interventions from a Multicultural Perspective	3-5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
EDUC 100B	EAST House Seminar: Current Issues and Debates in Education	1
EDUC 110	Sociology of Education: The Social Organization of Schools	4
EDUC 112X	Urban Education	3-4
EDUC 120C	Education and Society	4-5
EDUC 146X	Perspectives on the Education of Linguistic Minorities	3-4
EDUC 148X	Critical Perspectives on Teaching and Tutoring English Language Learners	3
EDUC 149	Theory and Issues in the Study of Bilingualism	3-5
EDUC 165	History of Higher Education in the U.S.	3-5
EDUC 178X	Latino Families, Languages, and Schools	3-5
EDUC 197	Education, Gender, and Development	4
EDUC 277	Education of Immigrant Students: Psychological Perspectives	4
HISTORY 158C	History of Higher Education in the U.S.	3-5
SOC 132	Sociology of Education: The Social Organization of Schools	4

## Thematic Concentration in Identity, Diversity and Aesthetics (IDA)

Students in the Comparative Studies in Race and Ethnicity major can choose a concentration in Identity, Diversity and Aesthetics (IDA). The Identity, Diversity, and Aesthetics Concentration in Comparative Studies in Race & Ethnicity is a program designed to explore the intersections of culture, race, the arts, and social transformation. In IDA courses taught by Stanford faculty, lecturers, and distinguished Visiting Artists, students learn how the arts, activism, and the academy interact to produce aesthetic and societal change.

The concentration is not declared in Axxess; it does not appear on the transcript or diploma. Students interested in IDA should contact the CSRE undergraduate program office.

The IDA concentration requires 15 units including two approved CSRE core courses and CSRE 200X CSRE Senior Seminar (WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. CSRE majors are also required to take a course in research methods (5 units). In addition to the core curriculum, students complete 40 units of course work relevant to the thematic concentration. Thematic courses may focus on artistic practice and performance, art history, creative writing, community arts, art and social change, writing for performance, critical studies in art and performance, and critical arts theory.

Additionally, IDA concentration students must complete a creative senior project. Possible senior projects include a stage production, a set of recorded music, an anthology of creative writing, a curated or solo exhibition, or a community arts workshop. Students who elect to write an honors thesis may incorporate their project as the basis for their thesis.

Students may find the following courses useful in fulfilling requirements in the Identity, Diversity and Aesthetics (IDA) concentration.

		Units
ASNAMST 158	Screening Asian America	5

CHILATST 179	Chicano & Chicana Theater: Politics In Performance	3-5
CSRE 99A	Art in Our Time: Ethics and Aesthetics of Crisis	4
CSRE 121X	Hip Hop, Youth Identities, and the Politics of Language	3-4
CSRE 122E	Art in the Streets: Identity in Murals, Site-specific works, and Interventions in Public Spaces	4
CSRE 127A	Can't Stop Won't Stop: A History Of The Hip-Hop Arts	4
CSRE 127B	The Pleasure Principle: A Post-Hip Hop Search for a Black Feminist Politics of Pleasure	3
CSRE 142	The Literature of the Americas	5
CSRE 177	Writing for Performance: The Fundamentals	5
CSRE 177B	Introduction to Dance on the Global Stage	4
CSRE 179C	Chroniclers of Desire: Creative Non-Fiction Writing Workshop	3-5
CSRE 179G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5
CSRE 201B	From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era	5
DANCE 45	Dance Improvisation Techniques and Strategies Lab: From Hip Hop to Contact	1
DANCE 197	Dance in Prison: The Arts, Juvenile Justice, and Rehabilitation in America	4
MUSIC 17Q	Perspectives in North American Taiko	4
NATIVEAM 167	Performing Indigeneity on Global Stage	4

## Thematic Concentration in Public Service

The Public Service thematic concentration is open to students in any major in the Comparative Studies in Race and Ethnicity Undergraduate Program. The concentration allows a student to develop an area of study focused on community development, public service, and social change. Studying how issues of race and ethnicity impact and are impacted by community and social problems, this concentration is designed to ensure that students interested in service and community have access to a structured curriculum that provides a solid grounding in the theory and practice of community and civic engagement in order to provide the skills and experiences that enable students to become leaders and actors in the sphere of public life.

Students who wish to pursue a thematic concentration in public service must organize their studies to include 15 units, including two approved CSRE core courses and CSRE 200X CSRE Senior Seminar (WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. In addition to the core curriculum, students complete a Research/Methodology requirement (5 units). Public Service concentration students should also prepare to complete 25 units (at least 5 courses) relevant to the theme of public service. Three of these courses should include a service learning component (i.e., require the student to participate in service in the local community as a central component to the course).

Students who select a thematic concentration in public service must complete an internship as part of their program of study. This internship can be completed during the academic year for credit or during the summer, but must be at least 300 hours.

Finally, students who pursue the concentration in public service should select a topic for their senior paper or honors thesis that reflects their interest in community work (i.e., service or organizing) or a community issue or concern that is addressed through public service.

This concentration is not declared on Axxess; it does not appear on the transcript or diploma. Students interested in this thematic concentration

should contact the CSRE Undergraduate Program Office for details about its requirements.

Students may find the following courses useful in fulfilling requirements for the Public Service thematic concentration:

		<b>Units</b>
AFRICAAM 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
ASNAMST 112	Public Archaeology: Market Street Chinatown Archaeology Project	4-5
ASNAMST 146S	Asian American Culture and Community	3-5
CSRE 11W	Service-Learning Workshop on Issues of Education Equity	1
CSRE 146	Community Matters: Research and Service with Community Organizations	2
CSRE 201B	From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era	5
CSRE 203A	The Changing Face of America: Civil Rights and Education Strategies for the 21st Century	5
CSRE 260	California's Minority-Majority Cities	4-5
DANCE 197	Dance in Prison: The Arts, Juvenile Justice, and Rehabilitation in America	4
EDUC 116X	Service Learning as an Approach to Teaching	3
EDUC 270A	Learning to Lead in Public Service Organizations	3-5
HISTORY 259A	Poverty and Homelessness in America	4-5
SOC 118	Social Movements and Collective Action	5
SOC 119	Understanding Large-Scale Societal Change: The Case of the 1960s	5
SOC 135	Poverty, Inequality, and Social Policy in the United States	5
SOC 141	Controversies about Inequality	5
URBANST 112	The Urban Underclass	5

## Thematic Concentration in Race and Health

The concentration in Race and Health is designed for students who are seeking an interdisciplinary exploration of health disparities, health access, and health policy. Through course work, students examine how health experiences are influenced by issues of race and ethnicity.

The concentration is not declared on Axxess; it does not appear on the transcript or diploma. Students interested in the Race and Health concentration should contact the CSRE undergraduate program office.

The Race and Health concentration requires 15 units including two approved CSRE core courses and CSRE 200X CSRE Senior Seminar (WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. In addition to the core curriculum, students complete a Research/Methodology requirement (5 units). The remaining 40 units of course work should be relevant to the thematic concentration and selected in consultation with the faculty adviser.

Students may find the following courses useful in fulfilling requirements in the Race and Health thematic concentration.

		<b>Units</b>
ANTHRO 82	Medical Anthropology	3-5
ANTHRO 185A	Race and Biomedicine	3-5
ASNAMST 161	Asian American Immigration and Health	3-5
HRP 212	Cross Cultural Medicine	3
HUMBIO 120	Health Care in America: An Introduction to U.S. Health Policy	4
HUMBIO 121E	Ethnicity and Medicine	1-3

HUMBIO 122S	Social Class, Race, Ethnicity, and Health	4
HUMBIO 128	Community Health Psychology	4
HUMBIO 129	Critical Issues in International Women's Health	4
MED 159A	Service-Learning in Migrant Health	2
MED 159B	Service-Learning in Migrant Health	2
NATIVEAM 240	Psychology and American Indian Mental Health	3-5
PEDS 222	Beyond Health Care: Seeking Health in Society	3
PEDS 250	Social and Environmental Determinants of Health	3
PSYCH 101	Community Health Psychology	4

## Thematic Concentration in Race and the American City

The Race and the American City concentration is designed for students who wish to develop methodologies, data, and theoretical and conceptual materials concerning how urban life, infrastructure, and policies are influenced by race and ethnicity. As virtual laboratories of social interaction, cities embody negotiations around resources, residences, financial districting, economic flow, health and educational resources, environmental policies, and city planning. A primary goal is for students to learn how they might contribute to the social and political discourse on race and ethnicity in the U.S. Participation in a public service internship and/or Stanford in Washington is encouraged.

The concentration is not declared on Axxess; it does not appear on the transcript or diploma. Students interested in the Race and the American City concentration should contact the CSRE undergraduate program office.

The Race and the American City concentration requires 15 units including two approved CSRE core courses and CSRE 200X CSRE Senior Seminar (WIM), taken Autumn Quarter of the senior year. One foundational course may be counted toward the 15 unit core requirement. In addition to the core curriculum, students complete a Research/Methodology requirement (5 units). The remaining 40 units of course work should be relevant to the thematic concentration and selected in consultation with the faculty adviser.

Students may find the following courses useful in fulfilling requirements in the Race and the American City thematic concentration.

		<b>Units</b>
CSRE 260	California's Minority-Majority Cities	4-5
PEDS 250	Social and Environmental Determinants of Health	3
SOC 135	Poverty, Inequality, and Social Policy in the United States	5
SOC 155	The Changing American Family	5
URBANST 112	The Urban Underclass	5
URBANST 114	Urban Culture in Global Perspective	5
URBANST 162	Managing Local Governments	4

## Asian American Studies Minor

A total of 30 units of approved course work is required for the minor. One CSRE core course and at least one foundational course are needed to fulfill the requirements for the minor. Proposals must be approved by the director.

Students in Asian American Studies may find the following courses useful in fulfilling course requirements in the major or minor.

### Core Courses

		<b>Units</b>
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5

CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 226	Race and Racism in American Politics	5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
CSRE 255D	Racial Identity in the American Imagination	4-5
PSYCH 75	Introduction to Cultural Psychology	5

## Foundational Courses

Students who completed ASNAMST 159/HISTORY 159 or ENGLISH 43C/143C last year may count this toward their Foundational Course Requirement. These are not offered in 2012-13.

		Units
ASNAMST 146S	Asian American Culture and Community	3-5

## Thematic Courses

		Units
ASNAMST 100C	EAST House Seminar: Current Issues and Debates in Education	1
ASNAMST 112	Public Archaeology: Market Street Chinatown Archaeology Project	2-5
ASNAMST 158	Screening Asian America	5
ASNAMST 174S	When Half is Whole: Developing Synergistic Identities and Mestiza Consciousness	5
ASNAMST 188	Gender and Sexuality in Asian American Literature	5
ASNAMST 295F	Race and Ethnicity in East Asia	4-5

## Chicana/o-Latina/o Studies Minor

A total of 30 units of approved course work is required for the minor. One CSRE core course and at least one foundational course are needed to fulfill the requirements for the minor. Proposals must be approved by the director.

Students in Chicana/o-Latina/o Studies may find the following courses useful in fulfilling course requirements in the major or minor.

### Core Courses

		Units
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 226	Race and Racism in American Politics	5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
CSRE 255D	Racial Identity in the American Imagination	4-5
PSYCH 75	Introduction to Cultural Psychology	5

### Foundational Courses

Students who completed CHICANST 180E or CHICANST/SOC 166 may count this toward their foundational course requirement. These courses are not offered in 2012-13.

### Thematic Courses

		Units
CHILATST 14N	Growing Up Bilingual	3
CHILATST 125S	Chicano/Latino Politics	5

CHILATST 175B	Transnational Latin American Migration to the United States	5
CHILATST 176S	Religion and the Politics of Culture in Chicana/o & Latina/o America	5
CHILATST 179	Chicano & Chicana Theater: Politics In Performance	3-5
CHILATST 200	Latin@ Literature	3-5
CHILATST 201B	From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era	5
CHILATST 201C	Critical Concepts in Chican@ Literature	3-5
CHILATST 275B	Governance, Resistance, and Identity in Modern Mexico	5

## Comparative Studies Minor

Students who wish to minor in Comparative Studies must complete a minimum of 30 units from the approved course list. Two core courses (or one core and one foundational course) are needed to fulfill the minor requirements.

Students in Comparative Studies may find the following courses useful in fulfilling course requirements in the major or minor.

### Core Courses

		Units
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 226	Race and Racism in American Politics	5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
CSRE 255D	Racial Identity in the American Imagination	4-5
PSYCH 75	Introduction to Cultural Psychology	5

### Foundational Courses

		Units
AFRICAAM 105	Introduction to African and African American Studies	5
NATIVEAM 138	American Indians in Comparative Historical Perspective	5
NATIVEAM 139	American Indians in Contemporary Society	5

### Thematic Courses

		Units
CSRE 103B	Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices	3-5
CSRE 104F	The Modern Tradition of Non-Violent Resistance	5
CSRE 107	The Black Mediterranean: Greece, Rome and Antiquity	4-5
CSRE 108	Introduction to Feminist Studies	4-5
CSRE 109A	Federal Indian Law	5
CSRE 109B	Indian Country Economic Development	5
CSRE 117N	Film, Nation, Latinidad	3-4
CSRE 117S	History of California Indians	5
CSRE 11W	Service-Learning Workshop on Issues of Education Equity	1

CSRE 121X	Hip Hop, Youth Identities, and the Politics of Language	3-4
CSRE 122E	Art in the Streets: Identity in Murals, Site-specific works, and Interventions in Public Spaces	4
CSRE 127A	Can't Stop Won't Stop: A History Of The Hip-Hop Arts	4
CSRE 127B	The Pleasure Principle: A Post-Hip Hop Search for a Black Feminist Politics of Pleasure	3
CSRE 135I	CSRE House Seminar: Race and Ethnicity at Stanford	1-2
CSRE 142	The Literature of the Americas	5
CSRE 142A	What is Hemispheric Studies?	5
CSRE 145	Race and Ethnic Relations in the USA	5
CSRE 146S	Asian American Culture and Community	3-5
CSRE 14N	Growing Up Bilingual	3
CSRE 162	Women in Modern America	4-5
CSRE 166B	Immigration Debates in America, Past and Present	3-5
CSRE 16N	African Americans and Social Movements	3
CSRE 177	Writing for Performance: The Fundamentals	5
CSRE 177B	Introduction to Dance on the Global Stage	4
CSRE 179	Asian American Experiences and Documentary Practice	5
CSRE 179C	Chroniclers of Desire: Creative Non-Fiction Writing Workshop	3-5
CSRE 179G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5
CSRE 183	Border Crossings and American Identities	5
CSRE 189W	Language and Minority Rights	3
CSRE 192E	Topics in the History of Sexuality: Sexual Violence	4-5
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 201B	From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era	5
CSRE 201C	Critical Concepts in Chican@ Literature	3-5
CSRE 203A	The Changing Face of America: Civil Rights and Education Strategies for the 21st Century	5
CSRE 216X	Education, Race, and Inequality in African American History, 1880-1990	3-5
CSRE 226	Race and Racism in American Politics	5
CSRE 233A	Counseling Theories and Interventions from a Multicultural Perspective	3-5
CSRE 235	Nation in Motion: Film, Race, and Immigration in Contemporary French Cinema	3-5
CSRE 99A	Art in Our Time: Ethics and Aesthetics of Crisis	4
CSRE 65N	Nation in Motion: Film, Race and Immigration in Contemporary French Cinema	3
CSRE 55R	Race and Upward Mobility in U.S. Cultural Production	3
CSRE 54S	Twice-Told Tales: Race, Revision and the Politics of Redress	3
CSRE 260	California's Minority-Majority Cities	4-5
CSRE 279C	Chroniclers of Desire: Creative Non-Fiction Writing Workshop	3-5
CSRE 279G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5
CSRE 289E	Queer of Color Critique: Race, Sex, Gender in Cultural Representations	3-5
CSRE 51N	Comparative Fictions of Ethnicity	5

## Jewish Studies Minor

Students who wish to minor in Jewish Studies must complete one CSRE core course, one Jewish Studies foundational course, at least one quarter of the Hebrew language or another approved Jewish language, and draw remaining courses from an approved list of Jewish Studies courses. A total of 30 units of approved course work is required for the Jewish Studies minor. Proposals must be approved by the director.

Students in Jewish Studies may find the following courses useful in fulfilling course requirements in the major or minor.

### Core Courses

Jewish Studies minors must take the 15-unit CSRE core curriculum including two core courses and a senior seminar taken in Autumn Quarter of the senior year. One foundational course that focuses on a non-Jewish ethnic group may be counted toward the 15-unit core requirement.

### Foundational Courses

		Units
RELIGST 23	Exploring Judaism	4
JEWISHST 140	Introduction to Hebrew Literature	3-5

### Thematic Courses

Students may take any JEWISHST courses in fulfillment of this requirements

		Units
JEWISHST 5	Biblical Greek	3-5
JEWISHST 5B	Biblical Greek II	3-5
JEWISHST 101A	First-Year Hebrew, First Quarter	4-5
JEWISHST 101B	First-Year Hebrew, Second Quarter	4-5
JEWISHST 101C	First-Year Hebrew, Third Quarter	4-5
JEWISHST 102	Land and Literature	4
JEWISHST 102A	Second-Year Hebrew, First Quarter	4
JEWISHST 102B	Second-Year Hebrew, Second Quarter	4
JEWISHST 102C	Second-Year Hebrew, Third Quarter	4
JEWISHST 104	Hebrew Forum	2-4
JEWISHST 104A	First-Year Yiddish, First Quarter	4
JEWISHST 104B	First-Year Yiddish, Second Quarter	4
JEWISHST 104C	First-Year Yiddish, Third Quarter	4
JEWISHST 106	Reflection on the Other: The Jew in Arabic Literature, the Arab in Hebrew Literature	4
JEWISHST 117	From Generation to Generation: Scientific and Cultural Approaches to Jewish Genetics	1
JEWISHST 120	Genesis and Gender: Male and Female in Judaism, Christianity, and Islam	4
JEWISHST 139	Rereading Judaism in Light of Feminism	4
JEWISHST 147	German Capstone: Reading Franz Kafka	3-5
JEWISHST 149	Senior Seminar	3-5
JEWISHST 182C	Heretics to Headscarves	5
JEWISHST 187C	Social Democracy from Marx to Gross National Happiness	5
JEWISHST 187D	Zionism and Its Critics	4-5
JEWISHST 199B	Directed Reading in Yiddish, Second Quarter	1-5

JEWISHST 226B	Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict	5
JEWISHST 282	Circles of Hell: Poland in World War II	5
JEWISHST 287D	Tel Aviv: Site, Symbol, City	4-5
JEWISHST 287E	Jewish Intellectuals and the Crisis of Modernity	4-5
JEWISHST 287S	Research Seminar in Middle East History	4-5
JEWISHST 288	Palestine and the Arab-Israeli Conflict	4-5
JEWISHST 299A	Directed Reading in Yiddish, First Quarter	1-5

## Native American Studies Minor

Students who wish to minor in Native American Studies must complete one CSRE core course and at least one foundational course in Native American Studies. Additional courses relevant to the area of concentration selected by the student in consultation with a faculty adviser must also be completed. A total of 30 units of approved course work is required for the minor. Proposals must be approved by the director.

Students in Native American Studies may find the following courses useful in fulfilling course requirements in the major or minor.

### Core Courses

		Units
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5
CSRE 196C	Introduction to Comparative Studies in Race and Ethnicity	5
CSRE 226	Race and Racism in American Politics	5
CSRE 245	Understanding Racial and Ethnic Identity Development	3-5
CSRE 255D	Racial Identity in the American Imagination	4-5
PSYCH 75	Introduction to Cultural Psychology	5

### Foundational courses

Students who completed NATIVEAM/ANTHRO 16 may count this course toward their Foundational Course requirement. This course is not offered in 2012-13.

		Units
NATIVEAM 138	American Indians in Comparative Historical Perspective	5
NATIVEAM 139	American Indians in Contemporary Society	5

### Thematic courses

		Units
NATIVEAM 109A	Federal Indian Law	5
NATIVEAM 114	Making History/Making Indians: Myths, Stereotypes & Realities	5
NATIVEAM 138	American Indians in Comparative Historical Perspective	5
NATIVEAM 139	American Indians in Contemporary Society	5
NATIVEAM 143A	American Indian Mythology, Legend, and Lore	3-5
NATIVEAM 167	Performing Indigeneity on Global Stage	4
NATIVEAM 240	Psychology and American Indian Mental Health	3-5

## Asian American Studies

*Director:* David Palumbo-Liu (Comparative Literature)

*Affiliated Faculty and Teaching Staff:* Anthony Antonio (Education), Gordon Chang (History), Kathryn Gin (Religious Studies), Denise Khor (Asian American Studies), Pamela Lee (Art and Art History), Jean Ma (Art and Art History), Stephen Sano (Music), Stephen Sohn (English), Stephen Murphy-Shigematsu (Asian American Studies), Jeanne L. Tsai (Psychology), Linda Uyechi (Music), Barbara Voss (Anthropology), Christine Min Wotipka (Education), Sylvia Yanagisako (Anthropology)

## Chicana/o-Latina/o Studies

*Director:* Gary Segura (Political Science)

*Affiliated Faculty and Teaching Staff:* Albert Camarillo (History), Kathleen Coll (Chicana/o-Latina/o Studies), Susana Gallardo (Chicana/o-Latina/o Studies), Angela Garcia (Anthropology), Kenji Hakuta (Education), Tomás Jiménez (Sociology), Melissa Michaelson (Chicana/o-Latina/o Studies), Ana Minian (History), Cherríe Moraga (Drama), Paula Moya (English), Amado Padilla (Education), José David Saldívar (Comparative Literature), Ramón Saldívar (English), Guadalupe Valdés (Education), Yvonne Yarbrow-Bejarano (Iberian and Latin American Cultures)

## Comparative Studies in Race and Ethnicity

*Director:* David Palumbo-Liu (Comparative Literature)

*Affiliated Faculty and Teaching Staff:* David Abernethy (Political Science, emeritus), H. Samy Alim (Education), Arneha Ball (Education), Rick Banks (Law), Lucius Barker (Political Science, emeritus), Donald Barr (Pediatrics), Jennifer Brody (Theater and Performance Studies), Bryan Brown (Education), Cheryl Brown (African and African American Studies), Albert Camarillo (History), James T. Campbell (History), Martin Carnoy (Education), Clayborne Carson (History), Prudence Carter (Education), Jeff Chang (Comparative Studies in Race and Ethnicity), Karen Cook (Sociology), Michele Dauber (Law), Linda Darling-Hammond (Education), Carolyn Duffey (American Studies), Jennifer Eberhardt (Psychology), Ala Ebtakar (Comparative Studies in Race and Ethnicity), Paulla Ebron (Anthropology), Penny Eckert (Linguistics), Harry Elam (Theater and Performance Studies), Michele Elam (English), James Ferguson (Anthropology), Corey Fields (Sociology), Shelley Fisher Fishkin (English), James Fishkin (Communication), Charlotte Fonrobert (Religious Studies), Estelle Freedman (History), Duana Fullwiley (Anthropology), Susana Gallardo (Chicana/o Studies), Angela Garcia (Anthropology), Gabriel Garcia (Medicine), Kathryn Gin (Religious Studies), Leah Gordon (Education), David Grusky (Sociology), Sean Hanretta (History), Gina Hernandez-Clarke (Comparative Studies in Race and Ethnicity), Allyson Hobbs (History), Miyako Inoue (Anthropology), Shanto Iyengar (Communication), Tomás Jiménez (Sociology), Gavin Jones (English), Terry Karl (Political Science), Pamela Karlan (Law), Matthew Kohrman (Anthropology), Jan Krawitz (Art and Art History), Jon Krosnick (Communication), Teresa LaFromboise (Education), David Laitin (Political Science), Liisa Malkki (Anthropology), Hazel Markus (Psychology), Ruben Martínez (Comparative Studies in Race and Ethnicity), Barbaro Martinez-Ruiz (Art and Art History), Douglas McAdam (Sociology), Jisha Menon (Theater and Performance Studies), Ana Minian (History), Cherríe Moraga (Theater and Performance Studies), Joan Morgan (Comparative Studies in Race and Ethnicity), Paula Moya (English), Elisabeth Mudimbe-Boyi (French and Italian), Thomas S. Mullaney (History), Stephen Murphy-Shigematsu (Asian American Studies), Hilton Obenzinger (American Studies), Susan Olzak (Sociology), Amado Padilla (Education), David Palumbo-Liu (Comparative Literature), Arnold Rampersad (English), Vaughn Rasberry (English), Robert Reich (Political Science), John Rickford (Linguistics), Cecilia Ridgeway (Sociology), Richard Roberts

(History), Aron Rodrigue (History), Michael Rosenfeld (Sociology), José David Saldívar (Comparative Literature), Ramón Saldívar (English), Joel Samoff (History), Debra Satz (Philosophy), Gary Segura (Political Science), Vered Shemtov (Division of Literatures, Cultures and Languages), C. Matthew Snipp (Sociology), Paul Sniderman (Political Science), Jayashiri Srikantiah (Law), James Steyer (Comparative Studies in Race and Ethnicity), Ewart Thomas (Psychology), Jeanne L. Tsai (Psychology), Linda Uyechi (Music), Guadalupe Valdés (Education), Gregory Walton (Psychology), Richard White (History), Jeremy Weinstein (Political Science), Michael Wilcox (Anthropology), Bryan Wolf (Art and Art History), Sylvia Yanagisako (Anthropology), Yvonne Yarbro-Bejarano (Iberian and Latin American Cultures), Steven Zipperstein (History)

*Teaching Fellows:* Tristan Ivory, Sarah Perkins, Elda Maria Roman

*Senior Seminar Coordinator:* Patricia Seo

## Jewish Studies

*Director:* Steven Weitzman (Religious Studies)

*Affiliated Faculty and Teaching Staff:* Zachary Baker (Stanford University Libraries), Joel Beinin (History), Jonathan Berger (Music), Arnold Eisen (Religious Studies, emeritus), Amir Eshel (German Studies), John Felstiner (English, emeritus), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), Avner Greif (Economics), Katherine Jolluck (History), Ari Kelman (Education), Jon Levitow (Language Center), Mark Mancall (History, emeritus), Norman Naimark (History), Reviel Netz (Classics), Jack Rakove (History), Aron Rodrigue (History), Gabriella Safran (Slavic Languages and Literatures), Vered KartiShemtov (Language Center, Comparative Literature), Lee Shulman (Education, emeritus), Peter Stansky (History, emeritus), Amir Weiner (History), Sam Wineburg (Education), Steven Zipperstein (History)

*Hebrew instructional staff:* Gallia Porat, Estee Greif

*Visiting Faculty:* Arie Dubnov (History)

*Writer in Residence:* Maya Arad

## Native American Studies

*Director:* C. Matthew Snipp (Sociology)

*Affiliated Faculty and Teaching Staff:* JoEllen Anderson (Native American Studies), Karen Biestman (Native American Studies), Kenneth Fields (English), Teresa LaFromboise (Education), Samantha Peralto (Language Center), Delphine Red Shirt Shaw (Native American Studies), Michael Wilcox (Anthropology)

## Asian American Studies

Students in Asian American Studies may find the following related courses useful in fulfilling course requirements in the major or minor.

		Units
EDUC 181	Multicultural Issues in Higher Education	4
EDUC 193F	Psychological Well-Being on Campus: Asian American Perspectives	1
ENGLISH 172	Modern Indian Literature	5
ENGLISH 261B	East Goes West: Transnational Asia/Pacific Spatial Geographies	5
ENGLISH 362S	Trauma Theory, Psychoanalysis and Asian American Literature	5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 265	Writing Asian American History	5

MUSIC 17Q	Perspectives in North American Taiko	4
PSYCH 217	Topics and Methods Related to Culture and Emotion	1-3

## Chicana/o-Latina/o Studies

Students in Chicana/o-Latina/o Studies may find the following related courses useful in fulfilling course requirements in the major or minor.

		Units
EDUC 146X	Perspectives on the Education of Linguistic Minorities	3-4
EDUC 149	Theory and Issues in the Study of Bilingualism	3-5
EDUC 178X	Latino Families, Languages, and Schools	3-5
EDUC 193B	Peer Counseling in the Chicano/Latino Community	1
EDUC 277	Education of Immigrant Students: Psychological Perspectives	4
HISTORY 165	Mexican American History through Film	4-5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 201	Introduction to Public History in the U.S., 19th Century to the Present	4-5
HISTORY 203E	Global Catholicism	5
RELIGST 111	Religions of Mexico	4
RELIGST 203	Myth, Place, and Ritual in the Study of Religion	3-5

## Comparative Studies in Race and Ethnicity

Students in Comparative Studies in Race and Ethnicity may find the following related courses useful in fulfilling course requirements in the major or minor.

		Units
AFRICAAM 43	Introduction to African American Literature	3-5
AFRICAAM 64C	From Freedom to Freedom Now!: African American History, 1865-1965	3
AFRICAAM 105	Introduction to African and African American Studies	5
AFRICAAM 147	History of South Africa	5
AFRICAAM 152G	Global Harlem Renaissance	5
AFRICAAM 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
AFRICAAM 261E	Mixed Race Literature in the U.S. and South Africa	5
AFRICAAM 262D	African American Poetics	5
AFRICAST 212	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AMSTUD 140	Stand Up Comedy and the "Great American Joke" Since 1945	3-5
AMSTUD 143	Introduction to African American Literature	3-5
ANTHRO 22N	Ethnographies of North America: An Introduction to Cultural and Social Anthropology	3-4
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5
ANTHRO 82	Medical Anthropology	3-5
ANTHRO 102	Urban Ethnography	5
ANTHRO 102	Urban Ethnography	5
ANTHRO 320A	Race, Ethnicity, and Language	3-4



CHILATST 179	Chicano & Chicana Theater: Politics In Performance	3-5	LINGUIST 150	Language in Society	4
COMM 160	The Press and the Political Process	4-5	MED 159A	Service-Learning in Migrant Health	2
DANCE 45	Dance Improvisation Techniques and Strategies Lab: From Hip Hop to Contact	1	MED 159B	Service-Learning in Migrant Health	2
DANCE 197	Dance in Prison: The Arts, Juvenile Justice, and Rehabilitation in America	4	MUSIC 17Q	Perspectives in North American Taiko	4
EDUC 100A	EAST House Seminar: Current Issues and Debates in Education	1	POLISCI 28N	The Changing Nature of Racial Identity in American Politics	5
EDUC 100B	EAST House Seminar: Current Issues and Debates in Education	1	POLISCI 120B	Campaigns, Voting, Media, and Elections	4-5
EDUC 112X	Urban Education	3-4	POLISCI 121L	Racial-Ethnic Politics in US	5
EDUC 115Q	Identities, Race, and Culture in Urban Schools	3	PSYCH 25N	Psychology, Inequality, and the American Dream	3
EDUC 116X	Service Learning as an Approach to Teaching	3	PSYCH 27N	The Psychology of Prejudice	3
EDUC 146X	Perspectives on the Education of Linguistic Minorities	3-4	PSYCH 75	Introduction to Cultural Psychology	5
EDUC 148X	Critical Perspectives on Teaching and Tutoring English Language Learners	3	PSYCH 183	Mind, Culture, and Society Research Core	2-3
EDUC 149	Theory and Issues in the Study of Bilingualism	3-5	PSYCH 215	Mind, Culture, and Society	3
EDUC 165	History of Higher Education in the U.S.	3-5	PSYCH 217	Topics and Methods Related to Culture and Emotion	1-3
EDUC 178X	Latino Families, Languages, and Schools	3-5	PSYCH 245	Social Psychological Perspectives on Stereotyping and Prejudice	3
EDUC 193B	Peer Counseling in the Chicano/Latino Community	1	RELIGST 111	Religions of Mexico	4
EDUC 193C	Psychological Well-Being On Campus: Perspectives Of The Black Diaspora	1	SOC 46N	Race, Ethnic, and National Identities: Imagined Communities	3
EDUC 193F	Psychological Well-Being on Campus: Asian American Perspectives	1	SOC 118	Social Movements and Collective Action	5
EDUC 193N	Peer Counseling in the Native American Community	1	SOC 119	Understanding Large-Scale Societal Change: The Case of the 1960s	5
EDUC 201	History of Education in the United States	3-5	SOC 120	Interpersonal Relations	5
EDUC 242	Language Use in the Chicano Community	3-5	SOC 132	Sociology of Education: The Social Organization of Schools	4
EDUC 367	Cultural Psychology	3-5	SOC 133	Law and Wikinomics: The Economic and Social Organization of the Legal Profession	1-5
EDUC 381	Multicultural Issues in Higher Education	4	SOC 135	Poverty, Inequality, and Social Policy in the United States	5
ENGLISH 261B	East Goes West: Transnational Asia/Pacific Spatial Geographies	5	SOC 136	Sociology of Law	5
ENGLISH 261C	Globalization and Contemporary Fiction	5	SOC 140	Introduction to Social Stratification	5
ENGLISH 362S	Trauma Theory, Psychoanalysis and Asian American Literature	5	SOC 141	Controversies about Inequality	5
FEMST 120	Introduction to Queer Studies	4-5	SOC 142	Sociology of Gender	5
HISTORY 48Q	South Africa: Contested Transitions	3	SOC 145	Race and Ethnic Relations in the USA	5
HISTORY 50B	19th Century America	3	SOC 155	The Changing American Family	5
HISTORY 50C	The United States in the Twentieth Century	3	URBANST 112	The Urban Underclass	5
HISTORY 54N	African American Women's Lives	3-4	URBANST 114	Urban Culture in Global Perspective	5
HISTORY 150B	19th-Century America	5	URBANST 140	Urban Ethnography	5
HISTORY 150C	The United States in the Twentieth Century	5			
HISTORY 158C	History of Higher Education in the U.S.	3-5			
HISTORY 201	Introduction to Public History in the U.S., 19th Century to the Present	4-5			
HISTORY 203E	Global Catholicism	5			
HISTORY 255	Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice	5			
HISTORY 259A	Poverty and Homelessness in America	4-5			
HISTORY 261	Race, Gender, and Class in Jim Crow America	5			
HRP 212	Cross Cultural Medicine	3			
HUMBIO 120	Health Care in America: An Introduction to U.S. Health Policy	4			
HUMBIO 121E	Ethnicity and Medicine	1-3			
HUMBIO 122S	Social Class, Race, Ethnicity, and Health	4			
HUMBIO 129	Critical Issues in International Women's Health	4			

## Native American Studies

Students in Native American Studies may find the following related courses useful in fulfilling course requirements in the major or minor.

		Units
ANTHRO 162	Indigenous Peoples and Environmental Problems	3-5
EDUC 193N	Peer Counseling in the Native American Community	1
RELIGST 203	Myth, Place, and Ritual in the Study of Religion	3-5
RELIGST 303	Myth, Place, and Ritual in the Study of Religion	3-5
SPECLANG 189A	First-Year Hawaiian, First Quarter	4
SPECLANG 189B	First-Year Beginning Hawaiian, Second Quarter	4
SPECLANG 189C	First-Year Hawaiian, Third Quarter	4
SPECLANG 247	Introduction to Siouan Language & Culture I	5
SPECLANG 248	Introduction to Siouan Language & Culture II	5

## Overseas Studies Courses in Comparative Studies in Race and Ethnicity

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/comparativestudiesinraceandethnicitycsre/> <http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/comparativestudiesinraceandethnicitycsre/> <http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/comparativestudiesinraceandethnicitycsre/http://bosp.stanford.edu>).

		Units
OSPCPTWN 18	Xhosa Language and Culture	2
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPCPTWN 38	Genocide: The African Experience	3-5
OSPKYOTO 60	Japan in World War II: Experiences and Memory	4-5
OSPMADRD 62	Spanish California: Historical Issues	5
OSPMADRD 74	Islam in Spain and Europe: 1300 Years of Contact	5
OSPMADRD 75	Sefarad: The Jewish Community in Spain	5
OSPPARIS 29	Colonization, Decolonization and Immigration in France	5

## Division of International, Comparative and Area Studies

The Division of International, Comparative and Area Studies (ICA) supports research and teaching in the cultures and societies of the world, and studies the problems facing developing societies as they seek to end their poverty and social and economic inequalities. ICA promotes new centers of teaching excellence in traditional areas of historical and cultural concerns, as well as promoting interdisciplinary activities related to developing new ideas for dealing with fundamental issues of justice, equality, and growth within nation states, cultures, and regions.

The Division of International, Comparative and Area Studies is comprised of research centers, degree granting programs, and religion and cultural centers: Center for African Studies\*; Center for East Asian Studies\*; The Europe Center; Center for Latin American Studies\*; Center for Russian, East European and Eurasian Studies\*; Center for South Asia; Ford Dorsey Program in International Policy Studies\*; France-Stanford Center for Interdisciplinary Studies; Hamid and Christina Moghadam Program in Iranian Studies; Mediterranean Studies Forum; Program in International

Relations\*; Sohaib and Sara Abbasi Program in Islamic Studies; and the Taube Center for Jewish Studies\*.

Degree granting programs are denoted with an asterisk (\*).

## Center for African Studies

*Director:* Jeremy Weinstein

Office: Encina Hall West, second floor

Web Site: <http://africanstudies.stanford.edu>

The Center for African Studies (CAS) is an interdisciplinary research program. CAS offers an undergraduate minor and certificate, and a Master of Arts (M.A.) degree. For further information, see the "African Studies (p. 254)" section of this bulletin.

## Center for East Asian Studies

*Director:* Gordon Chang

Office: Encina Commons

Web Site: <http://ceas.stanford.edu>

The Center for East Asian Studies (CEAS) seeks to increase interdisciplinary communication among faculty, students, and outside scholars whose research, teaching, or study focuses on East Asia. CEAS offers a master's degree program. It sponsors programs that enhance public knowledge and access to the University's East Asia resources.

For further information, see the "East Asian Studies (<http://www.stanford.edu/dept/registrar/bulletin/5815.htm>)" section of this bulletin.

## The Europe Center

*Director:* Amir Eshel

Office: Encina East 106

Web Site: <http://europeanstudies.stanford.edu>

The Europe Center is a multidisciplinary institute committed to the examination of European society, culture, politics, diplomacy, and security.

## Center for Latin American Studies

*Director:* Rodolfo Dirzo

Office: Bolivar House

Web Site: <http://las.stanford.edu>

The Center for Latin American Studies at Stanford University (CLAS) offers academic programs for students, coordinates academic conferences and lectures, and fosters interdisciplinary research for students and faculty through fellowships and funding opportunities. The Center offers an undergraduate minor, an interdisciplinary honors program for undergraduates, and a master's degree.

For further information, see the "Center for Latin American Studies (<http://www.stanford.edu/dept/registrar/bulletin/5980.htm>)" section of this bulletin.

## Center for Russian, East European and Eurasian Studies

*Director:* Robert Crews

Office: Encina Hall West, second floor

Web Site: <http://creees.stanford.edu>

The Center for Russian, East European and Eurasian Studies (CREEES) offers an undergraduate minor and a one-year master's program in interdisciplinary area studies.

For further information, see the "Center for Russian, East European and Eurasian Studies (<http://www.stanford.edu/dept/registrar/bulletin/6635.htm>)" section of this bulletin.

## Center for South Asia

*Director:* Thomas Blom Hansen  
*Office:* Encina Hall West, first floor  
*Web Site:* <http://southasia.stanford.edu>

The Center for South Asia (CSA) serves to coordinate and develop Stanford's resources for the study of South Asia across all the disciplines in the School of Humanities and Sciences. It works closely with departments and other units of the University to increase faculty strength, support research, enhance the curriculum, build the library collection, and sponsor programs and events.

## Ford Dorsey Program In International Policy Studies

*Director:* Kathryn Stoner  
*Office:* Encina Hall West, second floor  
*Web Site:* <http://ips.stanford.edu>

The Ford Dorsey Program in International Policy Studies (IPS) is a two-year master's program that seeks to train the next generation of policy analysts to solve key global problems.

For further information, see the "International Policy Studies" (<http://www.stanford.edu/dept/registrar/bulletin/5949.htm>) section of this bulletin.

## France-Stanford Center For Interdisciplinary Studies

*Director:* Amalia Kessler  
*Office:* Building 260, room 105  
*Web Site:* <http://francestanford.stanford.edu>

The France-Stanford Center for Interdisciplinary Studies, founded in partnership with the French Ministry of Foreign Affairs, aims to bridge the disciplines of the humanities, social sciences, sciences, engineering, business, and law, addressing historical and contemporary issues of significance for France and the United States. The Center brings together Stanford faculty and students and academics in France to advance collaborative research and foster interdisciplinary inquiry. Its programs include conferences, support for collaborative research projects, internships, exchanges, lectures, and seminars.

## Hamid and Christina Moghadam Program In Iranian Studies

*Director:* Abbas Milani  
*Office:* Encina Hall West, second floor  
*Web Site:* <http://iranian-studies.stanford.edu>

The Hamid and Christina Moghadam Program in Iranian Studies at Stanford fosters the interdisciplinary study of Iran as a civilization, one of the oldest in the world. The program combines pedagogy, policy analysis, and research on all aspects of Iran's past, present, and future. The program organizes lectures and student research conferences on Iran.

## Mediterranean Studies Forum

*Director:* Shahzad Bashir  
*Office:* Encina Hall West, Room 211  
*Web Site:* <http://mediterraneanstudies.stanford.edu>

The Mediterranean Studies Forum encourages scholars to explore the interplay among societies, cultures, and communities around the Mediterranean Basin from the Middle Ages to the present. Its focus is on all aspects of co-existence and conflict that have marked these encounters in the empires, port cities, nation states, and transregional and transnational social, religious, cultural, and economic contexts of North Africa, the Levant, the Balkans, and Southern Europe. It is also interested in the relations of the Mediterranean with other regions and areas of the world. The central goal of the forum is to contribute to interfield and interdisciplinary dialogue among scholars of these areas through lectures, colloquia, workshops, conferences, and publications.

## Program in International Relations

*Director:* Mike Tomz  
*Office:* Encina Hall West, second floor  
*Web Site:* <http://internationalrelations.stanford.edu>

International Relations (IR) is an interdisciplinary undergraduate major focusing on changing political, economic, and cultural relations within the international system in the modern era.

For further information, see the "International Relations (<http://www.stanford.edu/dept/registrar/bulletin/5953.htm>)" section of this bulletin.

## Sohaib and Sara Abbasi Program in Islamic Studies

*Director:* Shahzad Bashir  
*Office:* Encina Hall West, Room 211  
*Web Site:* <http://islamicstudies.stanford.edu>

The mission of the Sohaib and Sara Abbasi Program in Islamic Studies is to serve as a forum for interdisciplinary research and teaching in Islamic studies, complemented by seminars, colloquia and public lectures. The program seeks to illuminate Islamic history from its beginnings to the 21st century, the religion of Islam in its many aspects, and the diversity of Muslim cultures and societies, past and present, not only in the Middle East but also including South and Southeast Asia, Africa, Europe, and America. In addition to geographical breadth, the program promotes the use of scholarly resources from both the humanities and the social sciences. Participating faculty and students bring perspectives and methods from academic fields including anthropology, art, economics, history, international relations, languages, law, literature, philosophy, political science, and religious studies.

## Taube Center For Jewish Studies

*Director:* Steven Weitzman  
*Office:* Building 360, Room 362G  
*Web Site:* <http://jewishstudies.stanford.edu>

The interdisciplinary Taube Center for Jewish Studies coordinates and promotes the study of all aspects of Jewish life. The center offers an

undergraduate minor and an interdisciplinary major coordinated by the Humanities and Sciences dean's office.

For further information, see the "Jewish Studies (p. 459)" section of this bulletin.

*Director:* Norman Naimark

*Advisory Committee:* Gordon Chang (History), Kathryn Stoner (Freeman Spogli Institute for International Studies), Jeremy Weinstein (Political Science)

*Directors' Committee:* Shahzad Bashir (Religious Studies), Gordon Chang (History), Robert Crews (History), Rodolfo Dirzo (Biology), Amir Eshel (German Studies), Thomas Blom Hansen (Anthropology), Amalia Kessler (Law), Abbas Milani (Hoover Institution), Norman Naimark (History), Kathryn Stoner (Freeman Spogli Institute for International Studies), Mike Tomz (Political Science), Jeremy Weinstein (Political Science), Stephen P. Weitzman (Religious Studies)

# Division of Literatures, Cultures, and Languages

Courses offered by the Division of Literatures, Cultures, and Languages are listed under the subject code DLCL on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=DLCL&filter-catalognumber-DLCL=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=DLCL&filter-catalognumber-DLCL=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=DLCL&filter-catalognumber-DLCL=on>).

The Division of Literatures, Cultures, and Languages consists of five academic departments (Comparative Literature, French and Italian, German Studies, Iberian and Latin American Cultures, and Slavic Languages and Literatures), five focal groups (Humanities Education, Performance, Philosophy and Literature, Poetics, and Renaissance) as well as the Language Center, which oversees language instruction at Stanford. All the departments of the division offer academic programs leading to B.A., M.A., and Ph.D. degrees. The division brings together scholars and teachers dedicated to the study of literatures, cultures, and languages from humanistic and interdisciplinary perspectives. The departments in the division are distinguished by the quality and versatility of their faculty, a wide variety of approaches to cultural traditions and expressions, and the intense focus on the mastery of languages. This wealth of academic resources, together with small classes and the emphasis on individual advising, creates a superior opportunity for students who wish to be introduced to or develop a deeper understanding of non-English speaking cultures.

The division's departments and the Language Center offer instruction at all levels, including introductory and general courses that do not require knowledge of a language other than English. These courses satisfy a variety of undergraduate requirements and can serve as a basis for developing a minor or a major program in the member departments. The more advanced and specialized courses requiring skills in a particular language are listed under the relevant departments, as are descriptions of the minor and major programs.

The DLCL itself offers one undergraduate minor program, an undergraduate multimedia laboratory course, and several graduate courses focused on the teaching of second languages, the teaching of literature, and academic professionalization.

## Focal Groups

While the five departments in the Division of Literatures, Cultures, and Languages serve common interests in literary and cultural traditions and their languages, the DLCL's Focal Groups bring together faculty members and graduate students who share topics and approaches that range across languages and national literatures. These groups are designed to respond directly to the research interests of the faculty as a community, and reflect long-term commitments by the participants. They are conceived as portals that open from the Division outward to the wider community of literary and humanities scholars at Stanford. The membership may include any member of the Stanford faculty or any Ph.D. student with an interest in the topic. Most Focal Groups include participants from several humanities departments outside the DLCL.

Thus the DLCL is characterized by two axes of intellectual inquiry:

- the departmental axis, which is organized by language, nation, and culture
- the focal axis, which may be organized by genre, period, methodology, or other criteria.

The convergence of the two axes, departments and Focal Groups, locates faculty members and graduate students in at least two intersecting communities. The DLCL believes that this convergence gives institutional form to the intellectual conditions under which many scholars of literature and culture presently work.

Each Focal Group maintains a standing research workshop at which both faculty and graduate student members discuss their work. Some Focal Groups offer formal courses; and all groups are responsible for overseeing research-oriented activities and extracurricular events in the relevant area, including sponsoring conferences, publications, podcasts, and other activities that disseminate the outcomes of their research.

## Humanities Education

*Chair:* Russell A. Berman (Comparative Literature, German Studies)

*Faculty Members:* Elizabeth Bernhardt (German Studies, Language Center), Eamonn Callan (School of Education), Adrian Daub (German Studies), Marisa Galvez (French and Italian), Orrin Robinson (German Studies), Gabriella Safran (Slavic Languages and Literatures), Mitchell Stevens (School of Education), Jennifer Summit (English), Guadalupe Valdés (School of Education)

*Web Site:* <http://dlcl.stanford.edu/groups/humanities-education>

The Focal Group on Humanities Education explores issues concerning teaching and learning in the humanities, including research on student learning, innovation in pedagogy, the role of new technologies in humanities instruction, and professional issues for humanities teachers at all educational levels.

## Performance

*Chairs:* Monika Greenleaf (Comparative Literature, Slavic Languages and Literatures), Peggy Phelan (Drama, English)

*Faculty Members:* Julie Draskoczy (Slavic Languages and Literatures), Jean Ha (History), Branislav Jakovljevic (Drama), Indra Levy (East Asian Languages and Cultures), Marília Librandi Rocha (Iberian and Latin American Cultures), Gabriella Safran (Slavic Languages and Literatures), Lisa Surwillo (Iberian and Latin American Cultures)

*Web Site:* <http://dlcl.stanford.edu/groups/performance>

The Performance group brings together departments of the DLCL with other disciplines, such as Drama, to achieve a cross-pollination and to reinvigorate performance theory through consciously re-mediated research interests, methodologies, and forms of scholarly expression. Each year of a three-year program focuses on a distinct goal:

1. Discussion of seminal texts and topics with key guests, extended through a blog on Arcade <<http://arcade.stanford.edu/>> .
2. A writing colloquium culminating in a conference and guest performances by invited artists at the Bing Concert Hall opening (2012).
3. Joint publication.

## Philosophy and Literature

Chairs: R. Lanier Anderson (Philosophy), Joshua Landy (French and Italian)

Faculty Members: Keith Baker (History), Russell Berman (Comparative Literature, German Studies), Alexis Burgess (Philosophy), Martón Dornbach (German Studies), Jean-Pierre Dupuy (French and Italian), Amir Eshel (Comparative Literature, German Studies), Gregory Freidin (Slavic Languages and Literatures), Robert Harrison (French and Italian), David Hills (Philosophy), Héctor Hoyos (Iberian and Latin American Cultures), Michelle Karnes (English), Marília Librandi Rocha (Iberian and Latin American Cultures), Joan Ramon Resina (Iberian and Latin American Cultures, Comparative Literature), Nariman Skakov (Slavic Languages and Literatures), Blakey Vermeule (English), Laura Wittman (French and Italian), Lee Yearley (Religious Studies)

Web Site: <http://dlcl.stanford.edu/groups/philosophy-literature>

The Focal Group on Philosophy and Literature brings together faculty and students from nine departments to investigate questions in aesthetics and literary theory, philosophically-inflected literary texts, and the form of philosophical writings. Fields of interest include both continental and analytic philosophy, as well as cognitive science, political philosophy, rational choice theory, and related fields. The group offers undergraduate tracks within eight majors, a graduate workshop, and a lecture series.

## Workshop in Poetics

Chairs: Roland Greene (Comparative Literature, English), Nicholas Jenkins (English)

Faculty Members: Marisa Galvez (French and Italian), Michael Predmore (Iberian and Latin American Cultures)

Web Site: <http://dlcl.stanford.edu/groups/workshop-poetics>

The Workshop in Poetics Focal Group is concerned with the theoretical and practical dimensions of the reading and criticism of poetry. During the four years of its existence, the Workshop has become a central venue at Stanford enabling participants to share their individual projects in a general conversation outside of disciplinary and national confinements. The two dimensions that the workshop sees as urgent are:

- poetics in its specificity as an arena for theory and interpretive practice.
- historical poetics as a particular set of challenges for the reader and scholar.

The core mission is to offer Stanford graduate students a space to develop and critique their current projects.

## Renaissances

Chair: Roland Greene (Comparative Literature, English)

Faculty Members: Cécile Alduy (French and Italian), Shahzad Bashir (Religious Studies), Paula Findlen (History), Tamar Herzog (History), Bissera Pentcheva (Art and Art History), Morten Steen Hansen (Art and Art History), Jennifer Summit (English)

Web Site: <http://dlcl.stanford.edu/groups/renaissances>

The Renaissances Focal Group discusses the present and future of early modern studies, drawing different fields of literature into conversation. In addition to sponsoring lectures and seminars focused primarily on methods and modes of research in the field, the group organizes the Renaissance/Early Modern seminar and is developing a web-based project on the Renaissance.

## Ph.D. Minor in Humanities

The Ph.D. minor in Humanities is a sequence of interdisciplinary seminars covering the following five periods: Antiquity, Medieval, Early-Modern, Enlightenment, and Modern. A framing seminar that leads students to reflect on what it means to teach and study the humanities in the 21st century will also be required. The Program is designed to provide students with broad historical knowledge and skills for conducting interdisciplinary research; to prepare students to teach beyond their area of expertise; and to create communities of students and faculty from different departments working on similar periods.

This degree is declared using the Graduate Program Authorization Petition, students must submit a PhD minor form ([http://studentaffairs.stanford.edu/sites/default/files/registrar/files/app\\_phd\\_minor.pdf](http://studentaffairs.stanford.edu/sites/default/files/registrar/files/app_phd_minor.pdf)) by the end of winter quarter, during their first year of studies. At this point, they must have taken at least one GPiH core seminar, and must enroll in a second one during the spring quarter of that year. If their application is successful, students will be admitted into the program during spring quarter. By spring quarter of their second year, students must have taken at least two more GPiH seminars, including the framing course (the other may be either a core seminar, or the extra-departmental course in their field). If students have not completed these requirements by this time, their participation in the program may be terminated. Students must finish coursework for the GPiH minor in their third year. Students who wish to enroll in the program after winter quarter of their first year must demonstrate that their participation will not delay their time to TGR.

To pursue the PhD Minor in Interdisciplinary Humanities, students must fulfill the following requirements, for a minimum of 20 units.

		Units
DLCL 320	Humanities Education in the Changing University	3
Complete three of the five core seminars		
DLCL 321	Classical Seminar: Rethinking Classics	
DLCL 322	Medieval Seminar	
DLCL 323	Early Modern Seminar	
DLCL 324	Enlightenment Seminar	
DLCL 325	Modern Seminar	
Take one additional graduate course (numbered 200 or above) on one of these periods (usually corresponding to the student's area of specialization) in a department other than the student's home department.		
Demonstrate the ability to use at least one foreign language for scholarly work (for instance, by engaging with a primary or secondary source in a seminar paper for any class). Students may petition to have this requirement waived, if it is deemed to be irrelevant to the student's course of study.		

## Minor in Modern Languages

The Division of Literatures, Cultures, and Languages offers an undergraduate minor that draws upon courses in literature and language within the division's departments and elsewhere in the University. The minor in Modern Languages is offered to students who want to supplement the course work in their major with course work in modern languages and literatures. The minor must be approved by the chairs of undergraduate

studies of the respective language departments. Students in any field qualify for the minor by meeting the following requirements:

	Units
A minimum of 20 units (10 units per language) at the intermediate level (second year) or beyond, not including conversation, in two languages other than English offered by the DLCL.	20
At least one additional course, at the 100 level or above, in each modern language being studied in the minor. These courses must be taught by DLCL Academic Council members or other senior members of the faculty.	6-10

Students are recommended to study, work, or intern abroad for at least eight weeks at a location where one of the languages is spoken. Course work in this minor may not duplicate work counted toward other majors or minors. Advanced Placement credit and transfer credit do not apply to this minor. All courses must be taken for a letter grade. By University policy, no more than 36 units may be awarded in this minor. Students declare the minor in Modern Languages through Axess.

## Minor in Middle Eastern Languages, Literatures, and Cultures

The African and Middle Eastern (AME) program is part of the Stanford Language Center and is affiliated with The Center for African Studies, the Abbasi Program in Islamic Studies, and the program in Jewish Studies. The program offers beginning, intermediate and advanced classes in Arabic, Hebrew, Swahili, and other African languages as well as classes in AME literatures and cultures. Additional languages such as Hausa, Chichewa, Amharic, Tigrigna, Igbo, Zulu, Kinyarwanda, and Twi are offered upon request, providing funding is available. Students can also request an AME language course by applying online. For further information check our FAQ page or contact the coordinator Khalid Obeid ([kyobeid@stanford.edu](mailto:kyobeid@stanford.edu)).

The undergraduate minor in Middle Eastern Languages, Literatures, and Cultures (<https://www.stanford.edu/dept/lc/language/courses/africanMidEastern/minor.html>) has been designed to give students majoring in other departments an opportunity to gain a substantial introduction to the Arabic and Hebrew languages, as well as an introduction to the cultures and civilizations of the Middle East. Students declaring a minor must do so no later than the last day of the Spring quarter of their junior year, or four quarters before degree conferred. If a student is not able to meet this deadline, he or she may petition the Language Center director and request a revised declaration date, which may be granted at the director's discretion. Requirements for the degree can be found in the Language Center (<https://www.stanford.edu/dept/lc/language/courses/africanMidEastern/minor.html>) section of this bulletin.

*Division Chair:* Gabriella Safran

## East Asian Languages and Cultures

Courses offered by the Department of East Asian Languages and Cultures are listed on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site under the subject codes:

- CHINGEN (Chinese General) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHINGEN&filter-catalognumber-CHINGEN=on>)
- CHINLIT (Chinese Literature) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHINLIT&filter-catalognumber-CHINLIT=on>)
- JAPANGEN (Japanese General) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=JAPANGEN&filter-catalognumber-JAPANGEN=on>)
- JAPANLIT (Japanese Literature) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=JAPANLIT&filter-catalognumber-JAPANLIT=on>)
- KORGEN (Korean General) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=KORGEN&filter-catalognumber-KORGEN=on&filter-coursestatus-Active=on>)  
(<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=KORLANG&filter-catalognumber-KORLANG=on>)
  - Courses with the suffix -GEN do not require reading knowledge of an Asian language.

Language courses are listed on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site under:

- CHINLANG (Chinese Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHINLANG&filter-catalognumber-CHINLANG=on>)
- JAPANLNG (Japanese Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=JAPANLNG&filter-catalognumber-JAPANLNG=on>)
- KORLANG (Korean Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=KORLANG&filter-catalognumber-KORLANG=on>)

The Department of East Asian Languages and Cultures offers programs for students who wish to engage with the cultures of China, Japan, and Korea as articulated in language, linguistics, literature, film, cultural studies, and visual arts. Students emerge with a sophisticated understanding of culture as a dynamic process embodied in language and other representational media, especially the verbal and visual forms that are central to humanistic study. Department faculty represent a broad range of research interests and specialties, and visiting scholars and postdoctoral fellows from the Stanford Humanities Center, the Andrew W. Mellon Fellowship of Scholars in the Humanities, the Freeman Spogli Institute for International Studies, and the Center for East Asian Studies add to the intellectual vitality of the department.

East Asian Languages and Cultures offers a full range of courses at the undergraduate and graduate levels. Undergraduate courses concentrate on language, literature, and other cultural forms from the earliest times to the present, covering traditional and contemporary topics from Confucian conceptions of self and society to inflections of gender in the twentieth century. Emphasis in classes is on developing powers of critical thinking and expression that will serve students well no matter what their ultimate career goals. Graduate programs offer courses of study involving advanced language training, engagement with primary texts and other materials, literary history, and training in research methodologies and critical approaches.

East Asian language skills provide a foundation for advanced academic training and professional careers in fields such as business, diplomacy, education, and law. The department also offers opportunities for students who choose to double-major or minor in other academic disciplines, including anthropology, art history, economics, education, history, linguistics, philosophy, political science, religious studies, and sociology.

The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy in Chinese and Japanese, and Bachelor of Arts in East Asian Studies. It also offers undergraduate minors and the Ph.D. minor in Chinese or Japanese language and literature.

For information concerning other opportunities for study about Asian history, societies, and cultures, see the following departments and programs: Anthropology, Art and Art History, Business, Comparative Literature, East Asian Studies, Economics, History, Law, Linguistics, Philosophy, Political Science, Religious Studies, and Sociology.

## Undergraduate Mission Statements for East Asian Languages and Cultures

### Chinese Major

The mission of the undergraduate program in Chinese is to expose students to a variety of perspectives in Chinese language, culture, and history by providing them with training in writing and communication, literature, and civilization. Emphasis in courses is on developing powers of critical thinking and expression that serve students well no matter what their ultimate career goals are. The program prepares students for diverse professions and enterprises, including business, government service, and academia.

### Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. effective and nuanced skills interpreting primary and secondary source materials.
2. in their own work a good grasp of the course material and methodologies in the studies of Chinese.
3. analytical writing skills and close reading skills.
4. effective oral communication skills.

### Japanese Major

The mission of the undergraduate program in Japanese is to expose students to a variety of perspectives in Japanese language, culture, and history by providing students with training in writing and communication, literature, and civilization. Emphasis in classes is on developing powers of critical thinking and expression that will serve students well no matter what their ultimate career goals are. The program prepares students for diverse professions and enterprises, including business, government service, and academia.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. effective and nuanced skills interpreting primary and secondary source materials.
2. in their own work a good grasp of the course material and methodologies in the studies of Japanese.
3. analytical writing skills and close reading skills.
4. effective oral communication skills.

### East Asian Studies Major

The mission of the program in East Asian Studies is to enable students to obtain a comprehensive understanding of East Asia broadly conceived, which is the area stretching from Japan through Korea and China to the contiguous areas of the Central Asian land mass. Majors are expected to have a good mastery of an East Asian language, and focus on a particular sub-region or a substantive issue involving the region as a whole. Emphasis in classes is on developing powers of critical thinking and expression to serve students well no matter what their ultimate career goals in business, government service, academia, or the professions.

### Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. effective and nuanced skills interpreting primary and secondary source materials.
2. in their own work a good grasp of the course material and methodologies in East Asian studies.
3. analytical writing skills and close reading skills.
4. effective oral communication skills.

### Study Abroad

Students interested in Japanese language, history, culture, and social organization are encouraged to apply to the Kyoto Center for Japanese Studies (KCJS), a two-semester academic program primarily for undergraduates wishing to do advanced work in the Japanese language and in Japanese studies.

In Spring Quarter, the Stanford Center for Technology and Innovation (SCTI), also in Kyoto, focuses on Japanese organizations and the political economy of research, development, and production of high technology and advanced industries, followed by an optional two-to-three month internship in an agency, firm, or laboratory in Japan. For information about either program in Kyoto, students should contact the Bing Overseas Studies Program office in Sweet Hall.

Undergraduates interested in studying Chinese language, history, culture, and society are encouraged to apply to the Stanford Program in Beijing, also offered through the Bing Overseas Studies Program. This program is located at Peking University and is open Autumn and Spring Quarters.

Students should take note of the Inter-University Program for Chinese Language Studies (IUP) (<http://ieas.berkeley.edu/iup>) at Tsinghua University ([iub@socrates.berkeley.edu](mailto:iub@socrates.berkeley.edu)) (<http://exploreddegrees.stanford.edu/>)

schoolofhumanitiesandsciences/eastasianlanguagesandcultures/  
mailto:iub@socrates.berkeley.edu); 510-642-3873) and the Inter-University  
Center (IUC) for Japanese Language Studies (<http://stanford.edu/dept/IUC>)  
in Yokohama (stacey.campbell@stanford.edu; 650-725-1490). Stanford is a  
member of these consortia.

Students interested in the graduate exchange program with the Department  
of Chinese at Peking University in Beijing should consult the chair of the  
department early in the academic year.

# Graduate Programs in East Asian Languages and Cultures

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and  
skills in East Asian Languages and Cultures and to prepare students for a  
professional career or doctoral studies. This is achieved through completion  
of courses, in the primary field as well as related areas, and experience with  
independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial  
scholarship and the ability to conduct independent research and analysis  
in East Asian Languages and Cultures. Through completion of advanced  
course work and rigorous skills training, the doctoral program prepares  
students to make original contributions to the knowledge of East Asian  
Languages and Cultures and to interpret and present the results of such  
research.

## Admission

All students contemplating application for admission to graduate study  
must have a creditable undergraduate record. The applicant need not have  
majored in Chinese or Japanese as an undergraduate, but must have had the  
equivalent of at least three years of training in the language in which he or  
she intends to specialize, and must also demonstrate a command of English  
adequate for the pursuit of graduate study. Applicants should not wish  
merely to acquire or improve language skills, but to pursue study in one  
of the following fields: Chinese history (pre-modern), Chinese linguistics,  
Chinese literature, Chinese philosophy, Japanese cultural history, Japanese  
literature, Japanese linguistics, and Japanese visual culture.

## Bachelor of Arts

The department offers the following degrees:

- Bachelor of Arts in Chinese
- Bachelor Arts in Japanese
- Bachelor of Arts in East Asian Studies

## Bachelor of Arts in Chinese

These requirements are in addition to the University's basic requirements  
for the bachelor's degree. Letter grades are mandatory for required courses.  
The following courses as well as their prerequisites must be completed with  
a grade point average (GPA) of 2.0 or better:

### Course List

#### I. Required Courses (10)

Units

Three CHINGEN or CHINLIT courses at the 100 level with one in each of the following areas: pre-modern China, modern China, and Chinese linguistics. The following courses are offered this year		
CHINGEN 91	Traditional East Asian Culture: China	5
JAPANGEN 92	Traditional East Asian Culture: Japan	5

#### II. First-year Modern Chinese (8-15)

Select one the following series 8-15

##### Series A

CHINLANG 1 First-Year Modern Chinese, First Quarter

CHINLANG 2 First-Year Modern Chinese, Second Quarter

CHINLANG 3 First-Year Modern Chinese, Third Quarter

##### Series B

CHINLANG 1B First-Year Modern Chinese for Bilingual Students, First Quarter

CHINLANG 2B First-Year Modern Chinese for Bilingual Students, Second Quarter

CHINLANG 3B First-Year Modern Chinese for Bilingual Students, Third Quarter

##### Series C

CHINLANG 5 Intensive First-Year Modern Chinese

#### III. Second-year Modern Chinese (8-15)

Select one of the following series: 8-15

##### Series A

CHINLANG 21 Second-Year Modern Chinese, First Quarter

CHINLANG 22 Second-Year Modern Chinese, Second Quarter

CHINLANG 23 Second-Year Modern Chinese, Third Quarter

##### Series B

CHINLANG 21B Second-Year Modern Chinese for Bilingual Students, First Quarter

CHINLANG 22B Second-Year Chinese for Bilingual Students, Second Quarter

CHINLANG 23B Second-Year Chinese for Bilingual Students, Third Quarter

##### Series C

CHINLANG 25 Intensive Second-Year Modern Chinese

#### IV. Third-year Modern Chinese (26-35)

Select one of the following series: 9-15

##### Series A

CHINLANG 101 Third-Year Modern Chinese, First Quarter 5

CHINLANG 102 Third-Year Modern Chinese, Second Quarter 5

CHINLANG 103 Third-Year Modern Chinese, Third Quarter 5

##### Series B

CHINLANG 101B Third-Year Modern Chinese for Bilingual Students, First Quarter

CHINLANG 102B Third-Year Modern Chinese for Bilingual Students, Second Quarter

CHINLANG 103B Third-Year Modern Chinese for Bilingual Students, Third Quarter

CHINLIT 125 Beginning Classical Chinese, First Quarter 2-5

#### V. Additional Courses (13-21)



CHINGEN 118	Constructing National History in East Asian Archaeology	
CHINGEN 119	Popular Culture and Casino Capitalism in China	
CHINGEN 121	Classical Chinese Rituals	
CHINGEN 131	Chinese Poetry in Translation	
CHINGEN 133	Literature in 20th-Century China (satisfies WIM requirement)	
CHINGEN 135	Chinese Bodies, Chinese Selves	
CHINGEN 140	Chinese Justice: Law, Morality, and Literature	
CHINGEN 141	Emergence of Chinese Civilization from Caves to Palaces	
CHINGEN 143	Images of Women in Ancient China and Greece	
CHINGEN 160	New Directions in the Study of Poetry and Literary Culture	
CHINGEN 169	A History of Chinese Drama	
CHINGEN 173	Chinese Language, Culture, and Society	
CHINGEN 194	The History and Culture of Peking Opera	
Four other content courses dealing with China, primarily at the 100 level, as approved by the undergraduate adviser		12-20
CHINGEN 198	Senior Colloquium in Chinese Studies	1
Total Units		65-96

- Students must also complete of a capstone essay of approximately 7,500 words, written either in a directed reading course or for one of the courses above.

## Honors Program

Majors with an overall grade point average (GPA) of 3.5 may apply for the honors program by submitting a senior thesis proposal to the honors committee during Winter or Spring Quarter of the junior year. The proposal must include:

- a thesis outline
- a list of all relevant courses the student has taken or plans to take
- a preliminary reading list including a work or works in Chinese,
- the name of a faculty member who has agreed to act as honors supervisor.

If the proposal is approved:

1. Research begins in Spring Quarter of the junior year, or by Autumn Quarter of the senior year at the latest, when the student enrolls in CHINLIT 189A Honors Research.
2. In Winter Quarter of the senior year, students enroll for 5 units in independent study, CHINLIT 199 Individual Reading in Chinese, with the thesis supervisor while writing the thesis, and the finished essay (normally about 15,000 words) is submitted to the committee no later than April 15 of the senior year.
3. Students enroll in CHINGEN 198 Senior Colloquium in Chinese Studies in the senior year to polish and present their theses (instead of writing a capstone essay).
4. 8-11 units of credit are granted for honors course work and the finished thesis.

# Bachelor of Arts in Japanese

These requirements are in addition to the University's basic requirements for the bachelor's degree. Letter grades are mandatory for required courses. The following courses as well as their prerequisites must be completed with a grade point average (GPA) of 2.0 or better:

		Units
<b>I. Required Courses (10)</b>		
CHINGEN 91	Traditional East Asian Culture: China	5
JAPANGEN 92	Traditional East Asian Culture: Japan	5
<b>II. First-year Modern Japanese (0)</b>		
JAPANLNG 1	First-Year Japanese Language, Culture, and Communication, First Quarter	
JAPANLNG 2	First-Year Japanese Language, Culture, and Communication, Second Quarter	
JAPANLNG 3	First-Year Japanese Language, Culture, and Communication, Third Quarter	
JAPANLNG 5	Intensive First-Year Japanese Language	
<b>III. Second-year Modern Japanese (0)</b>		
JAPANLNG 21	Second-Year Japanese Language, Culture, and Communication, First Quarter	
JAPANLNG 22	Second-Year Japanese Language, Culture, and Communication, Second Quarter	
JAPANLNG 23	Second-Year Japanese Language, Culture, and Communication, Third Quarter	
JAPANLNG 20	Intensive Second-Year Japanese	
<b>IV. Third-year Modern Japanese (15)</b>		
JAPANLNG 101	Third-Year Japanese Language, Culture, and Communication, First Quarter	5
JAPANLNG 102	Third-Year Japanese Language, Culture, and Communication, Second Quarter	5
JAPANLNG 103	Third-Year Japanese Language, Culture, and Communication, Third Quarter	5
<b>V. Additional Courses (43-61)</b>		
Three JAPANGEN or JAPANLIT courses at the 100 level with one in each of the following areas: pre-modern Japan, modern Japan, and Japanese linguistics. The following courses are offered this year:		9-15
JAPANGEN 121	Translating Japan, Translating the West	
JAPANGEN 125	Emotions of Japanese Cinema (Postindustrial Version)	4
JAPANGEN 137	Classical Japanese Literature in Translation	
JAPANGEN 138	Introduction to Modern Japanese Literature and Culture (required course; satisfies WIM requirement)	3-4
JAPANGEN 141	Japanese Performance Traditions	3-4
JAPANLIT 157	Points in Japanese Grammar	2-4
JAPANLIT 170	The Tale of Genji and Its Historical Reception	
JAPANGEN 184	Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting	4
JAPANGEN 187	Romance, Desire, and Sexuality in Modern Japanese Literature	

JAPANLIT 287	Pictures of the Floating World: Images from Japanese Popular Culture	5
Four other content courses dealing with Japan primarily at the 100 level, as approved by the undergraduate adviser		12-20
JAPANGEN 198	Senior Colloquium in Japanese Studies	1
Total Units		68-86

- Students must also complete of a capstone essay of approximately 7,500 words, written either in a directed reading course or for one of the courses above.
- JAPANGEN 198 Senior Colloquium in Japanese Studies may be used to satisfy the Japanese linguistics requirement.
- JAPANGEN 51 Japanese Business Systems/ JAPANGEN 251 Japanese Business Systems can not counted toward the major.
- Students who complete third-year Japanese at KCJS satisfy the language requirement but are required to take a placement test if they wish to enroll in:
  - JAPANLNG 211 Fourth-Year Japanese, First Quarter
  - JAPANLNG 212 Fourth-Year Japanese, Second Quarter
  - JAPANLNG 213 Fourth-Year Japanese, Third Quarter

Students who want to concentrate in Chinese or Japanese linguistics can substitute the four other content courses primarily at the 100 level with LINGUIST 1 Introduction to Linguistics and three other linguistics courses at the 100 level, as approved by the undergraduate adviser in consultation with the student's academic adviser.

These requirements are in addition to the University's basic requirements for the bachelor's degree. Letter grades are mandatory for required courses.

## Honors Program

Majors with an overall grade point average (GPA) of 3.5 may apply for the honors program by submitting a senior thesis proposal to the honors committee during Winter or Spring Quarter of the junior year. The proposal must include a thesis outline, a list of all relevant courses the student has taken or plans to take, a preliminary reading list including a work or works in Chinese or Japanese, and the name of a faculty member who has agreed to act as honors supervisor.

If the proposal is approved:

- research begins in spring quarter of the junior year, or by autumn quarter of the senior year at the latest, when the student enrolls in JAPANLIT 189A Honors Research
- In winter quarter of the senior year, students enroll for five units in independent study with the thesis supervisor while writing the thesis, and the finished essay (normally about 15,000 words) is submitted to the committee no later than April 15 of the senior year. JAPANLIT 189B Honors Research
- Students enroll in the Senior Colloquium in the senior year to polish and present their theses (instead of writing a capstone essay). JAPANGEN 198 Senior Colloquium in Japanese Studies
- Eight to eleven units of credit are granted for honors course work and the finished thesis.

## Bachelor of Arts in East Asian Studies

Majors in East Asian Studies begin or continue the mastery of Chinese, Japanese, or Korean. Within the humanities or social sciences, they may focus on a particular sub-region, for example, Japan; South China, Hong Kong, and Taiwan; or western China and Central Asia; or a substantive issue involving the region as a whole, such as environmental protection, public health, rural development, historiography, cultural expression, or

religious beliefs. The major seeks to reduce the complexity of a region to intellectually manageable proportions and illuminate the interrelationships among the various facets of a society.

Potential majors must submit a Student Proposal for a Major in East Asian Studies form not later than the end of the first quarter of the junior year. Majors must complete at least 75 units of course work on China, Japan, and/or Korea in addition to a one unit Senior Colloquium. Courses to be credited toward major requirements must be completed with a grade of 'C' or better. Requirements are:

1. Language: proficiency in Chinese, Japanese, or Korean language at the second-year level or above, to be met either by course work or examination. Students who meet the requirement through examination are still expected to take an additional 15 units of language at a higher level, or literature courses taught in the language, or the first year in an additional Asian language. No more than 30 units of language courses are counted toward the major.
2. Area Courses: a minimum of three area courses, one in each category below (courses listed are examples and by no means exhaustive; if uncertain whether a particular course fits into one of these categories, contact the department to check.

		Units
A.		
Art, Literature, and Religion		
ARTHIST 2	Asian Art and Culture	5
ARTHIST 187	Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868	4
ARTHIST 287A	The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime	5
CHINGEN 91	Traditional East Asian Culture: China	5
JAPANGEN 92	Traditional East Asian Culture: Japan	5
KORGEN 101	Korean Culture in the New Millennium	4
KORGEN 120	Modern and Contemporary Korean literature in translation	4
KORGEN 140	Children's Literature and Childhood in East Asia	3-5
RELIGST 18	Zen Buddhism	4
RELIGST 104	The Daoist Body	4
RELIGST 114B	Religions of Korea	1-4
RELIGST 150	The Lotus Sutra: Story of a Buddhist Book	4
B.		
History		
HISTORY 93	Late Imperial China	3
HISTORY 94B	Japan in the Age of the Samurai	5
HISTORY 98	The History of Modern China	3
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 191C	Early Imperial China	5
HISTORY 191D	China: The Northern and Southern Dynasties	5
HISTORY 192	China: The Early Empires	3-5
HISTORY 193	Late Imperial China	5
HISTORY 194B	Japan in the Age of the Samurai	5

HISTORY 194D	Japan and the World, 1543-1868	4-5
HISTORY 195	Modern Korean History	5
HISTORY 195C	Modern Japanese History: From Samurai to Pokemon	5
HISTORY 198	The History of Modern China	5
HISTORY 198G	Beijing, Shanghai, and the Structure of China	3-5

**C. Units**

Contemporary Social Sciences		
ANTHRO 25N	Contemporary Japanese Popular Culture	1-3
ANTHRO 77	Japanese Society and Culture	5
ANTHRO 152A	Urban Poverty and Inequality in Contemporary China	5
POLISCI 140L	China in World Politics	5
POLISCI 148	Chinese Politics: The Transformation and the Era of Reform	5
OSPKYOTO 215X	The Political Economy of Japan	4-5
SOC 107	China After Mao	5
SOC 167A	Asia-Pacific Transformation	5

3. Substantive Concentration: additional courses on East Asia, one of which must be a seminar above the 100 level. Majors are encouraged to distribute their course work among at least three disciplines and two subregions in Asia. The subregions need not be traditionally defined. Examples include China, Japan, or Korea; or, in recognition of the new subregions which are emerging, South China and Taiwan, or Central Asia. At least four courses must have a thematic coherence built around a topic. Examples include:

- East Asian religions and philosophies
- Culture and society of modern Japan
- Ethnic identities in East Asia
- Arts and literature in late imperial China
- Foreign policy in East Asia
- Social transformation of modern Korea
- China's political economy

See ExploreCourses under CHINGEN (<https://explorecourses.stanford.edu/search?q=CHINGEN&view=catalog&page=0&catalog=71&filter-term=Autumn=on&filter-term=Winter=on&filter-term=Spring=on&filter-term=Summer=on&filter-coursestatus=Active=on&collapse=&filter-catalognumber-CHINGEN=on&filter-catalognumber-CHINGEN=on>), CHINLIT (<https://explorecourses.stanford.edu/search?q=CHINLIT&view=catalog&page=0&catalog=71&filter-term=Autumn=on&filter-term=Winter=on&filter-term=Spring=on&filter-term=Summer=on&filter-coursestatus=Active=on&collapse=&filter-catalognumber-CHINLIT=on&filter-catalognumber-CHINLIT=on>), JAPANGEN (<https://explorecourses.stanford.edu/search?q=JAPANGEN&view=catalog&page=0&catalog=71&filter-term=Autumn=on&filter-term=Winter=on&filter-term=Spring=on&filter-term=Summer=on&filter-coursestatus=Active=on&collapse=&filter-catalognumber-JAPANGEN=on&filter-catalognumber-JAPANGEN=on>), JAPANLIT (<https://explorecourses.stanford.edu/search?q=JAPANLIT&view=catalog&page=0&catalog=71&filter-term=Autumn=on&filter-term=Winter=on&filter-term=Spring=on&filter-term=Summer=on&filter-coursestatus=Active=on&collapse=&filter-catalognumber-JAPANLIT=on&filter-catalognumber-JAPANLIT=on>).

term=Spring=on&filter-term=Summer=on&filter-coursestatus=Active=on&collapse=&filter-catalognumber-JAPANLIT=on&filter-catalognumber-JAPANLIT=on), and Korgen (<https://explorecourses.stanford.edu/search?q=KORGEN&view=catalog&page=0&catalog=71&filter-term=Autumn=on&filter-term=Winter=on&filter-term=Spring=on&filter-term=Summer=on&filter-coursestatus=Active=on&collapse=&filter-catalognumber-KORGEN=on&filter-catalognumber-KORGEN=on>).

4. Capstone Essay: completion of a paper of approximately 7,500 words, written either in a directed reading course or for one of the courses in item 3 above, which should be built upon the student's thematic interest. CHINGEN 198 Senior Colloquium in Chinese Studies or JAPANGEN 198 Senior Colloquium in Japanese Studies, Senior Colloquium (1 unit), is required of majors during their senior year to develop and present the capstone essay or honors paper.
5. At least one quarter overseas in the country of focus.
6. An East Asian Studies course that satisfies the University Writing in the Major requirement (WIM) should be completed before beginning the senior essay. This year, CHINGEN 133 Literature in 20th-Century China and JAPANGEN 138 Introduction to Modern Japanese Literature and Culture satisfy the WIM requirement.
7. The courses for the major must add up to at least 76 units, comprised of the one-unit Senior Colloquium and at least 75 additional units, all taken for a letter grade. Courses must be at least three units to be counted towards the degree.

These requirements are in addition to the University's basic requirements for the bachelor's degree. Letter grades are mandatory for required courses.

## Honors Program

Majors with an overall grade point average (GPA) of 3.5 may apply for the honors program by submitting a senior thesis proposal to the honors committee during Winter or Spring Quarter of the junior year. The proposal must include a thesis outline, a list of all relevant courses the student has taken or plans to take, a preliminary reading list including a work or works in Chinese or Japanese, and the name of a faculty member who has agreed to act as honors supervisor.

If the proposal is approved, research begins in Spring Quarter of the junior year, or by Autumn Quarter at the latest, when the student enrolls in 2-5 units of credit for independent study. In Winter Quarter, students enroll for five units in independent study with the thesis supervisor while writing the thesis, and the finished essay (normally about 15,000 words) is submitted to the committee no later than April 15 of the senior year. Students enroll in the Senior Colloquium, CHINGEN 198 Senior Colloquium in Chinese Studies or JAPANGEN 198 Senior Colloquium in Japanese Studies, in the senior year to polish and present their theses (instead of writing a capstone essay). Eight to eleven units of credit are granted for honors course work and the finished thesis. One advanced level colloquium or seminar dealing with China, Japan, or Korea is required as well.

## Overseas Studies

Courses approved for the East Asian Languages and Cultures majors which are taught overseas can be found in the "Overseas Studies (<http://www.stanford.edu/dept/registrar/bulletin/5090.htm>)" section of this Bulletin, or in the Overseas Studies office, Sweet Hall. To find course offerings in ExploreCourses, click on OSPKYOTO (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPKYOTO&filter-catalognumber-OSPKYOTO=on>) or OSPBEIJ (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OSPBELJ&filter-catalognumber-OSPBELJ=on>).

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/>)

schoolofhumanitiesandsciences/eastasianlanguagesandcultures/http://explorecourses.stanford.edu) web site or the Bing Overseas Studies (http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/eastasianlanguagesandcultures/http://bosp.stanford.edu) web site. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

## Minor in Chinese or Japanese

The undergraduate minors in Chinese and Japanese have been designed to give students majoring in other departments an opportunity to gain a substantial introduction to Chinese or Japanese language, as well as an introduction to the culture and civilization of East Asia. The minors consist of a minimum of 20 units from the following requirements:

1. A. Completion of language study through the second-year level for students with no previous training in Chinese or Japanese.

B. **Units**

Select one of the following Series: 9-15

### Series A

CHINLANG Second-Year Modern Chinese, First  
21 Quarter

CHINLANC Second-Year Modern Chinese, Second  
22 Quarter

CHINLANG Second-Year Modern Chinese, Third  
23 Quarter

### Series B

CHINLANG Second-Year Modern Chinese for  
21B Bilingual Students, First Quarter

CHINLANC Second-Year Chinese for Bilingual  
22B Students, Second Quarter

CHINLANG Second-Year Chinese for Bilingual  
23B Students, Third Quarter

CHINLANC Intensive Second-Year Modern Chinese  
25

### Series C

JAPANLNC Second-Year Japanese Language, Culture,  
21 and Communication, First Quarter

JAPANLNG Second-Year Japanese Language, Culture,  
22 and Communication, Second Quarter

JAPANLNC Second-Year Japanese Language, Culture,  
23 and Communication, Third Quarter

JAPANLNG Intensive Second-Year Japanese  
20

- C. Students who already have first-year competence in Chinese or Japanese must complete the third-year course.

D. **Units**

Select one of the following Series: 9-15

### Series A

CHINLANG Third-Year Modern Chinese, First Quarter  
101

CHINLANC Third-Year Modern Chinese, Second  
102 Quarter

CHINLANG Third-Year Modern Chinese, Third Quarter  
103

### Series B

CHINLANG Third-Year Modern Chinese for Bilingual  
101B Students, First Quarter

CHINLANC Third-Year Modern Chinese for Bilingual  
102B Students, Second Quarter

CHINLANG Third-Year Modern Chinese for Bilingual  
103B Students, Third Quarter

### Series C

JAPANLNG Third-Year Japanese Language, Culture,  
101 and Communication, First Quarter

JAPANLNC Third-Year Japanese Language, Culture,  
102 and Communication, Second Quarter

JAPANLNG Third-Year Japanese Language, Culture,  
103 and Communication, Third Quarter

- E. Students who already have a competence at the second-year level may fulfill the language component of the minor by taking three courses in the department using materials in either Chinese or Japanese. These courses may be language courses such as the third-year sequence mentioned above, the fourth-year language sequence, or they may be advanced literature and linguistics courses, depending on the capabilities and interests of the student.

2. The core courses:

3. **Units**

CHINGEN 91 Traditional East Asian Culture: China 5

JAPANGEN 92 Traditional East Asian Culture: Japan 5

4. Two courses selected from among the department's other offerings in the literature, linguistics, and civilization of a given minor area (CHINGEN, CHINLIT, JAPANGEN, JAPANLIT). All courses for the minor must be taken for a letter grade and completed with a GPA of 2.0 or better.

5. **Units**

CHINGEN 118 Constructing National History in East Asian  
Archaeology 3-5

CHINGEN 119 Popular Culture and Casino Capitalism in  
China 3-4

CHINGEN 121 Classical Chinese Rituals 3-5

CHINGEN 131 Chinese Poetry in Translation 4

CHINGEN 132 Chinese Fiction and Drama in Translation 4

CHINGEN 133 Literature in 20th-Century China 4-5

CHINGEN 140 Chinese Justice: Law, Morality, and Literature 3-5

CHINGEN 141 Emergence of Chinese Civilization from Caves  
to Palaces 3-4

CHINGEN 150 Sex, Gender, and Power in Modern China 3-5

CHINGEN 173 Chinese Language, Culture, and Society 4

JAPANGEN Translating Japan, Translating the West  
121 3-4

JAPANGEN Emotions of Japanese Cinema (Postindustrial  
125 Version) 4

JAPANGEN Classical Japanese Literature in Translation  
137 4

JAPANGEN Introduction to Modern Japanese Literature and  
138 Culture 3-4

JAPANGEN Japanese Performance Traditions 4

JAPANGEN Early Modern Japan: The Floating World of  
141 Chikamatsu 4

JAPANGEN Early Modern Japan: The Floating World of  
160 Chikamatsu 4

JAPANGEN Aristocrats, Warriors, Sex Workers, and  
184 Barbarians: Lived Life in Early Modern  
Japanese Painting 4

JAPANGEN Romance, Desire, and Sexuality in Modern  
187 Japanese Literature 3-4

## Minor in East Asian Studies

The goal of the minor in East Asian Studies is to provide the student with a broad background in East Asian culture as a whole, while allowing the student to focus on a geographical or temporal aspect of East Asia. The minor may be designed from the following, for a total of six courses and a minimum of 20 units. All courses should be taken for a letter grade.

1. Three area courses, one in each category (see East Asian Studies major for listing of area courses).
2. One undergraduate seminar above the 100 level and two other courses from among those listed as approved for East Asian Studies majors, including literature courses but excluding language courses. These courses are listed under East Asian Studies (EASTASN) in this bulletin, and under CHINGEN (<https://explorecourses.stanford.edu/search?q=CHINGEN&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-CHINGEN=on&filter-catalognumber-CHINGEN=on>), CHINLIT (<https://explorecourses.stanford.edu/search?q=CHINLIT&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-CHINLIT=on&filter-catalognumber-CHINLIT=on>), JAPANGEN (<https://explorecourses.stanford.edu/search?q=JAPANGEN&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-JAPANGEN=on&filter-catalognumber-JAPANGEN=on>), JAPANLIT (<https://explorecourses.stanford.edu/search?q=JAPANLIT&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-JAPANLIT=on&filter-catalognumber-JAPANLIT=on>), and KORGEN (<https://explorecourses.stanford.edu/search?q=KORGEN&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-KORGEN=on&filter-catalognumber-KORGEN=on>).

Applications for the minor should be submitted online through Axess and are due no later than the second quarter of the junior year.

## Master of Arts Programs in East Asian Languages and Cultures

1. The M.A. is granted in Chinese and in Japanese. The normal length of study for the degree is two years.
2. No financial aid is available for those applicants who wish to obtain the M.A. only.
3. Students who wish to spend the first year of graduate study at the Beijing or Yokohama centers must obtain department approval first.
4. Candidates for the degree must be in residence at Stanford in California during the final quarter of registration.
5. A thesis or an annotated translation of a text of suitable literary or historical worth is required for the M.A. degree. Under special circumstances, a paper approved by the graduate adviser may be substituted.

6. The University's basic requirements for the master's degree, including a 45-unit minimum requirement, are given in the "Graduate Degrees (p. 38)" section of this Bulletin. Department requirements are set forth below.

## Master of Arts in Chinese

The M.A. program in Chinese is designed for students with strong academic records and an interest in pursuing postgraduate research in Chinese literature, philosophy, or linguistics, but who have not yet acquired the language skills or disciplinary foundation necessary to enter a Ph.D. program. (Note: Students who wish to pursue advanced language training in preparation for post-graduate research in other fields of Chinese studies are referred to the interdisciplinary M.A. program in the Center for East Asian Studies.)

The candidate must:

1. Demonstrate proficiency in both modern and classical Chinese through completion of one of the tracks of third-year Chinese with a letter grade of 'B' or higher :

		Units
CHINLANG 103	Third-Year Modern Chinese, Third Quarter	5
CHINLANG 103B	Third-Year Modern Chinese for Bilingual Students, Third Quarter	3

3. One of three advanced classical Chinese courses:

		Units
CHINLIT 221	Advanced Classical Chinese: Philosophical Texts	3-5
CHINLIT 222	Advanced Classical Chinese: Historical Narration	2-5
CHINLIT 223	Advanced Classical Chinese: Literary Essays	3-5

Qualified students may, upon consultation with the graduate adviser, be permitted to certify that they have attained the equivalent level of proficiency by passing examinations.completion with a letter grade of 'B' or higher of third-year Chinese through one of these and Classical Chinese.

5. Complete the following for a letter grade of 'B' or higher:

		Units
CHINGEN 201	Teaching Chinese Humanities	1

6. Four courses in Chinese literature or linguistics numbered between CHINLIT 230 and 292:

		Units
CHINLIT 261	Sources of Chinese Poetry	4
CHINLIT 263	Lyric (Shih) I	2-4
CHINLIT 265	Major Figures in Classical Chinese Shi Poetry	2-4
CHINLIT 266	Chinese Ci Poetry (Song Lyrics)	4
CHINLIT 272	Traditional Chinese Fiction: Novels	2-4
CHINLIT 273	Chinese Drama	2-4
CHINLIT 274	Modern Chinese Novel: Theory, Aesthetics, History	4
CHINLIT 279	For Love of Country: National Narratives in Chinese Literature and Film	3-5
CHINLIT 289	The Poetics and Politics of Affect in Modern China	3-5
CHINLIT 290	Chinese Cultural Revolution: Performance, Politics, and Aesthetics	4
CHINLIT 291	The Structure of Modern Chinese	2-4
CHINLIT 292	The History of Chinese	4

- 8. Two upper-division or graduate-level courses in fields such as Chinese anthropology, art history, history, philosophy, politics, and religion, as approved by the graduate adviser in consultation with the student's individual adviser
- 9. A master's thesis, enroll in:
- 10. CHINLIT 299 Master's Thesis or Translation

**Units**  
1-5

## Master of Arts in Chinese, Archaeology Track

The M.A. in Chinese, Archeology track, is designed for students an interest in pursuing postgraduate research in Chinese archaeology who have not yet acquired the language skills or disciplinary foundation necessary to enter a Ph.D. program. The track is declared on Axxess; it appears on the transcript but not on the diploma.

### Degree Requirements

A candidate must

1. Demonstrate proficiency in both modern and classical Chinese by completing:
  - A. third-year Chinese through CHINLANG 103 Third-Year Modern Chinese, Third Quarter with a minimum grade of 'B+'.
  - B. one of three advanced classical Chinese courses:
 

		<b>Units</b>
CHINLIT 221	Advanced Classical Chinese: Philosophical Texts	3-5
CHINLIT 222	Advanced Classical Chinese: Historical Narration	2-5
CHINLIT 223	Advanced Classical Chinese: Literary Essays	3-5
  - C. Qualified students may, upon consultation with the graduate adviser, be permitted to certify that they have attained the equivalent level of proficiency by passing examinations or presenting documentary evidence of attendance at a bachelor's institution in which Chinese is the language of instruction. Exemptions may also be granted to students who study prehistoric archaeology. Instead, these students should take required course work relating to archaeology which is offered in the Stanford Archaeology Center. For details students should consult with the supervisor or the graduate adviser.

2. Complete 45 units, including the following four graduate level CHINGEN or ANTHRO subject code courses appropriate to the Chinese Archaeology track. All courses must be passed with a minimum grade of 'B+'.

		<b>Units</b>
3.	CHINGEN 241 Emergence of Chinese Civilization from Caves to Palaces	3-4
	CHINGEN 218 Constructing National History in East Asian Archaeology	3-5
	ANTHRO 303 Introduction to Archaeological Theory	5
	ANTHRO 307 Archaeological Methods and Research Design	5

4. Two upper-division or graduate-level courses in fields such as Chinese anthropology, archaeology, art history, history, philosophy, political science and religious studies, as approved by the graduate adviser in consultation with the student's individual adviser.
5. Master's Thesis: CHINLIT 299 Master's Thesis or Translation

## Master of Arts in Japanese

The M.A. program in Japanese is designed for students with strong academic records and an interest in pursuing postgraduate research in Japanese literature, cultural history, or linguistics, but who have not yet acquired the language skills or disciplinary foundation necessary to enter a Ph.D. program. *Note:* Students who wish to pursue advanced language training in preparation for postgraduate research in other fields of Japanese studies are referred to the interdisciplinary M.A. program in the Center for East Asian Studies.

The candidate must:

1. Complete third-year Japanese:

		<b>Units</b>
JAPANLNG 101	Third-Year Japanese Language, Culture, and Communication, First Quarter	5
JAPANLNG 102	Third-Year Japanese Language, Culture, and Communication, Second Quarter	5
JAPANLNG 103	Third-Year Japanese Language, Culture, and Communication, Third Quarter	5

2. Complete one of the following for a letter grade of 'B' or higher:

3. **Units** 9-15

JAPANLNG 211	Fourth-Year Japanese, First Quarter	
JAPANLNG 212	Fourth-Year Japanese, Second Quarter	
JAPANLNG 213	Fourth-Year Japanese, Third Quarter	
Classical Japanese		5-10
JAPANLIT 246	Introduction to Premodern Japanese	
JAPANLIT 247	Readings in Premodern Japanese	

*Note:* qualified students may, upon consultation with the graduate adviser, be permitted to certify that they have attained the equivalent level of proficiency by passing examinations.

4. Complete the following with a letter grade of 'B' or higher:

- A. four adviser-approved courses in Japanese literature, culture, or linguistics from among the offerings of the Department of East Asian Languages and Cultures, not including courses taken to fulfill the language requirement

- B. **Units**

JAPANLIT 235	Academic Readings in Japanese I	2-4
JAPANLIT 236	Academic Readings in Japanese II	2-4
JAPANLIT 246	Introduction to Premodern Japanese	3-5
JAPANLIT 257	Points in Japanese Grammar	2-4
JAPANLIT 270	The Tale of Genji and Its Historical Reception	4
JAPANLIT 276	Modern Japanese Short Stories	2-4
JAPANLIT 279	Research in Japanese Linguistics	2-4
JAPANLIT 281	Japanese Pragmatics	2-4
JAPANLIT 287	Pictures of the Floating World: Images from Japanese Popular Culture	5

JAPANLIT 296	Modern Japanese Literature	2-5
JAPANLIT 298	The Theory and Practice of Japanese Literary Translation	2-5
JAPANLIT 396	Seminar: Modern Japanese Literature	2-5

C. **Units**

JAPANLIT 201	Proseminar: Introduction to Graduate Study in Japanese	2-5
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D. two upper-division or graduate-level courses in fields such as Japanese anthropology, art history, history, philosophy, politics, and religion, as approved by the graduate adviser in consultation with the student's individual adviser

E. a master's thesis; enroll in:

F. **Units**

JAPANLIT 299	Master's Thesis or Translation	1-5
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## Coterminal B.A. and M.A. Programs in East Asian Languages and Cultures

With department approval, students may be able to combine programs for the B.A. and M.A. degrees in Chinese or Japanese. Prospective applicants must consult with the graduate adviser. For details, see the "Graduate Degrees (p. 38)" section of this bulletin or at the Registrar's (<http://registrar.stanford.edu/shared/publications.htm#Coterm>) web site.

For those interested in a coterminal program with an M.A. in East Asian Studies, please contact the Center for East Asian Studies for application procedures and deadlines, or visit the CEAS (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/eastasianlanguagesandcultures/http://ceas.stanford.edu>) web site and the "East Asian Studies (p. 370)" section of this bulletin.

## Doctor of Philosophy Programs in East Asian Languages and Cultures

The Ph.D. degree is granted in Chinese and Japanese. Candidates for the degree are expected to acquire a thorough familiarity with Chinese or Japanese literature and linguistics, an adequate command of relevant languages, and a comprehensive knowledge of East Asian history, social institutions, and thought. The University's basic requirements for the Ph.D. are given in the "Graduate Degrees (p. 38)" section of this bulletin. Department requirements are set forth below.

### Admission to Candidacy

Students admitted with a B.A. only are evaluated by the graduate faculty during the Autumn Quarter of their second year at Stanford. The evaluation is based on written work and at least a portion of the M.A. thesis or translation. If the faculty have serious doubts about a student's ability to work for the Ph.D., they convey this to the student. During the subsequent Spring Quarter, the faculty formally decide whether a student should be admitted to candidacy for the Ph.D. or be terminated. In the case of a student who already has an M.A. in Chinese or Japanese when admitted to the department, the evaluation takes place in the Spring Quarter of the student's first year. If a student goes to the Inter-University Program

for Chinese Language Studies (IUP) at Tsinghua University or the Inter-University Center (IUC) for Japanese Language Studies in Yokohama during the first two years of study, the department may consider an extension for admission to candidacy. The timing of the evaluation of a student admitted with an M.A. in East Asian Studies is decided on an individual basis.

Admission to candidacy does not mean that the student has fulfilled all requirements for the degree except the dissertation, but that the department faculty consider the student qualified to pursue a program of study leading to the Ph.D. and that, subject to continued satisfactory progress, the student's status in this department is secure.

## Doctor of Philosophy in Chinese

The Ph.D. program in Chinese is designed to prepare students for a doctoral degree in Chinese literature, philosophy, or linguistics. Applicants must have a minimum of three years of Chinese language study at Stanford or the equivalent to be considered for admission. Ph.D. students will complete the M.A. as described above on the way to advancing to Ph.D. candidacy (see department guidelines for admission to candidacy above). The majority of required course work for Ph.D. students demands the ability to read primary and secondary materials in Chinese. Advanced standing may be considered for students entering the Ph.D. program who have already completed an M.A. in Chinese literature or linguistics elsewhere only in cases when the level of prior course work and research is deemed equivalent to departmental requirements for the Ph.D. All courses must be taken for a letter grade.

A candidate must fulfill the following requirements:

- Complete advanced classical Chinese through CHINLIT 223 Advanced Classical Chinese: Literary Essays and the department's requirements for the M.A. in Chinese.
- Demonstrate proficiency in at least one supporting language, to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of course work, to be determined on a case-by-case basis. When deemed necessary by the student's adviser(s), working knowledge of a third language may also be required.
- |  |   |              |
|--|---|--------------|
|  |   | <b>Units</b> |
|  | CHINGEN 201 Teaching Chinese Humanities | 1            |
- Complete two relevant seminars at the 300 level. These seminars must be in different subjects.
- CHINLIT 371 Aesthetics, Politics, and Literary Criticism: East and West 2-5
- Pass a set of three comprehensive written examinations, one of which tests the candidate's methodological competence in the relevant discipline. The remaining two fields are chosen, with the approval of the graduate adviser in consultation with the student's individual adviser, from the following: archaeology, anthropology, art, Chinese literature, history, Japanese literature, linguistics, philosophy, and religion. With the adviser's approval, a Ph.D. minor in a supporting field may be deemed equivalent to the completion of one of these three examinations.
- Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter, and taking DLCL 301 The Learning and Teaching of Second Languages.
- Pass the University Oral Examination—General regulations governing the oral examination are found in the "Graduate Degrees (p. 38)" section of this Bulletin. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.

- Submit a dissertation demonstrating ability to undertake original research based on primary and secondary materials in Chinese.

## Doctor of Philosophy in Chinese, Archaeology track

1. Complete one of three advanced classical Chinese courses and the requirements for the M.A. Qualified students may, upon consultation with the graduate adviser, be permitted to certify that they have attained the equivalent level of proficiency by passing examinations or presenting documentary evidence. Exemptions may be granted to students who study prehistoric archaeology. Instead, these students should take coursework offered in the Stanford Archaeology Center. Consult with graduate adviser.

		<b>Units</b>
CHINLIT 221	Advanced Classical Chinese: Philosophical Texts	3-5
CHINLIT 222	Advanced Classical Chinese: Historical Narration	2-5
CHINLIT 223	Advanced Classical Chinese: Literary Essays	2-5

2. Demonstrate proficiency in at least one supporting foreign language (in addition to Chinese and English), to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of coursework, to be determined on a case-by-case basis.

3. Six graduate level CHINGEN or ANTHRO courses appropriate to the Chinese Archaeology track, as approved by the adviser:

		<b>Units</b>
CHINGEN 118	Constructing National History in East Asian Archaeology	3-5
CHINGEN 141	Emergence of Chinese Civilization from Caves to Palaces	3-4
ANTHRO 303	Introduction to Archaeological Theory	5
ANTHRO 308	Proposal Writing Seminar	5
ANTHRO 307	Archaeological Methods and Research Design	5
ANTHRO 310G	Introduction to Graduate Studies	2
ANTHRO 444	Anthropology Colloquium: Graduate Seminar	1

4. Serve as a teaching assistant for two quarters and research assistant in an archaeology laboratory for two quarters.

5. Pass qualifying examinations in Chinese archaeology.

6. Carry out fieldwork related to dissertation research.

7. Pass University oral examination. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.

8. Submit a dissertation demonstrating ability to undertake original research based on primary materials in Chinese or data related to China.

## Doctor of Philosophy in Japanese

The Ph.D. program in Japanese is designed to prepare students for a doctoral degree in Japanese literature, cultural history, or linguistics. Applicants must have a minimum of three years of Japanese language study at Stanford or the equivalent to be considered for admission. Ph.D. students will complete an M.A. on the way to advancing to Ph.D. candidacy (see department guidelines for admission to candidacy above). The majority of required course work for Ph.D. students demands the ability to read primary and secondary materials in Japanese. Advanced standing may be considered for students entering the Ph.D. program who have already completed an M.A. in Japanese literature or linguistics elsewhere only in cases when the level of prior course work and research is deemed

equivalent to departmental requirements for the Ph.D. All courses must be taken for a letter grade.

A candidate must fulfill the following requirements:

- Demonstrate proficiency in both modern and classical Japanese language by completing the following courses, or by demonstrating an equivalent level of linguistic attainment by passing the appropriate certifying examinations. fourth-year Japanese through:

		<b>Units</b>
A.		
JAPANLNG 213	Fourth-Year Japanese, Third Quarter	3-5

classical Japanese through:

		<b>Units</b>
B.		
JAPANLIT 246	Introduction to Premodern Japanese	3-5
JAPANLIT 247	Readings in Premodern Japanese	2-5

- Demonstrate proficiency in at least one supporting language, to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of course work, to be determined on a case-by-case basis. When deemed necessary by the student's adviser(s), working knowledge of a third language may also be required.

Students concentrating in classical Japanese literature are normally expected to fulfill this requirement by completing kanbun:

		<b>Units</b>
A.		
	first-year classical Chinese:	

		<b>Units</b>
B.		
CHINLIT 205	Beginning Classical Chinese, First Quarter	2-5
CHINLIT 206	Beginning Classical Chinese, Second Quarter	2-5
CHINLIT 207	Beginning Classical Chinese, Third Quarter	2-5

- Complete eight adviser-approved courses numbered above 200 from among the offerings of the Department of East Asian Languages and Cultures. At least four of these eight courses must be advanced seminars numbered above 300. At least one of these eight courses must deal with Japanese linguistics. For students focusing on modern literature, at least two of these eight courses must deal with premodern material, and for students focusing on premodern literature, at least two of the eight courses must deal with modern material.

		<b>Units</b>
JAPANLIT 257	Points in Japanese Grammar	2-4
JAPANLIT 270	The Tale of Genji and Its Historical Reception	4
JAPANLIT 276	Modern Japanese Short Stories	2-4
JAPANLIT 279	Research in Japanese Linguistics	2-4
JAPANLIT 281	Japanese Pragmatics	2-4
JAPANLIT 287	Pictures of the Floating World: Images from Japanese Popular Culture	5
JAPANLIT 296	Modern Japanese Literature	2-5
JAPANLIT 298	The Theory and Practice of Japanese Literary Translation	2-5
JAPANLIT 350	Japanese Historical Fiction	3-5
JAPANLIT 377	Seminar: Structure of Japanese	2-4
JAPANLIT 381	Topics in Pragmatics and Discourse Analysis	2-4



- Complete two upper-division or graduate-level courses in two supporting fields, for a total of four courses outside of Japanese literature or linguistics. Supporting fields, to be determined in consultation with the student's primary adviser, may include Japanese anthropology, art, history, philosophy, politics, and religion, Chinese literature, comparative literature, etc.

6.		<b>Units</b>
	JAPANLIT 201 Proseminar: Introduction to Graduate Study in Japanese	2-5

- Pass a comprehensive qualifying examination that tests the candidate's breadth and depth in the primary field of research and methodological competence in the relevant discipline.

- Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter and taking:

9.		<b>Units</b>
	DLCL 301 The Learning and Teaching of Second Languages	3

- Pass the University Oral Examination. General regulations governing the oral examination are found in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this Bulletin. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.

- Submit a dissertation demonstrating ability to undertake original research based on primary and secondary materials in Japanese.

## Doctor of Philosophy in Japanese, Linguistics Track

- Demonstrate proficiency in both modern and classical Japanese language by completing the following courses, or by demonstrating an equivalent level of linguistic attainment by passing the appropriate certifying examinations:

		<b>Units</b>
JAPANLNG 213	Fourth-Year Japanese, Third Quarter	3-5
JAPANLIT 246	Introduction to Premodern Japanese	3-5
JAPANLIT 247	Readings in Premodern Japanese	2-5

- Demonstrate proficiency in at least one supporting language, to be chosen in consultation with the primary adviser according to the candidate's specific research goals. Reading proficiency must be certified through a written examination or an appropriate amount of course work, to be determined on a case-by-case basis. When deemed necessary by the student's adviser(s), working knowledge of a third language may also be required.

- Complete six adviser-approved courses numbered above 200 from among the offerings of the Department of East Asian Languages and Cultures. At least one of these six courses must be an advanced seminar numbered above 300. At least one of these six courses must deal with Japanese literature.

- Complete five upper-division or graduate-level courses in linguistics and other supporting fields. To be determined in consultation with the student's primary adviser, these may include applied linguistics, Chinese linguistics, psychology, education, anthropology, sociology, etc.

- Complete JAPANLIT 279 Research in Japanese Linguistics

- Submit two qualifying papers presenting substantial research in two different subfields of Japanese linguistics.

- Submit an annotated bibliography pertaining to the topic of dissertation.

- Demonstrate pedagogical proficiency by serving as a teaching assistant for a minimum of one quarter and taking DLCL 301 The Learning and Teaching of Second Languages

- Pass the University Oral Examination. The candidate is examined on questions related to the dissertation after acceptable parts of it have been completed in draft form.

- Submit a dissertation demonstrating ability to undertake original research based on primary and secondary materials in Japanese.

## Ph.D. Minor in East Asian Languages and Cultures

A student taking a Ph.D. minor in Chinese or Japanese must complete at least 30 units of work within the department at the 200 and 300 level, chosen in consultation with a department adviser. The student must take either CHINGEN 201 Teaching Chinese Humanities or JAPANLIT 201 Proseminar: Introduction to Graduate Study in Japanese unless the department is satisfied that work done elsewhere has provided similar training. The student must also pass a written examination in the Chinese or Japanese language.

*Emeriti:* (Professors) Albert E. Dien, David S. Nivison, Makoto Ueda, John Wang<sup>1</sup>; (Associate Professor) Susan Matisoff; (Senior Lecturer) Yin Chuang

*Chair:* Ban Wang

*Directors of Graduate Studies:* James Reichert (Japanese), Li Liu (Chinese)

*Directors of Undergraduate Studies:* Yoshiko Matsumoto (Japanese), Haiyan Lee (Chinese)

*Professors:* Steven D. Carter (on leave autumn), Ronald Egan, Li Liu, Yoshiko Matsumoto, Chao Fen Sun, Melinda Takeuchi (East Asian Languages and Cultures, Art and Art History), Ban Wang (East Asian Languages and Cultures, Comparative Literature)

*Associate Professors:* Haiyan Lee, Indra Levy, James Reichert

*Assistant Professors:* Yiqun Zhou, Dafna Zur

*Consulting Professor:* Richard Dasher

*Lecturers:* Paul Festa, Regina Llamas

*Postdoctoral Fellows:* Paul Roquet, Armin Selbitschka

Chinese-Japanese Area Studies Faculty:

*Professors:* Carl W. Bielefeldt (Religious Studies), Gordon Chang (History), Richard Dasher (Center for Integrated Systems), John Kieschnick (Religious Studies), Mark E. Lewis (History), Paul Harrison (Religious Studies), Jean Oi (Political Science), David Palumbo-Liu (Comparative Literature), Gi-Wook Shin (Sociology), Richard Vinograd (Art and Art History), Andrew Walder (Sociology), Kären Wigen (History), Arthur P. Wolf (Anthropology), Lee H. Yearley (Religious Studies), Xueguang Zhou (Sociology)

*Associate Professors:* Jindong Cai (Music), Matthew Sommer (History), Miyako Inoue (Anthropology), Matthew Kohrman (Anthropology), Thomas Mullaney (History)

*Assistant Professors:* Jennifer Adams (Education), Phillip Lipsky (Political Science), Jean Ma (Art and Art History), Yumi Moon (History), Jun Uchida (History)

<sup>1</sup> Recalled to active duty.

## East Asian Studies

### Mission

The Center for East Asian Studies (CEAS) coordinates University instructional, research, and special activities related to China, Japan, and Korea. Faculty and students who share a common interest in the study of

East Asia are brought together by the center from a broad range of academic concerns covering nearly every discipline and historical period. CEAS is part of the Division of International Comparative and Area Studies (<http://ica.stanford.edu>) in the School of Humanities and Sciences. As an East Asia National Resource Center (NRC), supported by the U.S. Department of Education, CEAS serves to strengthen access to and training in the major languages of East Asia, and to broaden East-Asia area studies training across all disciplines.

Courses offered by the Center for East Asian Studies are listed under the subject code EASTASN on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EASTASN&filter-catalognumber-EASTASN=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EASTASN&filter-catalognumber-EASTASN=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EASTASN&filter-catalognumber-EASTASN=on>).

The EASTASN courses listed on ExploreCourses deal primarily with China, Japan, and/or Korea. Literature courses are listed with the subject codes of CHINGEN (<https://explorecourses.stanford.edu/search?filter-term-Autumn=on&filter-term-Summer=on&filter-catalognumber-CHINGEN=on&page=0&catalog=71&q=CHINGEN&filter-coursestatus-Active=on&view=catalog&filter-term-Spring=on&filter-term-Winter=on&collapse=>), CHINLIT (<https://explorecourses.stanford.edu/search?q=CHINLIT&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=>), JAPANGEN (<https://explorecourses.stanford.edu/search?q=JAPANGEN&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=>), and JAPANLIT (<https://explorecourses.stanford.edu/search?q=JAPANLIT&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=>) on ExploreCourses (<http://explorecourses.stanford.edu>). Many other theoretical and methodological courses within departments at Stanford are taught by faculty who are East Asian specialists; these courses often have a substantial East Asian component and a list of current applicable courses from outside departments may be found in the "Master of Arts in East Asian Studies (<http://www.stanford.edu/dept/registrar/bulletin/5824.htm>)" section of this bulletin. For courses in Chinese, Japanese, and Korean language instruction use the subject codes CHINLANG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHINLANG&filter-catalognumber-CHINLANG=on>), JAPANLNG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=JAPANLNG&filter-catalognumber-JAPANLNG=on>), and KORLANG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=KORLANG&filter-catalognumber-KORLANG=on>). For courses in Classical Chinese, search under the subject code CHINLIT (<https://explorecourses.stanford.edu/search?q=CHINLIT&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=>).

## Undergraduate Programs in East Asian Studies

Undergraduates interested in East Asia can become involved by attending CEAS events, taking courses in the subject codes listed above, or earning a Minor or Bachelor of Arts degree in East Asian Studies. These undergraduate degrees in East Asian Studies are now administered by the Department of East Asian Cultures and Languages (p. 357). The Bing Overseas Study Program (<http://bosp.stanford.edu>) also offers study abroad opportunities and internships in East Asia.

For language study, CEAS provides undergraduate fellowships for language study in China, Japan, or Korea; students must simultaneously apply to a pre-approved language program abroad. Applications are due in February each year. Deadlines and application information can be found on the CEAS web site (<http://ceas.stanford.edu/students/fellowships.php>). In addition, undergraduates can obtain a coterminal M.A. degree in East Asian Studies while concurrently working on their undergraduate major by applying during the regular admissions cycle no later than their senior year.

## Graduate Programs in East Asian Studies

### Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in East Asian Studies and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

### Master's Programs

The M.A. program in East Asian Studies is designed both for students who plan to complete a Ph.D. but who have not yet decided on the particular discipline in which they prefer to work, and for students who wish to gain a background in East Asian Studies in connection with a career in nonacademic fields such as business, law, education, journalism, or government service. Students interested in pursuing professional careers are encouraged to plan for additional training through internships or graduate professional programs, in conjunction with obtaining an M.A. in East Asian Studies.

### Doctoral Programs

Stanford does not offer a Ph.D. in East Asian Studies. However, there are more than 100 doctoral students with a specialization on China, Korea, or Japan within various departments and schools of the University. The departments that offer an East Asian concentration are Anthropology, Art and Art History, Comparative Literature, East Asian Languages and Cultures, Economics, Education, History, Linguistics, Music, Political Science, Religious Studies, and Sociology. It is also possible to specialize in East Asia within some of the doctoral programs of the professional schools of Business, Education, and Law. Inquiries should be directed to the individual department or school concerned.

### Postdoctoral Programs

The Center for East Asian Studies offers postdoctoral fellowships in Chinese Studies (<http://ceas.stanford.edu/resources/chinesePostdoctoral.php>) each year. Postdoctoral fellowships in other areas are also available from the Freeman-Spogli Institute of International Studies and the Walter H. Shorenstein Asia-Pacific Research Center.

## Financial Aid

Students in graduate programs who plan to do work in Chinese, Japanese, or Korean language and area studies courses, may be eligible for Foreign Language and Area Studies (FLAS) fellowships and are encouraged to apply for them at the time of application to Stanford. Recipients of FLAS fellowships must be American citizens or permanent residents.

## Master of Arts in East Asian Studies

University requirements for the master's degree are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The master's degree program allows a great deal of flexibility in combining language training, interdisciplinary area studies, and a disciplinary concentration. The director of the center assigns preliminary faculty advisers to all students. Members of the staff and faculty are available for academic and career planning. The M.A. program is normally completed in two academic years, but students can shorten this time by receiving credit for prior language work or by attending summer sessions. Students are urged to complete the degree requirements within one year if their background makes it possible.

Applicants must submit scores for the General Test of the Graduate Record Examination, official transcripts and a writing sample along with their online application. Foreign applicants are also required to take the Test of English as a Foreign Language (TOEFL). Applications for admission and financial aid should be made online; see the Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/eastasianstudies/http://gradadmissions.stanford.edu>) web site. The deadline for submitting applications for the 2013-2014 academic year is December 11, 2012.

## Coterminal Bachelor's and Master's Program in East Asian Studies

The center admits a limited number of Stanford undergraduates to work for a coterminal M.A. degree in East Asian Studies. Applications are accepted once a year during the regular CEAS M.A. application cycle. The deadline for the 2013-14 academic year is December 11, 2012. Students may apply after completing 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree. Applicants are expected to meet the same standards as those seeking admission to the M.A. program, and they must submit the following directly to the Center's office:

- a completed coterminal application form (<http://registrar.stanford.edu/pdf/CotermApplic.pdf>)
- a written statement of purpose (<http://studentaffairs.stanford.edu/gradadmissions/applying/statement>)
- an unofficial Stanford transcript
- three letters of recommendation, at least two of which should be from members of the department of concentration
- first 15 pages of a representative writing sample (seminar paper, term paper, honors thesis, journal article, etc.). Do not submit more than 15 pages.
- copy of scores from the General Test of the Graduate Record Exam (official score should be sent to Stanford's school code 4704)
- a list of courses the applicant intends to take to fulfill degree requirements.

Coterm applications are reviewed along with peer applications by the M.A. Admissions Committee of the Center for East Asian Studies (CEAS) (<http://ceas.stanford.edu/admissions/apply.php>).

Students must meet all requirements for both B.A. and M.A. degrees. They must complete a total of 15 full-time quarters or the equivalent, or three full quarters after completing 180 units for a total of 225 units. Cotermers are not eligible for University financial aid, but are eligible to apply for Foreign Language and Area Studies (FLAS) Fellowships (<http://ceas.stanford.edu/students/fellowships.php>) administered by CEAS.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4874.htm>)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Registrar's (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Degree Requirements

### Language Requirement

Students must complete the equivalent of Stanford's first three full years of language training in Chinese, Japanese, or Korean. Students entering the program without any language preparation should complete first- and second-year Chinese, Japanese, or Korean within the first year of residence at Stanford if they intend to graduate within two years (this would necessitate completing a summer language program). All language courses taken at Stanford used towards fulfilling the language requirement must be for letter grades. Conversation classes cannot be used for meeting this requirement, and units from the language courses numbered 1-99 do not count toward the 46 units required for the degree. Language courses numbered 100 and above can be used towards meeting the 46 units minimum for the degree, but cannot be used towards fulfilling the content courses requirement unless the language course is at the fourth-year level or above, and the student is specializing in literature.

The language requirement may be satisfied in part or in full by placing into an appropriate Stanford language class through the language proficiency exam given by the Language Center. Students who fulfill this minimum three-year language requirement before completing other requirements are encouraged to continue language study, or take courses in which Chinese, Japanese, or Korean are used, for as long as they are in the program. Please note that the language used to meet the three year language proficiency requirement should match the student's country/region of focus. Students in the M.A. program are also eligible to apply for the Inter-University language programs in Beijing and Yokohama. Work completed in one of these programs may be counted toward the M.A. degree's language requirement. Language courses are listed in the bulletin under the following subject codes on the Stanford Bulletin's ExploreCourses web site: CHINLANG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHINLANG&filter-catalognumber-CHINLANG=on>), JAPANLNG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=JAPANLNG&filter-catalognumber-JAPANLNG=on>), and KORLANG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=KORLANG&filter-catalognumber-KORLANG=on>).

## M.A. Thesis Requirement

A master's thesis, representing a substantial piece of original research, should be filed with the center's program office as part of the graduation requirements. With the adviser's approval, the master's thesis requirement may be satisfied by expanding a research paper written for an advanced course, and should have a minimum of 10,000 words in the main body of the thesis (excluding references, citations, appendices, etc.). The M.A. thesis is due at noon on the last day of classes, of the quarter in

which the student applies to graduate. Please see the Academic Calendar (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/eastasianstudies/studentaffairs.stanford.edu/registrar/academic-calendar>) for specific dates.

## Area Studies and Unit Requirements

Students must complete a minimum total of 46 units for the degree at Stanford, comprised of:

1. 1-unit core course, EASTASN 330 Core Seminar: Issues and Approaches in East Asian Studies
2. At least 9 additional approved content courses (listed below) related to East Asia meeting the following criteria:
  - A. Taken for a letter grade
  - B. Taken for 3 units or more
  - C. Do not count as part of the language requirement (language courses beyond third-year level are accepted for students specializing in literature)
  - D. At least 23 units at 200 level or above (above 300 level for HISTORY courses), remaining units at 100 level or above (above 200 for HISTORY courses). In general, M.A. students should register for classes with the higher course number (for example, graduate students should register for EASTASN 217 Health and Healthcare Systems in East Asia and undergraduates should register for EASTASN 117 Health and Healthcare Systems in East Asia if the class is open to both graduate students and undergraduates).
  - E. At least 3 of the 9 course must be either in the same department or within the same thematic focus across several departments (see sample themes below). 1 of these 3 courses must be an advanced seminar (200 level or above) that requires a research paper related to East Asia. Students must submit the syllabus of the seminar they take to the student services coordinator at CEAS to be kept with the department student file in order to show fulfillment of the requirement.
3. Additional courses as necessary to reach the minimum 46 units for the degree meeting the following criteria:
  - A. Taken for a letter grade
  - B. At least level 100 or above (above 200 for HISTORY courses)
  - C. Must be an academic content course - such as a lecture, seminar, or colloquium (no activity courses, EFS language classes, etc.). Language classes are okay if the course number is above level 100 and it is taken for a letter grade.
4. The cumulative grade point average (GPA) for all courses must be 3.0 or higher; grades for the 9 content courses plus the 1-unit core course must be a 'B' or higher.

## Sample Theme 1

	Units
ANTHRO 253A Population and social trends in Japan	3-5
HISTORY 392D Japan in Asia, Asia in Japan	4-5
HISTORY 396D Modern Japan	4-5

## Sample Theme 2

	Units
HISTORY 392 The Two Koreas	5
KORGEN 201 Korean Culture in the New Millennium	4
EASTASN 290K Law and Society in South Korea	3

## Sample Theme 3

		Units
IPS 246	China on the World Stage	3-5
POLISCI 340L	China in World Politics	5
POLISCI 348	Chinese Politics: The Transformation and the Era of Reform	5

## Course Petitions and Directed Reading

Some theory-oriented or methodological courses may be used to meet part of the 9 courses requirements, provided that they are demonstrably useful for understanding East Asian problems. A course petition (<http://ceas.stanford.edu/students/forms.php>) and syllabus must be submitted no later than the end of the second week of the quarter in which the course is offered. Students are limited to 3 petitions total. Credit toward the area studies requirement is not given for courses taken before entering the M.A. program, however students may take courses for exchange credit at the University of California, Berkeley, with the approval of their adviser and the Office of the University Registrar.

Students may choose to do a directed reading course with a faculty member if the current course offerings do not meet a particular research or study need. Directed reading courses are independent study projects a student may undertake with a relevant Stanford faculty member. Once the student has found a faculty member to support his or her studies, the student must inform the Student Services Coordinator immediately so that the appropriate section can be added for EASTASN 300. The limitations for directed reading units are:

1. A maximum of 10 units may apply towards the general degree requirements
2. A maximum of 5 units may apply toward the 23 units of graduate-level work
3. If applying the units to the 9 courses requirement, the student must submit a detailed syllabus.
4. Taken for a letter grade

## Approved Content Courses

Because East Asian Studies is an interdisciplinary major, the majority of the courses that apply towards the degree are listed under other departments. In addition to courses listed under the EASTASN subject code, students should check the list below, as well as on the Stanford Bulletin's ExploreCourses site (<http://explorecourses.stanford.edu>) for courses in other departments that will meet the degree requirements for East Asian Studies; such departments include (but are not limited to) Anthropology, East Asian Languages and Cultures, History, Political Science, Religious Studies, and Sociology. Not all courses offered by other departments that have East Asia content may be listed below or on the CEAS web site. If there is a course not listed here that has East Asia content, check with the Center for East Asian Studies to verify whether or not it can be used to fulfill the degree requirements.

The following course list represents courses that may, with the adviser's approval, be used to fulfill degree requirements (please see the Law School (<http://www.law.stanford.edu/organizations/offices/office-of-the-registrar/stanford-non-law-student-course-registration>) or GSB (<https://gsbapps.stanford.edu/nongsbreg>) web sites for instructions on how to enroll in their courses):

	Units
AUTUMN QUARTER	
ARTHIST 184 Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting	4

ARTHIST 288B	The Enduring Passion for Ink: Contemporary Chinese Ink Painting	5	CHINGEN 219	Popular Culture and Casino Capitalism in China	3-4
CHINGEN 233	Literature in 20th-Century China	4-5	CHINGEN 240	Chinese Justice: Law, Morality, and Literature	3-5
CHINGEN 235	Chinese Bodies, Chinese Selves	3-5	CHINGEN 243	Images of Women in Ancient China and Greece	4
CHINGEN 241	Emergence of Chinese Civilization from Caves to Palaces	3-4	CHINGEN 260	New Directions in the Study of Poetry and Literary Culture	4
CHINGEN 269	A History of Chinese Drama	3-4	CHINLIT 206	Beginning Classical Chinese, Second Quarter	2-5
CHINGEN 294	The History and Culture of Peking Opera	3-4	CHINLIT 223	Advanced Classical Chinese: Literary Essays	2-5
CHINLIT 205	Beginning Classical Chinese, First Quarter	2-5	CHINLIT 266	Chinese Ci Poetry (Song Lyrics)	4
CHINLIT 273	Chinese Drama	2-4	CHINLIT 369	Late Imperial Chinese Fiction	2-5
CHINLIT 371	Aesthetics, Politics, and Literary Criticism: East and West	2-5	COMPLIT 147B	From Greece to Tahrir Square: The Rhetoric of Democracy	3-5
COMM 277Y	Specialized Writing and Reporting: Foreign Correspondence in the Middle East and Asia	4	EASTASN 217	Health and Healthcare Systems in East Asia	3-5
EASTASN 300	Graduate Directed Reading (Offered every quarter)	1-7	EASTASN 290K	Law and Society in South Korea	3
EASTASN 330	Core Seminar: Issues and Approaches in East Asian Studies	1	EDUC 306D	World, Societal, and Educational Change: Comparative Perspectives	4-5
EDUC 202	Introduction to Comparative and International Education	4-5	FILMSTUD 210N	Darkness in Light: The Filmic Imagination of Horror	3
EDUC 306A	Economics of Education in the Global Economy	5	GSBGEN 336	Energy Markets and Policy	4
EDUC 306Y	Economic Support Seminar for Education and Economic Development	1	HISTORY 290E	Movies and Empire in East Asia	5
FILMSTUD 316	International Documentary	4	HISTORY 356	U.S.-China Relations: From the Opium War to Tiananmen	4-5
FILMSTUD 436	Chinese Cinema	5	HISTORY 390E	Movies and Empire in East Asia	5
HISTORY 291F	Yangtze: Nature, History, and the River	5	HISTORY 391G	Pre-Modern Chinese Warfare	3-5
HISTORY 289	The Indian Ocean World: Winds, Merchants & Empires	5	HISTORY 392D	Japan in Asia, Asia in Japan	4-5
HISTORY 391K	Speaking Through Objects: Material Culture in Late Imperial China, 1550-1820	5	HISTORY 393B	Homosexuality in Historical and Comparative Perspective	4-5
HISTORY 393C	Late Imperial China	4-5	HISTORY 496A	Graduate Research Seminar in Modern Chinese History	4-5
HISTORY 395F	Race and Ethnicity in East Asia	4-5	JAPANGEN 221	Translating Japan, Translating the West	3-4
HISTORY 395G	Lost in Translation: Nineteenth Century Japan	5	JAPANGEN 251	Japanese Business Systems	3-5
HISTORY 396D	Modern Japan	4-5	JAPANLIT 270	The Tale of Genji and Its Historical Reception	4
IPS 230	Democracy, Development, and the Rule of Law	5	JAPANLIT 287	Pictures of the Floating World: Images from Japanese Popular Culture	5
IPS 245	An Introduction to Theories of Authoritarian Resilience and Vulnerability	3-5	JAPANLIT 396	Seminar: Modern Japanese Literature	2-5
IPS 264	Behind the Headlines: An Introduction to Contemporary South Asia	3-5	PEDS 226	Famine in the Modern World	3
JAPANGEN 184	Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting	4	POLISCI 348	Chinese Politics: The Transformation and the Era of Reform	5
JAPANGEN 237	Classical Japanese Literature in Translation	4	POLISCI 443S	Political Economy of Reform in China	5
JAPANGEN 287	Romance, Desire, and Sexuality in Modern Japanese Literature	3-4	RELIGST 212	Chuang Tzu	5
JAPANLIT 279	Research in Japanese Linguistics	2-4	RELIGST 347	Chinese Buddhist Texts	3-5
JAPANLIT 296	Modern Japanese Literature	2-5	RELIGST 358	Japanese Buddhist Texts	3-5
POLISCI 314D	Democracy, Development, and the Rule of Law	5	SOC 309	Nations and Nationalism	4-5
POLISCI 340L	China in World Politics	5	SPRING QUARTER		
RELIGST 113B	Japanese Religion Through Film	4	ARTHIST 287A	The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime	5
RELIGST 219A	Death and the Afterlife in Buddhism	2-5	ARTHIST 489	Connoisseurship Studies of Chinese Painting, Calligraphy, and Seals	5
SOC 214	Economic Sociology	5	CHINGEN 218	Constructing National History in East Asian Archaeology	3-5
TAPS 153S	Japanese Theater: Noh to Contemporary Performance	4	CHINGEN 250	Sex, Gender, and Power in Modern China	3-5
WINTER QUARTER			CHINLIT 207	Beginning Classical Chinese, Third Quarter	2-5
AMSTUD 261B	East Goes West: Transnational Asia/Pacific Spatial Geographies	5	EASTASN 289K	Changing North Korean Society	3
ARTHIST 287	Pictures of the Floating World: Images from Japanese Popular Culture	5	EDUC 306B	Politics, Policy Making, and Schooling Around the World	3-4
CHINGEN 173	Chinese Language, Culture, and Society	4	EDUC 309X	Educational Issues in Contemporary China	3-4
			FILMSTUD 235	Emotions of Japanese Cinema (Postindustrial Version)	4
			FILMSTUD 333	Contemporary Chinese Auteurs	4

HISTORY 290B	Tibet: A Place in Time	5
HISTORY 295J	Chinese Women's History	5
HISTORY 391D	Colonialism and Collaboration in East Asia	5
HISTORY 391E	Maps, Borders, and Conflict in East Asia	4-5
HISTORY 392G	Modern Korea	4-5
HISTORY 395J	Gender and Sexuality in Chinese History	4-5
HISTORY 496B	Graduate Research Seminar in Modern Chinese History	4-5
HISTORY 498C	Japanese Imperial Archives, Part 1	4-5
IPS 244	U.S. Policy toward Northeast Asia	5
IPS 246	China on the World Stage	3-5
JAPANGEN 225	Emotions of Japanese Cinema (Postindustrial Version)	4
JAPANGEN 238	Introduction to Modern Japanese Literature and Culture	3-4
JAPANGEN 241	Japanese Performance Traditions	3-4
JAPANGEN 287A	The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime	5
JAPANLIT 246	Introduction to Premodern Japanese	3-5
JAPANLIT 257	Points in Japanese Grammar	2-4
JAPANLIT 276	Modern Japanese Short Stories	2-4
LAW 245	China Law and Business	3
LINGUIST 284A	Writing Systems in a Digital Age	2-3
MATSCI 159Q	Japanese Companies and Japanese Society	3
POLISCI 218J	Japanese Politics and International Relations	5
RELIGST 150	The Lotus Sutra: Story of a Buddhist Book	4
RELIGST 315	Third Bhavanakrama & the Writings of Héshang Moheyan: Scripture in Buddhist Scholastic Polemics	3-5
SOC 267A	Asia-Pacific Transformation	5
SUMMER QUARTER		
HISTORY 498D	Japanese Imperial Archives, Part 2	4-5
MS&E 249	Economic Growth and Development	3

## Joint and Dual Degree Programs in East Asian Studies

### East Asian Studies and Law

This joint degree program grants an M.A. degree in East Asian Studies and a Doctor of Jurisprudence (J.D.) degree. It is designed to train students interested in a career in teaching, research, or the practice of law related to East Asian legal affairs. Students must apply separately to the East Asian Studies M.A. program and to the Stanford School of Law and be accepted by both. Completing this combined course of study requires approximately four academic years, depending on the student's background and level of training in Chinese, Japanese, or Korean. Up to 45 units of approved courses may be counted towards both degrees. For more information, see the "Joint Degree Programs (<http://www.stanford.edu/dept/registrar/bulletin/7376.htm>)" section of this bulletin and the Stanford Law School's web site (<http://www.law.stanford.edu/degrees/joint>). Students who have been accepted by both programs should consult with the departments to determine which courses can be double-counted.

### East Asian Studies and Education

This dual degree program grants an M.A. degree in East Asian Studies and a secondary school teaching credential in social studies. To be eligible for this program, students should apply to the M.A. program in East Asian

Studies and then apply to the Stanford Teacher Education Program during the first year at Stanford. Completing the dual program requires at least two years, including one summer session when beginning the education component of the program. Admissions processes for both programs are completely independent of each other and units from courses can only be applied to one degree or the other, not both.

## East Asian Studies and Business

This dual degree program grants an M.A. degree in East Asian Studies and a Master of Business Administration degree. Students must apply separately to the East Asian Studies M.A. program and the Graduate School of Business and be accepted by both. Completing this combined course of study requires approximately three academic years (perhaps including summer sessions), depending on the student's background and level of training in Chinese, Japanese, or Korean language. Admissions processes for both programs are completely independent of each other and units from courses can only be applied to one degree or the other, not both.

*Director:* Gordon Chang

*Affiliated Faculty and Staff:*

*Anthropology:* Harumi Befu (emeritus), Lisa M. Curran, Miyako Inoue, Matthew Kohrman (on leave), Sylvia Yanagisako

*Art and Art History:* Jean Ma, Melinda Takeuchi, Richard Vinograd (on leave), Xiaozhe Xie

*Biology:* Marcus W. Feldman

*Business:* Hau Lee, William F. Miller (emeritus), John Roberts (emeritus), Kenneth Singleton

*Center for International Security and Cooperation:* Undraa Agvaanlvsan, Chaim Braun

*Civil and Environmental Engineering:* David Freyberg, Renate Fruchter, Leonard Ortolano (on leave Autumn)

*Communications:* James Fishkin

*Comparative Literature:* David Palumbo-Liu

*Earth Sciences:* Stephan Graham, Rosamond L. Naylor

*East Asian Languages and Cultures:* Steven Carter (on leave Autumn), Richard Dasher, Albert E. Dien (emeritus), Ronald Egan, Paul Festa, Haiyan Lee, Indra Levy, Mark E. Lewis, Li Liu, Regina Llamas, Yoshiko Matsumoto, David S. Nivison (emeritus), James Reichert, Paul Roquet (postdoctoral fellow), Armin Selbitschka (postdoctoral fellow), Chao Fen Sun, Melinda Takeuchi, Makoto Ueda (emeritus), Ban Wang, John C. Y. Wang (emeritus), Yiqun Zhou, Dafna Zur

*East Asian Studies:* Karen Eggleston, LeRon J. Harrison (postdoctoral fellow), Scott Rozelle (on leave), Yulian Wu (postdoctoral fellow)

*Economics:* Masahiko Aoki (emeritus), Ronald McKinnon (emeritus)

*Education:* Jennifer Adams, Anthony L. Antonio, Martin Carnoy, Francisco Ramirez, Christine M. Wotipka

*Electrical Engineering:* Richard Dasher

*Freeman Spogli Institute for International Studies:* Thomas Fingar

*History:* Gordon Chang, Peter Duus (emeritus), Mark E. Lewis, Mark Mancall (emeritus), Yumi Moon, Thomas Mullaney, Matthew Sommer, Jun Uchida, Lyman P. Van Slyke (emeritus), Kären Wigen

*Ho Center for Buddhist Studies:* Irene Lin, Tenzin Tethong

*Hoover Institution:* Richard Allen, Scott W. Atlas, Larry Diamond, Thomas Henriksen, Alex Inkeles, Tai-Chun Kuo, Hsiao-ting Lin, Alice L. Miller, Robert Myers, Toshio Nishi, Mark Peattie, William Perry, Alvin Rabushka, William Ratliff, Henry Rowen, Charles Wolf Jr.

*Human Biology:* Arthur P. Wolf

*Law:* Eric Feldman, Thomas Heller (emeritus), Erik Jensen

*Linguistics:* Daniel Jurafsky (on leave)

*Management Science and Engineering:* Siegfried S. Hecker, Pamela Hinds, Edison Tse, Yinyu Ye

*Materials Science and Engineering:* Robert Sinclair

*Medicine:* David Katzenstein, Samuel LeBaron (emeritus)

*Music:* Jingdong Cai, Jaroslaw Kapuscinski (on leave), Stephen Sano, Linda Uyechi, Hui Daisy You

*Political Science:* Masahiko Aoki (emeritus), Phillip Lipsy, Jean C. Oi

*Religious Studies:* Carl Bielefeldt, Paul Harrison, Irene Lin, David S. Nivison (emeritus)

*Shorenstein APARC:* Michael Armacost, Rafiq Dossani, Karen N. Eggleston, Donald K. Emmerson, Scott Rozelle (on leave)

*Sociology:* Gi-Wook Shin, Andrew Walder (on leave Autumn 2012), Xueguang Zhou (on leave Autumn 2012)

*Stanford Language Center:* Marina Chung, Robert Clark, Sik Lee Dennig, Michelle DiBello, Hee-sun Kim, Nina Lin, Hisayo O. Lipton, Momoyo Kubo Lowdermilk, Emiko Yasumoto Magnani, Kiyomi Nakamura, Michelle Rogoyski, Yu-hwa Liao Rozelle, Momoe Saito-Fu (Winter and Spring only), Su Kyung Seo, Le Tang, Yoshiko Tomiyama, Huazhi Wang, Hong Zeng, Youping Zhang, Xiaofang Zhou, Xiaiya Zhu

## Economics

Courses offered by the Department of Economics are listed under the subject code ECON on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ECON&filter-catalognumber-ECON=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ECON&filter-catalognumber-ECON=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ECON&filter-catalognumber-ECON=on>).

The department's purpose is to acquaint students with the economic aspects of modern society, to familiarize them with techniques for the analysis of contemporary economic problems, and to develop in them an ability to exercise judgment in evaluating public policy. There is training for the general student as well as for those who plan careers as economists in civil service, private enterprise, teaching, or research.

The department's curriculum is an integral part of Stanford's programs in International Relations, Public Policy, and Urban Studies.

The faculty interests and research cover a wide spectrum of topics in most fields of economics, including behavioral economics, comparative institutional analysis, econometrics, economic development, economic history, experimental economics, industrial organization, international trade, labor, macro- and microeconomic theory, mathematical economics, environmental economics, and public finance.

## Mission of the Undergraduate Program in Economics

The mission of the undergraduate program in Economics is to acquaint students with the economic aspects of modern society, to familiarize them with techniques for the analysis of contemporary economic problems, and to develop in them an ability to exercise judgment in evaluating public policy. The program introduces students to macro- and microeconomic theory, teaches them to think and write clearly about economic problems and policy issues and to apply the basic tools of economic analysis. The undergraduate major provides an excellent background for those who plan

careers in government and private enterprise as well as those pursuing graduate degrees in professional schools or in the field of economics.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. understanding of core knowledge within Economics.
2. ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
3. ability to write clearly and persuasively and communicate ideas clearly.
4. ability to evaluate theory and critique research within the discipline.

## Graduate Programs in Economics

The primary objective of the graduate program is to educate students as research economists. In the process, students also acquire the background and skills necessary for careers as university teachers and as practitioners of economics. The curriculum includes a comprehensive treatment of modern theory and empirical techniques. Currently, 20 to 25 students are admitted each year.

Graduate programs in economics are designed to ensure that students receive a thorough grounding in the methodology of theoretical and empirical economics, while at the same time providing specialized training in a wide variety of subfields and a broad understanding of associated institutional structures. Toward these ends, the program is arranged so that the student has little choice in the curriculum at the outset but considerable latitude later on.

Students admitted to graduate standing in the department are expected to have a strong background in college-level economics, mathematics, and statistics. Preparation ordinarily consists of a college major in economics, a year-long calculus sequence that includes multivariate analysis, a course in linear algebra, and a rigorous course in probability and statistics.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Economics and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Economics. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Economics and to interpret and present the results of such research.

## Graduate Fields

### A. Economic Development

To receive credit for this field, students must complete two courses from:

		<b>Units</b>
ECON 215	Economic Development	2-5
ECON 216	Development Economics III	2-5
ECON 217	Topics in International Macroeconomics: Theory and Evidence for Latin America:	2-5

and submit a paper from one of these courses

Students wishing to do research in the field are advised to take courses in international economics, such as ECON 266 International Economics II, and in comparative institutional analysis.

## B. Economic History/Institutions

The requirement for the field is one research paper on a subject approved by one of the faculty teaching any of the following courses:

		<b>Units</b>
ECON 225	Economics of Technology and Innovation	2-5
ECON 226	U.S. Economic History	2-5
ECON 227	European Economic History	2-5
ECON 228	Institutions and Organizations in Historical Perspective	2-5

## C. Monetary Theory and Advanced Macroeconomics

Requirements for this field are completion of two courses from:

		<b>Units</b>
ECON 233	Advanced Macroeconomics I	2-5
ECON 235	Advanced Macroeconomics III	2-5
ECON 236	Financial Economics I	2-5
ECON 237	Financial Economics II	2-5

## D. Public Finance

To receive credit for the field, students must complete ECON 241 Public Finance and Taxation I and ECON 242 Public Finance and Taxation II by passing the final examinations, and submit an acceptable research paper on a topic approved by the instructor for either course.

## E. Economics of Labor

To receive credit for this field, students must complete two courses from:

		<b>Units</b>
ECON 246	Labor Economics I	2-5
ECON 247	Labor Economics II	2-5
ECON 248	Labor Economics III	2-5

## F. Economics of Industry

To receive credit for the field, students must complete ECON 257 Industrial Organization 1 and ECON 258 Industrial Organization 2A and submit one research paper, the subject of which has been approved in advance by one of the faculty teaching:

		<b>Units</b>
ECON 257	Industrial Organization 1	2-5
ECON 258	Industrial Organization 2A	2-5
ECON 259	Industrial Organization II B	2-5
ECON 260	Industrial Organization III	2-5

## G. International Economics

To receive credit for this field, students must complete two courses from:

		<b>Units</b>
ECON 265	International Economics I	2-5

ECON 266	International Economics II	2-5
ECON 267	Topics in International Trade (recommended)	2-5

A research paper from any of these courses must also be submitted.

## H. Econometrics

A student may satisfy the requirements for the econometrics field by completing two courses from the following:

		<b>Units</b>
ECON 273	Advanced Econometrics I	2-5
ECON 275	Time Series Econometrics	2-5
ECON 276	Limited Dependent Variables	2-5

## I. Microeconomic Theory

To receive credit for this field, students must complete two courses from the following:

		<b>Units</b>
ECON 282	Contracts, Information, and Incentives	2-5
ECON 283	Theory and Practice of Auction Market Design	2-5
ECON 289	Advanced Topics in Game Theory and Information Economics	2-5
ECON 291	Social and Economic Networks	2-5

## J. Environmental Economics

To receive credit for this field, students must complete:

		<b>Units</b>
ECON 250	Environmental Economics	2-5
ECON 251	Natural Resource and Energy Economics	2-5

Students can petition to substitute another environment/natural resource course for either of these.

## Other Programs

Other programs leading to dual degrees may be arranged. For example, the Ph.D. in Economics combines with one or two years of study in the School of Law, leading to the nonprofessional Master of Legal Studies (M.L.S.) degree. A dual degree program does not permit counting any courses toward both the Economics and the Law degrees. For more information, see the Degrees & Joint Degrees (<http://www.law.stanford.edu/program/degrees>) web site.

## Fellowships and Assistantships

The department awards a number of fellowships for graduate study. Many first-year and a few second- or third-year students are typically awarded full fellowships, including a stipend and tuition. All students whose records justify continuation in the program may be assured support for the second through fourth years in the form of employment as a teaching or research assistant. These half-time appointments provide a stipend and tuition allowance. Entering students are not normally eligible for research or teaching assistantships.



# Joint Degree Programs in Economics with the School of Law

## J.D./M.A. AND J.D./PH.D.

The Department of Economics and the School of Law offer a joint program leading to either a J.D. degree combined with an M.A. degree in Economics, or to a J.D. degree combined with a Ph.D. in Economics.

The J.D./M.A. and J.D./Ph.D. degree programs are designed for students who wish to prepare themselves for careers in areas relating to both law and economics. Students interested in either joint degree program must apply and gain entrance separately to the School of Law and the Department of Economics and, as an additional step, must secure permission from both academic units to pursue degrees in those units as part of a joint degree program. Interest in either joint degree program should be noted on the student's admission applications and may be considered by the admission committee of each program. Alternatively, an enrolled student in either the Law School or the Economics department may apply for admission to the other program and for joint degree status in both academic units after commencing study in either program.

Joint degree students may elect to begin their course of study in either the School of Law or the Department of Economics. Faculty advisers from each academic unit participate in the planning and supervising of the student's joint program. Students must be enrolled full time in the Law School for the first year of law school, and, at some point during the joint program, may be required to devote one or more quarters largely or exclusively to studies in the Economics program regardless of whether enrollment at that time is in the Law School or in the Department of Economics. At all other times, enrollment may be in the graduate school or the Law School, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. and the M.A. or Ph.D. degrees as specified in this bulletin or by the School of Law.

The Law School approves courses from the Economics Department that may count toward the J.D. degree, and the Economics department approves courses from the Law School that may count toward the M.A. or Ph.D. degree in Economics. In either case, approval may consist of a list applicable to all joint degree students or may be tailored to each individual student's program. The list may differ depending on whether the student is pursuing an M.A. or a Ph.D. in Economics.

In the case of a J.D./M.A. program, no more than 45 quarter hours of approved courses may be counted toward both degrees. In the case of a J.D./Ph.D. program, no more than 54 quarter hours of approved courses may be counted toward both degrees. In either case, no more than 36 quarter hours of courses that originate outside the Law School may count toward the Law degree. To the extent that courses under this joint degree program originate outside the Law School but count toward the Law degree, the Law School credits permitted under Section 17(1) of the Law School Regulations shall be reduced on a unit-per-unit basis, but not below zero. The maximum number of Law School credits that may be counted toward the M.A. or the Ph.D. in Economics is the greater of: (a) 5 quarter hours in the case of the M.A. and 10 quarter hours in the case of the Ph.D.; or (b) the maximum number of hours from courses outside of the department that M.A. or Ph.D. candidates in Economics are permitted to count toward the applicable degree under general departmental guidelines or in the case of a particular student's individual program.

Tuition and financial aid arrangements are normally made through the school in which the student is then enrolled.

For more information, see the Degrees & Joint Degrees (<http://www.law.stanford.edu/program/degrees>) web site.

# Bachelor of Arts in Economics

The total number of units required for the major is 80. Students are encouraged to complete the core courses 1-7 below, as early as possible. Ideally, students should complete the core during the sophomore year, before taking upper division courses. Courses may not be taken before the prerequisites are completed. The required number of field courses is four. There is great flexibility in the choice of electives, including upper-division math and statistics.

Of the 80 units required for the major, at least 55 must be taken at Stanford in California. Students cannot declare Economics as their major or minor until they have completed ECON 50 Economic Analysis I with a grade of 'B' or better. All courses required for the economics major must be taken for a letter grade.

## Requirements for the Economics Major (80 Units)

		Units
ECON 1A	Introductory Economics A	5
ECON 1B	Introductory Economics B (Prerequisite: ECON 1A)	5
ECON 50	Economic Analysis I (Prerequisites: ECON 1A and MATH 51 (letter grade required))	5
ECON 51	Economic Analysis II (Prerequisite: ECON 50)	5
ECON 52	Economic Analysis III (Prerequisites: ECON 50 and 1B)	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists (Prerequisite: MATH 41 or equivalent) <sup>1</sup>	5
ECON 102B	Introduction to Econometrics (Prerequisites: ECON 50 and 102A) <sup>2</sup>	5

<sup>1</sup> It is recommended that students satisfy this basic statistics requirement before proceeding with the rest of the program.

<sup>2</sup> Material in ECON 102B Introduction to Econometrics is used in a number of field courses. Students are advised to design their program of study so that ECON 102B Introduction to Econometrics is not taken in their senior year but early in their program.

## Field Courses

Must be taken at Stanford in California; 20 units.

	Units
Select four of the following:	20
ECON 102C Advanced Topics in Econometrics (waiting for this course to load from PS)	
ECON 111 Money and Banking	
ECON 113 Economics of Innovation (not offered this year)	
ECON 118 Development Economics	
ECON 126 Economics of Health and Medical Care	
ECON 128 Economic Development: A Historical Perspective	
ECON 136 Market Design <sup>1</sup>	
ECON 137 Decision Modeling and Information <sup>2</sup>	
ECON 140 Introduction to Financial Economics <sup>3</sup>	
ECON 141 Public Finance and Fiscal Policy	
ECON 145 Labor Economics	
ECON 146 Economics of Education	

ECON 147	Economics of Human Resources
ECON 149	The Modern Firm in Theory and Practice
ECON 153	Economics of the Internet
ECON 155	Environmental Economics and Policy
ECON 157	Imperfect Competition
ECON 158	Regulatory Economics
ECON 160	Game Theory and Economic Applications <sup>4</sup>
ECON 164	Law, Economics and Politics of International Trade
ECON 165	International Finance (not offered this year)
ECON 166	International Trade
ECON 179	Experimental Economics
ECON 180	Honors Game Theory <sup>4</sup>
ECON 181	Honors Information and Incentives <sup>2</sup>
ECON 182	Honors Market Design <sup>1</sup>

- <sup>1</sup> Students may not count units from both ECON 136 Market Design and ECON 182 Honors Market Design towards their field course requirements as the courses cover similar subject matter.
- <sup>2</sup> Students may not count units from both ECON 137 Decision Modeling and Information and ECON 181 Honors Information and Incentives towards their field course requirements as the courses cover similar material.
- <sup>3</sup> Students may not count units from both ECON 135 Finance for Non-MBAs and ECON 140 Introduction to Financial Economics towards their major as the courses are too similar in content.
- <sup>4</sup> Students may not count units from both ECON 160 Game Theory and Economic Applications and ECON 180 Honors Game Theory towards their field course requirements as the courses cover similar subject matter.

## Writing in the Major Course

Must be taken at Stanford in California; 5 units. This course should be taken only after completing ECON 51 Economic Analysis II and ECON 52 Economic Analysis III, ECON 102B Introduction to Econometrics, and at least two field courses.

		Units
ECON 101	Economic Policy Analysis	5

## Electives

20 units; choose from ECON courses numbered from 100 through 198, excluding ECON 190 Introduction to Financial Accounting and ECON 191 Introduction to Cost Accounting.

Up to 10 units may be satisfied by:

		Units
MATH 113	Linear Algebra and Matrix Theory	3
MATH 115	Functions of a Real Variable	3
MATH 136	Stochastic Processes	3
MATH 151	Introduction to Probability Theory	3
MATH 171	Fundamental Concepts of Analysis	3
MATH 175	Elementary Functional Analysis	3
STATS 200	Introduction to Statistical Inference	3
STATS 206	Applied Multivariate Analysis	3
STATS 207	Introduction to Time Series Analysis	3
STATS 217	Introduction to Stochastic Processes	3
STATS 218	Introduction to Stochastic Processes	3
STATS 237	Theory of Investment Portfolios and Derivative Securities	3

A maximum of 10 units of transfer credit OR of ECON 139D Directed Reading, Directed Reading, may be taken under this section. Suitable transfer credit must be approved in writing by the Associate Director of Undergraduate Studies. Advanced undergraduate majors with strong quantitative preparation may enroll in graduate (200-level) courses with permission of the Director of Undergraduate Studies and the course instructor. Some courses offered by Overseas Studies may be counted towards this requirement. The department does not give credit for internships.

## Other Requirements

No courses receiving Department of Economics credit under the preceding requirements may be taken credit/no credit, and 55 of the 80 units required for the major must be taken at Stanford in California.

Students scoring a 5 on both the advanced placement microeconomics and advanced placement macroeconomics exam may petition the Director of Undergraduate Studies to have the ECON 1A Introductory Economics A (but not ECON 1B Introductory Economics B) course requirement waived. Students do not receive units credit for placing out of ECON 1A Introductory Economics A.

A grade point average (GPA) of 2.0 (C) or better must be received for all units applied toward the preceding requirements.

To use transfer credit in partial satisfaction of the requirements, the student must obtain written consent from the department's Associate Director of Undergraduate Study, who establishes the amount of credit to be granted toward the department requirements (see the Information Book for Economics Majors). Students must have completed all Stanford prerequisites for approved transfer credit courses in order to use those courses towards the Economics major.

Course prerequisites are enforced. Students taking courses to satisfy prerequisites in another department or institution must petition for Stanford course substitution or transfer credit approval in order to satisfy course prerequisites.

The time limit for satisfactory completion of a course is one year from the date an incomplete is given, although instructors may set a shorter time limit. Students are responsible for seeing that all grades of 'incomplete' are cleared within the time limit.

## Sample Programs

Sample listings of upper-division economics electives may be examined in the department's Information Book for Economics Majors (<http://economics.stanford.edu/undergraduate>). Sample programs are provided for the following areas of emphasis:

- Liberal arts
- Pre-business
- Quantitative
- International
- Political economy and regulation
- Preparation for graduate school in economics

## Honors Program

The honors program offers an opportunity for independent research, creativity, and achievement. It is designed to encourage a more intensive study of economics than is required for the normal major, with course and research work of exceptional quality. Honors students may participate in an Honors Research Symposium during Spring Quarter, with those nominated for prizes making oral presentations. The honors program requires:

1. Completing all requirements for the major; plus five additional units, bringing the total to 85 units.

2. Achieving a grade point average (GPA) of at least 3.5 for the required courses of the Economics major (excluding ECON 139D Directed Reading and ECON 199D Honors Thesis Research). See details in the Information Book for Economics Majors.
3. Complete ECON 102B Introduction to Econometrics and at least two lecture courses most relevant for the proposed topic of the honors thesis by the end of the junior year. (These can be included in the basic 80 units.)
4. Candidates must write an honors thesis in their senior year for at least one unit and up to 10 units of credit (ECON 199D Honors Thesis Research). The thesis must be of very high quality and written under the direction of a member of the department or its affiliated faculty. Units of ECON 199D Honors Thesis Research do not count toward the course work requirements for the basic economics major, or in the computation of the GPA requirement for honors. Students may apply 5 units of ECON 199D Honors Thesis Research to the Writing in the Major requirement (WIM). The WIM requirement (ECON 101 Economic Policy Analysis or ECON 199D Honors Thesis Research) must be completed in order for the degree to be conferred.

Juniors interested in the honors program should attend an informational meeting scheduled by the honors program director during the first week of each quarter. At this meeting, students receive information on organizing an honors project and are given details on honors programs. Prospective candidates for the honors program should submit an application to the director no later than the end of the first month of the third quarter before graduation (typically Autumn Quarter of the senior year). Also required, later in the same quarter, is a three-page thesis proposal that must be approved by the thesis adviser.

## Minor in Economics

The minor in Economics has two main goals: to acquaint students with the rudiments of micro- and macroeconomic theory that are required of all majors; and to allow students to build competence in the application of this theory to two fields of economics of their choosing, and the opportunity to specialize further in any one of these fields by taking one additional advanced course in the Department of Economics.

### Course Work

		Units
ECON 1A	Introductory Economics A	5
ECON 1B	Introductory Economics B (Prerequisite: ECON 1A)	5
ECON 50	Economic Analysis I (Prerequisites: ECON 1A and MATH 51 (letter grade required))	5
ECON 51	Economic Analysis II (Prerequisite: ECON 50)	5
ECON 52	Economic Analysis III (Prerequisites: ECON 50 and 1B)	5
Select two of the following: <sup>1</sup>		10
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	
ECON 102B	Introduction to Econometrics	
ECON 102C	Advanced Topics in Econometrics	
ECON 111	Money and Banking	
ECON 118	Development Economics	
ECON 126	Economics of Health and Medical Care	
ECON 128	Economic Development: A Historical Perspective	
ECON 136	Market Design <sup>2</sup>	
ECON 137	Decision Modeling and Information <sup>3</sup>	
ECON 140	Introduction to Financial Economics <sup>4</sup>	

ECON 141	Public Finance and Fiscal Policy
ECON 145	Labor Economics
ECON 146	Economics of Education
ECON 147	Economics of Human Resources
ECON 149	The Modern Firm in Theory and Practice
ECON 153	Economics of the Internet
ECON 155	Environmental Economics and Policy
ECON 157	Imperfect Competition
ECON 158	Regulatory Economics
ECON 160	Game Theory and Economic Applications <sup>5</sup>
ECON 164	Law, Economics and Politics of International Trade
ECON 165	International Finance (not offered this year)
ECON 166	International Trade
ECON 179	Experimental Economics
ECON 180	Honors Game Theory <sup>5</sup>
ECON 181	Honors Information and Incentives <sup>3</sup>
ECON 182	Honors Market Design <sup>2</sup>

- <sup>1</sup> Must be taken at Stanford in California
- <sup>2</sup> Students may not count units from both ECON 136 Market Design and ECON 182 Honors Market Design towards their major as the courses cover similar subject matter.
- <sup>3</sup> Students may not count units from both ECON 137 Decision Modeling and Information and ECON 181 Honors Information and Incentives towards their major as the courses cover similar subject matter.
- <sup>4</sup> Students may not count units from both ECON 135 Finance for Non-MBAs and ECON 140 Introduction to Financial Economics towards their minor as the courses are too similar in content.
- <sup>5</sup> Student may not count units from both ECON 160 Game Theory and Economic Applications and ECON 180 Honors Game Theory towards their major as the courses cover similar subject matter.

## Other Requirements

At least 20 out of the 35 units for the minor must be taken at Stanford. Students must have completed all Stanford prerequisites for approved transfer credit courses in order to use those courses towards the Economics minor.

No courses receiving Department of Economics credit under the preceding requirements may be taken credit/no credit. A grade point average (GPA) of 2.0 or better must be received for all units applied toward the minor.

Students must complete their declaration of the minor no later than the last day of the preceding quarter before their degree conferral.

## Master of Arts in Economics

University requirements for the master's degree are described in the "Graduate Degrees" (p. 38) section of this bulletin.

The department does not admit students who plan to terminate their graduate study with the M.A. degree. Economics students may, but need not, elect to add this degree in addition to their current Ph.D. degree. A master's option is also available to currently enrolled Ph.D. candidates from other departments.

## Admission

Prospective students must have completed the Stanford requirements for a B.A. in Economics or approximately equivalent training. Since students are required to take some of the same courses as Ph.D. candidates, similar preparation in mathematics and statistics generally is expected. Prospective

applicants should submit their credentials together with a plan of study to the Director of Graduate Study for approval.

## Degree Requirements

A master's program must satisfy these criteria:

1. Completing, at Stanford, at least 45 units of credit beyond those required for the bachelor's degree, of which at least 40 units must be in the Department of Economics. Students must complete ECON 202 Core Economics: Modules 1 and 2 and at least three other 200-level courses. They must receive a grade of 'B-' or better in ECON 202 Core Economics: Modules 1 and 2. Undergraduate courses must be numbered 105 or higher (with the exception of the ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists, ECON 102B Introduction to Econometrics, ECON 102C Advanced Topics in Econometrics sequence listed below). No seminar courses numbered 300 or above can be counted.
2. Demonstrating competence in empirical methodology by receiving a grade of 'B-' or better in both ECON 270 Intermediate Econometrics I and ECON 271 Intermediate Econometrics II, or by receiving a grade of 'B-' or above in each of ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists, ECON 102B Introduction to Econometrics, and ECON 102C Advanced Topics in Econometrics.
3. Submitting two term papers (or a thesis of sufficient quality). At least one of these papers must be deemed to represent graduate-level work. Normally, this means that it is written in connection with a 200-level course. A maximum of 10 units of credit can be earned for a thesis toward the 45-unit degree requirement. In lieu of this paper requirement, students may elect to take two additional 200+ level Economics courses.
4. A grade point average (GPA) of 3.0 must be maintained for all master's level work. All courses must be taken for a letter grade.

## Doctor of Philosophy in Economics

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

Admitted students must be adequately prepared in calculus, linear algebra, and statistics (see above). When deemed appropriate, a student may be required to complete the necessary background preparation at Stanford. All students take a common core curriculum at the outset and later branch out into the desired fields of specialization. Well-prepared students should anticipate spending, with some overlap, approximately two years in course work and another two years in seminars, independent study, and dissertation research. The goal is to complete the program in four years, although some types of research programs may require at least five years to complete. The department has a strong commitment to guiding students through the program expeditiously.

Questions and petitions concerning the program and the admissions process should be addressed to the Director of Graduate Study, who has responsibility for administering the graduate program.

Specific requirements are best discussed in two stages, the first consisting of requirements for admission to candidacy and the second involving further requirements for earning the degree.

## Admission to Candidacy for Ph.D.

A student may apply for admission to candidacy when the following minimal requirements are met:

1. Successful results on comprehensive examinations in both of:
  - A. Core Economics. The examination is based on material from:

		Units
ECON 202	Core Economics: Modules 1 and 2	2-5
ECON 203	Core Economics: Modules 5 and 6	2-5
ECON 204	Core Economics: Modules 9 and 10	2-5
ECON 210	Core Economics: Modules 3 and 7	2-5
ECON 211	Core Economics: Modules 11 and 12	2-5
ECON 212	Core Economics: Modules 4 and 8	2-5

C. Econometrics. The examination is based on material from:

		Units
ECON 270	Intermediate Econometrics I	2-5
ECON 271	Intermediate Econometrics II	2-5
ECON 272	Intermediate Econometrics III	2-5

2. Completing the requirements in two additional fields of specialization from the list below or, if approved in advance by the Director of Graduate Study, in one such field together with a substantial amount of work toward a second field taught in a related department (e.g. GSB Finance). Advanced fields include econometrics, economic development, economic history, industrial organization, international economics, labor economics, microeconomic theory, monetary theory and advanced macroeconomics, environmental economics, and public finance. Students may request permission from the Director of Graduate Study to create a field not listed as an advanced field above (e.g. Behavioral/Experimental). Each field listed below can be satisfied by completing two courses, although students in some fields may be advised to add a third course, which can then be counted toward the distribution requirement discussed later. All courses (or comprehensive exams, when offered) must be passed with a grade of 'B' or better.

		Units
<b>Development</b>		
ECON 215	Economic Development	
ECON 216	Development Economics III (not offered this year)	
ECON 217	Topics in International Macroeconomics: Theory and Evidence for Latin America:	
<b>History</b>		
ECON 225	Economics of Technology and Innovation (not offered this year)	
ECON 226	U.S. Economic History	
ECON 227	European Economic History	
ECON 228	Institutions and Organizations in Historical Perspective	
<b>Macroeconomics</b>		
ECON 233	Advanced Macroeconomics I	
ECON 235	Advanced Macroeconomics III	
ECON 236	Financial Economics I	
ECON 237	Financial Economics II	
<b>Finance</b>		
FINANCE 622	Dynamic Asset Pricing Theory	
FINANCE 624	Corporate Finance Theory	
FINANCE 625	Empirical Asset Pricing	
<b>Public Economics</b>		
ECON 241	Public Finance and Taxation I	
ECON 242	Public Finance and Taxation II	
<b>Labor</b>		

ECON 246	Labor Economics I
ECON 247	Labor Economics II
ECON 248	Labor Economics III
Environmental	
ECON 250	Environmental Economics
ECON 251	Natural Resource and Energy Economics
Industrial Organization	
ECON 257	Industrial Organization I
ECON 258	Industrial Organization 2A
ECON 259	Industrial Organization II B
ECON 260	Industrial Organization III
International	
ECON 265	International Economics I
ECON 266	International Economics II
ECON 267	Topics in International Trade (not offered this year)
Econometrics	
ECON 273	Advanced Econometrics I
ECON 275	Time Series Econometrics (not offered this year)
ECON 276	Limited Dependent Variables
Behavioral/Experimental	
ECON 277	Behavioral and Experimental Economics III
ECON 278	Behavioral and Experimental Economics I
ECON 279	Behavioral and Experimental Economics II
Microtheory	
ECON 282	Contracts, Information, and Incentives
ECON 283	Theory and Practice of Auction Market Design
ECON 285	Market Design
ECON 289	Advanced Topics in Game Theory and Information Economics
ECON 291	Social and Economic Networks

4. Completing a candidacy paper, normally written in conjunction with one of the special fields selected above. Satisfactory presentation of this paper or another research paper is required in Autumn Quarter of the third year, along with an additional presentation of an expanded research paper in Spring Quarter is also required for admission to candidacy.

It is expected that the student meet, and indeed exceed, the above standards by the end of the third year of residency. When this is not possible for any reason, the Director of Graduate Study should be consulted as early as possible during the third year. Once it is deemed that the above standards have been met, the student should complete the Application for Candidacy for Degree of Doctor of Philosophy. After approval, candidacy remains valid for five years (although it can be terminated earlier by the department if progress is deficient); it can be renewed or extended beyond this period only under unusual circumstances.

## Further Requirements for the Ph.D. Degree

1. *Distribution Requirement:* Students must complete four other graduate-level courses meeting the following requirements:
  - A. at least one course from the area of economic history, unless history is one of the two fields of specialization.
  - B. courses in at least two fields other than the two fields of specialization. Distribution courses cannot be crosslisted in those fields.

C. with advance approval of the Director of Graduate Study, some of these distribution courses may be drawn from related fields taught in other departments. However, including courses taken to meet either the specialization or distribution requirements, no more than two courses in total may be taken outside the Economics department.

2. *Teaching Experience:* Each student must serve as a teaching assistant for at least one quarter. It is strongly recommended that this requirement be satisfied before the final year of residence.
3. *Seminar Participation:* Each student is expected to participate in at least two all-year research seminars by the end of the fourth year of residence. Normally, participation in a seminar requires one or more oral presentations and the submission of a research paper (which, however, need not be completely separate from dissertation research).
4. *Ph.D. Dissertation:* The process involves selecting a topic, choosing an appropriate adviser, submitting a prospectus (signed by the adviser) outlining the proposed research, selecting a three-member reading committee (usually all from the Department of Economics, although exceptions can be made under certain circumstances), passing the University oral examination at which these three faculty (and two other members of the Academic Council) ask questions about the completed research, and submitting a final draft of the work signed by all members of the reading committee. The student is advised to initiate this process as early as possible.

## Ph.D. Minor in Economics

To be recommended for the Ph.D. degree with Economics as a minor subject, a student must qualify in three fields of economics, at least one of which must be in the core economics sequence. The standard of achievement in these fields is the same for minor as for major candidates, including the department's comprehensive examinations where appropriate.

## Joint Degree Program in Ph.D. in Economics and Master of Public Policy

The Ph.D./M.P.P. joint degree is designed for students who wish to prepare themselves for careers in areas relating to both policy and economics. Students interested in this degree first apply to the Economics Department, indicating an interest in the joint program. There is one admissions application and one fee. If the decision is made by the department to admit the applicant, the file is then forwarded to the M.P.P. program. An admission decision, based on the information in the Ph.D. application, is made promptly, and the department informs the student of the decision. Students may also apply to the M.P.P. after having commenced study in the Economics Department at Stanford, by first receiving the consent of the Director of Graduate Studies in Economics and then applying to the Public Policy program.

Students must have a faculty adviser from the Economics Department to assist with the planning and supervising of the joint program. The adviser is usually chosen from among the department's Public Policy-affiliated faculty.

Tuition and financial aid arrangements are made through the Economics Department.

## Requirements for the M.P.P./Ph.D. in Economics

### Core M.P.P. curriculum of 45 units

		Units
PUBLPOL 301B	Cost-Benefit Analysis and Evaluation	4-5
PUBLPOL 302A	Introduction to American Law	3-5
PUBLPOL 302B	Economic Analysis of Law	4
PUBLPOL 304A	Collective Action: Ethics and Policy	3-5
PUBLPOL 305A	Judgment and Decision Making	4
PUBLPOL 305B	Public Policy and Social Psychology: Implications and Applications	4
PUBLPOL 306	Writing and Rhetoric for Policy Audiences	4
PUBLPOL 307	Justice	4-5
PUBLPOL 309	Practicum	1-10
PUBLPOL 311	Public Policy Colloquium	1
Total Units		32-47

*Emeriti:* (Professors) Takeshi Amemiya, Theodore Anderson, Masahiko Aoki, Kenneth J. Arrow, Paul A. David, Victor R. Fuchs, John G. Gurley, Peter J. Hammond, Donald Harris, Bert G. Hickman, Mordecai Kurz, Lawrence J. Lau, Ronald I. McKinnon, Roger G. Noll, Nathan Rosenberg, Thomas Sargent, David A. Starrett, Joseph E. Stiglitz

*Honorary Emerita:* (Professor) Anne O. Krueger

*Chair:* Jonathan Levin

*Professors:* Kyle Bagwell, B. Douglas Bernheim, Nicholas A. Bloom, Michael J. Boskin, Timothy F. Bresnahan, Liran Einav, Lawrence Goulder, Avner Greif, Robert E. Hall, Han Hong, Caroline Hoxby, Matthew O. Jackson, Peter Klenow, Jonathan Levin, Thomas E. MaCurdy, Paul R. Milgrom, Muriel Niederle, John H. Pencavel, Luigi Pistaferri, Monika Piazzesi, Joseph Romano, Alvin Roth, K. Martin Schneider, Ilya Segal, John B. Shoven, John B. Taylor, Frank Wolak, Gavin Wright

*Assistant Professors:* Ran Abramitzky, Manuel Amador, Giacomo DeGiorgi, Michael Dickstein, Pascaline Dupas, Doireann Fitzgerald, Kyna Fong, Matthew Harding, Jakub Kastl, Fuhito Kojima, Pablo Kurlat, Aprajit Mahajan, Kalina Manova, Petra Moser, Florian Scheuer, Charles Sprenger, Alexander Wolitzky

*Senior Lecturer:* Geoffrey Rothwell

*Lecturers:* Marcelo Clerici-Arias, Gopi Shah Goda, Alexander Gould, Marc Hafstead, Ward Hansen, Hamilton Helmer, Koichiro Ito, Ro Khanna, Scott M. McKeon, David Molitar, Greg Rosston, Cristian Santesteban, Thomas Shanahan, F. Victor Stanton, Mark Tendall, Marshall Yan, Shuang Zhang

*Courtesy Professors:* Anat Admati, Lawrence Baker, David Baron, Jay Bhattacharya, Jeremy Bulow, Walter Falcon, Stephen Haber, David Kreps, N. Grant Miller, Rosamond Naylor, Bruce Owen, A. Mitchell Polinsky, Peter C. Reiss, D. John Roberts, Barry Weingast, Robert Wilson

*Courtesy Assistant Professor:* Peter Koudijs, Nicolas Lambert, Mar Reguant

*Visiting Professors:* Alexander Galetovic, Pablo Andres Newmeyer, Serguei Maliar, Paolo Pin

*Visiting Assistant Professor:* John Lynham

*Visiting Associate Professor:* Ghazala Azmat

## Overseas Studies Courses in Economics

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/economics/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/economics/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/economics/http://bosp.stanford.edu>).

		Units
OSPBEIJ 55	Chinese Economy in Transition	5
OSPBEIJ 75	China in the Global Economy	5
OSPBER 115X	The German Economy: Past and Present	4-5
OSPBER 161X	The German Economy in the Age of Globalization	4-5
OSPFLO 35	European Economic and Monetary Integration	5
OSPKYOTO 215X	The Political Economy of Japan	4-5
OSPMADR 54	Contemporary Spanish Economy and the European Union	5
OSPMOSC 62	Economic Reform and Economic Policy in Modern Russia	5
OSPOXFRD 45	British Economic Policy since World War II	5
OSPPARIS 91	Globalization and Its Effect on France and the European Union	5
OSPPARIS 124X	Building the European Economy: Economic Policies and Challenges Ahead	5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5

## English

Courses offered by the Department of English are listed under the subject code ENGLISH on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ENGLISH&filter-catalognumber-ENGLISH=on>) web site.

## Mission of the Department of English

To study English at Stanford is to explore -- deeply and rewardingly -- the rich legacy of literature written in English, past and present. We offer a wealth of courses on individual authors, the history of literary genres, literary theory, new media, and creative writing. Given the emphasis on critical thinking and interpretation, the English major is in turn an excellent preparation for many professional fields, including teaching, journalism, law, publishing, medicine, and business. The graduate program features rigorous training in the research and analysis of British, American, and Anglophone literary histories and texts, preparing students to produce

scholarship of originality and importance, and to teach literature at the highest levels.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of major theories, methods, and concepts of literary study and critical analysis.
2. an awareness of how authors and texts develop in relation to their historical contexts.
3. a comprehension of the formal qualities of key literary genres, forms, and styles.
4. an effective style of writing and a powerful use of language.

## Bachelor of Arts in English

In the undergraduate program, students explore the traditions of literature in English. Courses emphasize interpretive thinking and creative writing, examining the dynamics of literary and cultural history, the structures of literary form and genre, and the practices of reading, writing, and critical analysis.

## Graduate Program in English

The graduate program features rigorous training in the research and analysis of British, American and Anglophone literary histories and texts, preparing students to produce scholarship of originality and importance, and to teach literature at advanced levels.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in English and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in English. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of English and to interpret and present the results of such research.

## Other Programs in English

### Ph.D. in Modern Thought and Literature

Stanford also offers a Ph.D. degree in Modern Thought and Literature. Under this program, students devote approximately half of their time to a modern literature from the Enlightenment to the present, and the other half to interdisciplinary studies. Interested students should see the "Modern Thought and Literature" section of this bulletin and consult the director of the program.

## Creative Writing Fellowships

The Creative Writing Program each year offers five two-year fellowships in poetry and five two-year fellowships in fiction. These are not degree-granting fellowships. Information is available in the Creative Writing office, (650) 725-1208.

## Bachelor of Arts in English

The English major is designed to provide students with both an understanding of the development of literatures in English and an appreciation of the variety and richness of literary texts. It offers a rigorous training in interpretive thinking and precise expression.

## Suggested Preparation for the Major

Prospective English majors are advised to consider Thinking Matters courses that relate to literature to satisfy this requirement. Also recommended is any introductory seminar taught by English department faculty through Stanford Introductory Studies.

		Units
<b>Thinking Matters Courses (23)</b>		
THINK 7	Journeys	4
THINK 17	The Poet Re-Making the World	4
THINK 30	Race Matters	4
THINK 31	Reimagining America: Cultural Memory and Identity Since the Civil War	4
THINK 38	Education as Self-Fashioning: The Active, Inquiring, Beautiful Life	7
<b>Introductory Seminars (23)</b>		
ENGLISH 14Q	"Tis All In Pieces, All Coherence Gone": John Donne, the Neurosciences, and the Early Modern World	4
ENGLISH 46N	The Hemingway Era	3
ENGLISH 47N	Sports and Culture	3
ENGLISH 50N	The Literature of Inequality: Have and Have-Nots from the Gilded Age to the Occupy Era	3
ENGLISH 68N	Mark Twain and American Culture	4
ENGLISH 71N	American Daughters: Hawthorne to Robinson	3
ENGLISH 88N	Graphic Novels Asian American Style	3

## Fields of Study or Degree Options

Because the Department of English recognizes that the needs and interests of literature students vary, it has approved several major programs of study. Each of these has different objectives and requirements; students should consider carefully which program of study corresponds most closely to their personal and intellectual objectives. The department offers the following fields of study for degrees in English:

- Literature
- Literature with Creative Writing Emphasis
- Literature with Interdisciplinary Emphasis
- Literature and Foreign Language Literature
- Literature and Philosophy

See below for further information on these fields of study.

# Degree Requirements

Students interested in majoring in English are encouraged to declare during their sophomore year, but no later than the beginning of their junior year. They are urged to discuss their plans with the undergraduate student services specialist as early as possible, and to take recommended preparatory courses for the major in their freshman and sophomore years. To declare the major, a student must fill out the Declaration of Major in Axess; choose a faculty adviser (<http://english.stanford.edu/faculty.php>); and submit a completed program proposal ([http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/1213\\_Program\\_Proposal.pdf](http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/1213_Program_Proposal.pdf)) form approved by the adviser. It is recommended that a student meet with the adviser at least once per quarter to discuss progress towards degree completion. Students who declared prior to September 2012 should refer to previous guidelines and requirements for the major.

With the exception of the required courses listed below, which must be taken for a letter grade, any two of the elective courses may be taken on a credit/no credit basis at the discretion of the instructor. Students may apply as many as four literature courses taken at approved universities towards the English major electives. Approval of such courses towards the major is at the discretion of the Director of Undergraduate Studies. Requests for transfer credit, including course syllabi and official transcript, should be submitted to the undergraduate student services specialist, and to the Office of the University Registrar's external credit evaluation section.

The total number of units required to graduate for each degree option is specified in the relevant section following. All courses should be taken for 5 units. Irrespective of field of study or degree option, all English majors must complete the following requirements:

## Required Courses (40 units)

	Units
<b>Historical courses (15)</b>	
ENGLISH 100A Literary History I	5
ENGLISH 100B Literary History II	5
ENGLISH 100C Literary History III	5
<b>Methodology courses (15)</b>	
ENGLISH 160 Poetry and Poetics	5
ENGLISH 161 Narrative and Narrative Theory	5
ENGLISH 162 Critical Methods	5
<b>Also Required (10)</b>	
ENGLISH 164 Senior Seminar (WIM) <sup>1</sup>	5
One additional history of literature course <sup>2 3</sup>	5
<b>Total Units</b>	<b>40</b>

<sup>1</sup> For those students accepted into the Honors program this can be fulfilled with ENGLISH 196A Honors Seminar: Critical Approaches to Literature.

<sup>2</sup> In 2012-13 the following courses satisfy the history of literature requirement:

- ENGLISH 115 The Literature of Crisis: From Chaucer to Graham Greene,
- ENGLISH 119F British Women Novelists from Aphra Behn to Charlotte Bronte
- ENGLISH 140H The Idea of the Theater
- ENGLISH 173H Passions, Emotions, Moods
- ENGLISH 184H Text Technologies: A History

- <sup>3</sup> This requirement may also be fulfilled with the following Thinking Matters or SLE courses:
- THINK 7 Journeys
  - THINK 17 The Poet Re-Making the World
  - THINK 30 Race Matters
  - THINK 31 Reimagining America: Cultural Memory and Identity Since the Civil War
  - THINK 38 Education as Self-Fashioning: The Active, Inquiring, Beautiful Life
  - SLE 91 Structured Liberal Education, SLE 92 Structured Liberal Education, and SLE 93 Structured Liberal Education.

Rules that apply to all English majors irrespective of field of study or degree option

1. Courses can only be counted once, i.e. can only satisfy one requirement.
2. Two of the elective courses may be taken on a credit/no credit basis at the discretion of the instructor.

## Field of Study I. Literature

This field of study is declared in Axess. It does not appear on either the official transcript or the diploma. This program provides for the interests of students who wish to understand the range and historical development of British, American and Anglophone literatures and a variety of critical methods by which their texts can be interpreted. The major emphasizes the study of literary forms and genres and theories of textual analysis. In addition to the degree requirements required of all majors and listed above, students must complete at least 30 additional units of courses consisting of:

1. Six to eight additional approved elective courses, only one of which may be a creative writing course, chosen from among those offered by the Department of English. In place of one of these six to eight elective courses, students may choose one upper-division course in a foreign literature read in the original language.

## Field of Study II. Literature with Creative Writing Emphasis

This field of study is declared in Axess. It appears on the official transcript, but not on the diploma. This program is designed for students who want a sound basic knowledge of the English literary tradition as a whole and at the same time want to develop skills in writing poetry or prose. In addition to the degree requirements required of all majors and listed above, students must complete at least 35 additional units of approved courses, in either the prose or poetry concentration:

### Prose Concentration-

	Units
ENGLISH 90 Fiction Writing or ENGLISH 91 Creative Nonfiction	5
ENGLISH 92 Reading and Writing Poetry (Can be fulfilled with a poetry literature seminar)	5
ENGLISH 146 Development of the Short Story: Continuity and Innovation	5
ENGLISH 190 Intermediate Fiction Writing (or any 190 series or 191 series) or ENGLISH 191 Intermediate Creative Nonfiction	5
3 elective literature courses (One of the courses may be fulfilled with a creative writing workshop).	
<b>Total Units</b>	<b>35</b>



## Poetry Concentration-

		Units
ENGLISH 90	Fiction Writing (Can be fulfilled with a prose literature seminar)	5
or ENGLISH 91	Creative Nonfiction	
ENGLISH 92	Reading and Writing Poetry	5
ENGLISH 192	Intermediate Poetry Writing (or any 192 series)	5
One literature course in poetry approved by a Creative Writing Professor		5
Three elective literature courses (One of the courses may be fulfilled with a creative writing workshop)		15
<b>Total Units</b>		<b>35</b>

## Field of Study III. Literature with Interdisciplinary Emphasis

This field of study is declared in Axess. It appears on the official transcript, but not on the diploma. This program is intended for students who wish to combine the study of one broadly defined literary topic, period, genre, theme or problem with an interdisciplinary program of courses (generally chosen from one other discipline) relevant to that inquiry. In addition to the degree requirements required of all majors and listed above, students must complete at least 35 additional units of approved courses including:

- Four elective literature courses chosen from among those offered by the Department of English. Students must select two of these courses in relation to their interdisciplinary focus.
- Three courses related to the area of inquiry. These courses may be chosen from another department or interdisciplinary program within the School of Humanities and Sciences including (but not limited to) such as African American Studies (<http://www.stanford.edu/dept/AAAS>), Anthropology (<https://www.stanford.edu/dept/anthropology/cgi-bin/web>), Art and Art History (<http://art.stanford.edu>), Classics (<http://www.stanford.edu/dept/classics/cgi-bin/web>), Comparative Literature (<http://www.stanford.edu/dept/DLCL/cgi-bin/web/dept/complit>), Comparative Studies in Race and Ethnicity (<http://ccsre.stanford.edu>), Feminist Studies (<http://www.stanford.edu/dept/femstudies>), Human Biology (<https://humbio.stanford.edu>), Music (<http://music.stanford.edu/Home>), Philosophy (<http://philosophy.stanford.edu>), Political Science (<http://politicalscience.stanford.edu>), Psychology (<http://psychology.stanford.edu>), Religious Studies (<http://www.stanford.edu/dept/relstud>), Science, Technology, and Society (<http://sts.stanford.edu>), and Sociology (<http://sociology.stanford.edu>). These courses should form a coherent program and must be relevant to the focus of the courses chosen by the student to meet the requirement. Each of these courses must be approved in advance by the interdisciplinary program director. In addition, students in this program must write at least one interdisciplinary paper.

This may be:

A.

Select one of the following:

ENGLISH Individual Research  
194

ENGLISH Seniors Honors Essay  
197

ENGLISH Individual Work  
198

ENGLISH Senior Independent Essay  
199

Units

1-10

- B. or a paper integrating the material in two courses the student is taking in two different disciplines.

## Field of Study IV. Literature and Foreign Language Literature

This field of study is declared in Axess. It appears on the official transcript, but not on the diploma. This track provides a focus in British and American literature with additional work in French literature; German literature; Italian literature; or Spanish literature. In addition to the degree requirements required of all majors and listed above, students must complete at least 35 additional units of approved courses including:

- Three elective courses chosen from among those offered by the Department of English, one of which may be a creative writing course.
- A coherent program of four courses in the foreign language literature, read in the original language, approved by the Director of Undergraduate Studies in English and by the relevant foreign language department.

## Field of Study V. Literature and Philosophy

This field of study is declared in Axess. It appears on the official transcript, but not on the diploma. Students should meet with the undergraduate director concerning the Literature and Philosophy focus. This track is for students who wish to explore interdisciplinary studies at the intersection of literature and philosophy while acquiring knowledge of the English language literary tradition as a whole. In addition to the degree requirements required of all majors and listed above, students must complete at least 35-45 additional units of approved courses including:

- PHIL 80 Mind, Matter, and Meaning (WIM): Prerequisite: introductory philosophy course.
- Gateway course: ENGLISH 81 Philosophy and Literature. This course should be taken as early as possible in the student's career, normally in the sophomore year.
- Aesthetics, Ethics, Political Philosophy: one course from PHIL 170 Ethical Theory series.
- Language, Mind, Metaphysics, and Epistemology: one course from PHIL 180 Metaphysics series.
- History of Philosophy: one course in the history of Philosophy, numbered above PHIL 100 Greek Philosophy.
- Two upper division courses of special relevance to the study of Philosophy and Literature. Both of these courses must be in the English department. A list of approved courses (<http://philit.stanford.edu/programs/relevance.html>) is available on the Philosophy and Literature web site.
- One additional elective course in the English department.
- One capstone seminar (<http://philit.stanford.edu/programs/capstone.html>) of relevance to the study of Philosophy and Literature.

## Honors Program

Students wishing to undertake a formal program of advanced literary criticism and scholarship, including the honors seminar and independent research, are invited to apply for the honors program in the Winter Quarter of the junior year. Any outstanding student is encouraged to engage in an honors thesis project.

Admission is selective. Provisional admission is announced in March. Permission to continue in the program is contingent upon submission, by May 15 of the junior year, of a senior honors essay proposal with a bibliography. Honors students are encouraged to complete before the start

of their senior year the three methodology courses that are English major requirements:

		Units
ENGLISH 160	Poetry and Poetics	5
ENGLISH 161	Narrative and Narrative Theory	5
ENGLISH 162	Critical Methods	5

In September before the senior year, students are encouraged to participate in the Bing Honors College. In Autumn Quarter of the senior year, students take a 3-unit honors seminar on critical approaches to literature. The senior-year seminar is designed to introduce students to the analysis and production of advanced literary scholarship. In addition, in Autumn Quarter of the senior year, honors students take a 2-unit essay workshop focused on the process of researching and writing the essay. Students who are studying at Oxford or at other institutions may be exempted from these requirements on request and with the approval of the director of the honors program.

In Winter and Spring quarters of the senior year, honors students complete the senior honors essay for 10 units under supervision of a faculty adviser.

The deadline for submitting the honors essay is May 15. Essays that receive a grade of 'A-' or above are awarded honors.

Students in the honors program complete the requirements of the major and the following:

		Units
ENGLISH 196A	Honors Seminar: Critical Approaches to Literature	3
ENGLISH 196B	Honors Essay Workshop	2
ENGLISH 197	Seniors Honors Essay	1-10

## Advanced Research Options

### Individual Research

Students taking 100- or 200-level courses may, with the consent of the instructor, write a follow-up 5-unit paper based on the course material and due no later than the end of the succeeding quarter (register for ENGLISH 194 Individual Research). The research paper is written under the direct supervision of the professor; it must be submitted first in a preliminary draft and subsequently in a final version.

### Senior Independent Essay

The senior independent essay gives senior English majors the opportunity to work throughout the year on a sustained piece of critical or scholarly work of around 10,000 words on a topic of their choice, with the close guidance of a faculty adviser. Each student is responsible for finding an adviser, who must approve the proposed topic before the end of the third quarter prior to expected graduation. The senior essay is read and graded by the adviser and one other member of the English faculty. Senior independent essay students register for ENGLISH 199 Senior Independent Essay.

## Overseas Studies or Study Abroad

The flexibility of the English major permits students to attend an overseas campus in any quarter, but it is advisable, and in some cases essential, that students spend their senior year at Stanford if they wish to participate in the Honors Program or in a special in-depth reading course. For more information on Stanford overseas programs, see the "Overseas Studies (<http://stanford.edu/dept/registrar/bulletin/5090.htm>)" section of this bulletin.

Students should consult their advisers and the undergraduate program officer to make sure that they can fulfill the requirements before graduation. The Stanford Program in Oxford usually offers courses which apply toward both University requirements and area requirements for the English major.

In either case, students should save the syllabi from their courses if they wish to apply to use them to fulfill an English major requirement.

## Overseas Studies Courses in English

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/http://explorecourses.stanford.edu>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/http://bosp.stanford.edu>) web site. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

		Units
OSPOXFRD 17	Novels of Sensation: Gothic, Detective Story, Prohibition, and Transgression in Victorian Fiction	5
OSPOXFRD 57	The Rise of the Woman Writer 1660-1860	5
OSPOXFRD 60	Shakespeare and his Contemporaries	5
OSPOXFRD 163X	Shakespeare: Critical Commentary	5

## Minor in English or in Creative Writing

Both the Department of English and the Creative Writing program offer a distinct minor.

### Minor in English Literature

The minor in English Literature offers some flexibility for those students who want to pursue specific interests within British and American literature, while still requiring certain courses that ensure coverage of a variety of periods, genres, and methods of studying literature.

### Degree Requirements

In order to graduate with a minor in English, students must complete the following program of seven 5-unit courses, at least one of which must be a seminar, for a total of 35 units:

### Required Courses for the Minor

		Units
<b>Historical courses (10)</b>		
Select two of the following:		10
ENGLISH 100A	Literary History I	
ENGLISH 100B	Literary History II	
ENGLISH 100C	Literary History III	
<b>Methodology courses (10)</b>		
Select two of the following:		10
ENGLISH 160	Poetry and Poetics	
ENGLISH 161	Narrative and Narrative Theory	
ENGLISH 162	Critical Methods	
<b>Elective courses (15)</b>		

Three elective courses from those offered in the English department (only one of which may be a course in Creative Writing). 15

Total Units 35

## Minor in Creative Writing

The minor in Creative Writing offers a structured environment in which students interested in writing prose or poetry develop their skills while receiving an introduction to literary forms. Students choose a concentration in either prose or poetry.

### Degree Requirements

In order to graduate with a minor in Creative Writing, students must complete the following program of six 5-unit courses for a total of 30 units. All courses must be taken for a letter grade. Courses taken abroad or at other institutions may not be counted towards the minor.

### Required Courses for the Minor

Students must complete at least 30 units of approved courses, in either the prose or poetry concentration:

#### Prose concentration-

	Units
ENGLISH 90 Fiction Writing	5
or ENGLISH 91 Creative Nonfiction	
ENGLISH 92 Reading and Writing Poetry	5
ENGLISH 94 Writing Across Genres	5
ENGLISH 146 Development of the Short Story: Continuity and Innovation	5
Select two of the following intermediate or advanced prose classes:	10
any ENGLISH 190 series	
any ENGLISH 191 series	
ENGLISH 198L Individual Work: Levinthal Tutorial	
ENGLISH 290 Advanced Fiction Writing	
ENGLISH 291 Advanced Creative Nonfiction	
Total Units	30

#### Poetry concentration-

	Units
ENGLISH 90 Fiction Writing	5
or ENGLISH 91 Creative Nonfiction	
ENGLISH 92 Reading and Writing Poetry	5
ENGLISH 94 Writing Across Genres	5
ENGLISH 160 Poetry and Poetics	5
Select two of the following intermediate or advanced poetry classes:	10
any ENGLISH 192 series	
ENGLISH 198L Individual Work: Levinthal Tutorial	
ENGLISH 292 Advanced Poetry Writing	
Total Units	30

## Master of Arts in English

University requirements for the M.A. are described in the "Graduate Degrees" section of this bulletin.

## Coterminal Bachelor's and Master's Degrees in English Literature

Students in the major who are interested in further postgraduate work in English may apply for Stanford's coterminal master's program. Candidates for a coterminal master's degree must fulfill all requirements for the M.A. in English (including the graduate language requirement), as well as general and major requirements for the B.A. in English.

A minimum GPA of 3.7 in the major is required of those applying for the coterminal master's degree. Students must also take the general GRE exam in the year in which they apply.

No courses used to satisfy the B.A. requirements (either as General Education Requirements or department requirements) may be applied toward the M.A. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree.

For University coterminal degree program rules and University application forms, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_uual/NBY\\_Coterm.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_uual/NBY_Coterm.html). University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin.

### Degree Requirements

M.A. candidates must complete with a 3.0 (B) grade point average (GPA) at least nine courses (a minimum of 45 units), at least two of which must be 300-level courses.

Ordinarily, graduate students enroll in courses numbered 200 and above. They may take no more than two courses numbered 101-199 without the consent of the Director of Graduate Studies, and no more than two courses outside the department.

The master's student may take no more than 10 units of directed reading and research (ENGLISH 398 Research Course).

No creative writing courses may be used to fulfill the requirements.

M.A. candidates must also demonstrate a reading knowledge of one foreign language. (For ways of fulfilling this requirement, see the section below on language requirements for the Ph.D.)

Interested students should consult their faculty adviser or the graduate program adviser for further details.

### Required Courses

1. Two courses in literature before 1800 (5 units each)
2. Two courses in literature after 1800 (5 units each)

### Elective Courses

Five courses (5 units each) which should represent a mixture of survey and specialized courses chosen to guarantee familiarity with a majority of the works on the qualifying exam reading list for doctoral candidates. Candidates who can demonstrate unusually strong preparation in the history of English literature may undertake a 40 to 60 page master's thesis. Each student is responsible for finding an adviser, who must approve the proposed topic before the end of Winter Quarter prior to anticipated graduation. Candidates register for up to 10 units of ENGLISH 399 Thesis

with the faculty member who supervises the thesis work. The thesis is read and graded by the adviser and one other member of the English faculty.

Candidates who write a master's thesis may petition to be excused from up to 10 units of the electives described above. The additional 35 units normally consist of the four required courses and three elective courses. These courses are chosen by the student and approved by the adviser and the Director of Graduate Studies.

## Coterminal Program with School of Education

Students interested in becoming middle school and high school teachers of English may apply for admission to the coterminal teaching program (CTP) of the Stanford Teacher Education Program (STEP) in the School of Education.

CTP students complete a special curriculum in English language, composition, and literature that combines a full English major with supplemental course work in subjects commonly taught in California public schools and a core program of foundational courses in educational theory and practice. They are then admitted to STEP for a fifth year of pedagogical study and practice teaching. Students who complete the curriculum requirements are able to enter STEP without the necessity of taking either the GRE or the usual subject matter assessment tests.

At the end of five years, CTP students receive a B.A. in English, an M.A. in Education, and a California Secondary Teaching Credential.

Students normally apply to the coterminal teaching program at the end of their sophomore year or at the beginning of their junior year. For complete program details and for information on how to apply, consult the Director of Undergraduate Studies in English or the CTP coordinator in the School of Education.

## Doctor of Philosophy in English

### Admission

Students with a bachelor's degree in English or a closely related field may apply to pursue graduate work toward an advanced degree in English at Stanford. Applicants for admission to graduate work must take the General Test of the Graduate Record Examination and the Subject Test in Literature. International students whose first language is not English are also required to take the TOEFL examination (with certain exceptions: see the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/http://gradadmissions.stanford.edu>) web site).

### University Degree Requirements

University requirements for the Ph.D. are described in the "Graduate Degrees (<http://stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

### Department Degree Requirements

The following department requirements, dealing with such matters as residence, dissertation, and examinations, are in addition to the University's basic requirements for the doctorate. Students should consult the most

recent edition of The Ph.D. Handbook; copies are available in the English graduate studies office.

A candidate for the Ph.D. degree must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the bachelor's degree. Candidates are required to complete at least 135 units of graduate work in addition to the doctoral dissertation. At least three consecutive quarters of graduate work, and the final course work in the doctoral program, must be taken at Stanford.

A student may count no more than 65 units of non-graded courses toward the 135 course units required for the Ph.D., without the written consent of the Director of Graduate Studies. A student takes at least 70 graded units (normally fourteen courses) of the 135 required total units. 5 of these 70 units may be fulfilled with ENGLISH 398 Research Course or ENGLISH 398R Revision and Development of a Paper. ENGLISH 396L Pedagogy Seminar I, ENGLISH 397A Pedagogy Seminar II, and ENGLISH 399 Thesis do not count toward the 70 graded units. No more than 10 units (normally two courses) may come from 100-level courses.

This program is designed to be completed in five years. Five quarters of supervised teaching, two as a teaching assistant in a literature course, one as a teaching apprentice, and two as the instructor of a Program in Writing and Rhetoric (PWR) course, are a requirement of the Ph.D. program.

In the first quarter of their first year, students take a 2-unit seminar in pedagogy as preparation for their initial teaching assistantship. In the first quarter of their second year, students take a pedagogy seminar and an apprentice teaching program. The seminar and apprentice teaching constitute a 50-percent teaching appointment. Apprentice teachers attend the classes and conferences of a senior mentor/instructor for two to three weeks. While teaching during the second and third quarters of the second year, students continue to participate in a series of PWR pedagogy workshops and visit one another's classrooms.

## I. English and American Literature

Students are expected to do course work across the full range of English and American literature. Students are required to fulfill the following requirements. Note: fulfillment of requirements 1, 2, and 3 must be through Stanford courses; students will not be excused from these three requirements or granted credit for course work done elsewhere.

- |  | Units |
|--|-------|
| 1. ENGLISH 396 Introduction to Graduate Study for Ph.D. Students | 5     |
| ENGLISH 396L Pedagogy Seminar I                                  | 2     |
- Graduate-level (at least 200-level) course work in English literature before 1700, and English and American literature after 1700 (at least 5 units of each).
  - Graduate-level (at least 200-level) course work in some aspect of literary theory such as courses in literary theory itself, narrative theory, poetics, rhetoric, cultural studies, gender studies (at least 5 units).
  - Students concentrating in British literature are expected to take at least one course (5 units) in American literature; students concentrating in American literature are expected to take at least one course (5 units) in British literature.
  - Of all courses taken, a minimum of six courses for a letter grade must be graduate colloquia and seminars, of which at least three must be graduate seminars. The colloquia and seminars should be from different genres and periods, as approved by the adviser.
  - Completion, in Autumn Quarter of the second year, of a pedagogy seminar which includes the apprentice teaching program described above, and a series of pedagogy workshops during Winter and Spring Quarters. There are no units associated with this work.

7. The remaining units of graded, graduate-level courses and seminars should be distributed according to the adviser's judgment and the candidate's needs. A student may receive graduate credit for no more than two 100-level courses in the Department of English.
8. Consent of the adviser if courses taken outside the Department of English are to count toward the requirement of 70 graded units of course work.
9. An oral qualifying examination based on a reading guide, to be taken at the end of the summer after the first year of graduate work. The final decision as to qualification is made by the graduate studies committee in consideration of the student's overall record for the first year's work in conjunction with performance on the examination. Note: A student coming to the doctoral program who has done graduate work at another university must petition in the first year at Stanford for transfer credit for course work completed elsewhere. The petition should list the courses and grades, and describe the nature and scope of course work, as well as the content, contact hours, and writing requirements. A syllabus must be included. The Director of Graduate Studies considers the petition in conjunction with the student's overall performance.
10. University Oral Examinations—A University oral examination covering the field of concentration (as defined by the student and the student's adviser). This examination, based on a reading list established by the candidate in consultation with his or her adviser, is normally taken no later than the Spring Quarter of the third year of graduate study.
11. Dissertation—As early as possible during graduate study, a Ph.D. candidate is expected to find a topic requiring extensive original research and to seek out a member of the department as his or her adviser. The adviser works with the student to select a committee to supervise the dissertation. candidates should take this crucial step as early in their graduate careers as possible. The committee may well advise extra preparation within or outside the department, and time should be allowed for such work. After the dissertation topic has been approved, the candidate should file a formal reading committee form as prescribed by the University. The dissertation must be submitted to the adviser as a rough draft, but in substantially final form, at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree.
12. Committee—The doctoral dissertation reading committee consists of the principal dissertation adviser and two other readers. At least one of these three must be from the English department. Normally, all members are on the Stanford Academic Council.

## II. English and Comparative Literature

The Ph.D. program in English and Comparative Literature is designed for students wishing an extensive knowledge of the literature, thought, and history of England and of at least one foreign country, for one period. Approximately half of the student's course work and reading is devoted to this period, with the remainder of the time given to other periods of English and American literature since 1350.

This degree, administered by the Department of English, is to be distinguished from the Ph.D. in Comparative Literature. The latter program is intended for students unusually well prepared in foreign languages and involves advanced work in three literatures, one of which may be English. Interested students should consult a Department of English adviser, but faculty from Comparative Literature may also provide useful supplementary information.

The requirements are as follows:

1. Knowledge of the basic structure of the English language and of Chaucer. This requirement may be met by examination, or by taking 10 units of courses chosen from among those offered in linguistics, English philology, and early and middle English literature including Chaucer. No particular courses are required of all students.
2.

		Units
ENGLISH 396	Introduction to Graduate Study for Ph.D. Students	5
ENGLISH 396L	Pedagogy Seminar I	2
3. Completion, in Autumn Quarter of the second year, of a pedagogy seminar, which includes the Apprentice Teaching Program described above, and a series of pedagogy workshops during winter and spring quarter. There are no units associated with this work.
4. A knowledge of one foreign language sufficient to take graduate-level literature courses in a foreign-language department and an advanced reading knowledge of a second language.
5. A minimum of 45 units in the history, thought, and literature of one period, in two or more languages, one of which must be English and one foreign. Students normally include at least two courses in a foreign literature read in the original language and two courses listed under Comparative Literature or Modern Thought and Literature. As many as 20 units of this requirement may be satisfied through courses in reading and research. A student may receive graduate credit for no more than two 100-level courses in the Department of English.
6. A minimum of six courses for a letter grade from graduate colloquia and graduate seminars, of which three must be graduate seminars and of which at least four must be in the Department of English. Among these courses, students should take one in literary theory or criticism. These colloquia and seminars should be in different genres and periods as approved by the adviser.
7. An oral qualifying examination: see item 9 under requirements of the Ph.D. program in English Literature. For qualifications in the doctoral program in English and Comparative Literature, candidates are not held responsible for literature before 1350, but instead include on their reading list a selection of works from a foreign literature read in the original language.
8. University Oral Examinations—A University oral examination covering the field of concentration (as defined by the student and the student's adviser). This examination, based on a reading list established by the candidate in consultation with his or her adviser, is normally taken no later than the Spring Quarter of the third year of graduate study.
9. Dissertation—As early as possible during graduate study, a Ph.D. candidate is expected to find a topic requiring extensive original research and to seek out a member of the department as his or her adviser. The adviser works with the student to select a committee to supervise the dissertation. Candidates should take this crucial step as early in their graduate careers as possible. The committee may well advise extra preparation within or outside the department, and time should be allowed for such work. After the dissertation topic has been approved, the candidate should file a formal reading committee form as prescribed by the University. The dissertation must be submitted to the adviser as a rough draft, but in substantially final form, at least four weeks before the University deadline in the quarter during which the candidate expects to receive the Ph.D. degree.
10. Committee—The doctoral dissertation reading committee consists of the principal dissertation adviser and two other readers. At least one of these three must be from the English department. Normally, all members are on the Stanford Academic Council.

## Language Requirements

Candidates for the Ph.D. degree (except those in English and Comparative Literature, for whom special language requirements prevail) must demonstrate a reading knowledge of two foreign languages. Candidates in the earlier periods must offer Latin and one of the following languages: French, German, Greek, Italian, or Spanish. In some instances, they may be required to offer a third language. Candidates in the later period (that is, after the Renaissance) must offer either French, German, or Latin as one language and may choose the second language from the following: Greek, Latin, French, German, Italian, Spanish, Russian, or another language relevant to the student's field of study. In all cases, the choice of languages offered must have the approval of the candidate's adviser. Any substitution of another language must be approved by the Director of Graduate Studies.

The graduate studies committee does not accept courses taken as an undergraduate in satisfaction of the language requirement for doctoral candidates. For students coming to doctoral work at Stanford from graduate work done elsewhere, satisfaction of a foreign language requirement is determined by the Director of Graduate Studies based on the contact hours, syllabus, reading list, etc. Transfer is not automatic.

The candidate must satisfy one language requirement by the end of the first year (that is, before the qualifying examination), and the other by the end of the third year.

Foreign language requirements for the Ph.D. may be fulfilled in any of the following ways:

1. A reading examination given each quarter by the various language departments, except for Latin and Greek.
2. For Latin and Greek, an examination given by one of the Department of English faculty.
3. Passage with a grade of 'B' or higher of a course in literature numbered 100 or higher in a foreign language department at Stanford. As an alternative for Latin, French, Italian, German, and Spanish, passage of the following, respectively, with a grade of 'B' or higher:

		Units
CLASSLAT 10	Intensive Beginning Latin	9-15
FRENLANG 250	Reading French	4
FRENLANG 250S	Reading French	2-4
GERLANG 250	Reading German	4
ITALLANG 250	Reading Italian	4
SPANLANG 250	Reading Spanish	3

*Emeriti: (Professors)* George H. Brown, W. B. Carnochan, W. S. Di Piero, John Felstiner, Albert J. Gelpi, Barbara C. Gelpi, David Halliburton, Shirley Heath, John L'Heureux, Herbert Lindenberger, Andrea A. Lunsford, Thomas C. Moser, Nancy H. Packer, Marjorie G. Perloff, Robert M. Polhemus, Arnold Rampersad, Ronald A. Rebholz, David R. Riggs, Lawrence V. Ryan, Wilfred H. Stone, Elizabeth C. Traugott, Wesley Trimpi; *(Associate Professor)* Sandra Drake; *(Professor, Teaching)* Larry Friedlander; *(Senior Lecturer)* Helen B. Brooks; *(Lecturer)* David MacDonald

*Chair:* Gavin Jones

*Director of Creative Writing Program:* Eavan Boland

*Director of Program in Writing and Rhetoric:* Nicholas Jenkins

*Professors:* John B. Bender (English, Comparative Literature), Eavan Boland, Terry Castle, Michele Elam, J. Martin Evans, Kenneth W. Fields, Shelley Fisher Fishkin, Denise Gigante (on leave), Roland Greene (English, Comparative Literature), Gavin Jones, Mark McGurl, Franco Moretti (English, Comparative Literature, on leave), Sianne Ngai, Stephen Orgel, Patricia A. Parker (English, Comparative Literature), Peggy Phelan (English, Drama), Nancy Rutenburg, Ramón Saldívar (English,

Comparative Literature), Jennifer Summit (on leave), Elizabeth Tallent (on leave Winter), Elaine Treharne, Blakey Vermeule, Tobias Wolff

*Associate Professors:* Blair Hoxby, Nicholas Jenkins, Adam Johnson, Paula Moya, Alex Woloch

*Assistant Professors:* Claire Jarvis, Michelle Karnes (on leave), Saikat Majumdar, G. Vaughn Rasberry, Stephen Sohn

*Senior Lecturer:* Judith Richardson, Christopher Rovee (Autumn only)

*Courtesy Professors:* David Palumbo-Liu, Bryan Wolf

*Courtesy Associate Professor:* Joshua Landy

*Lecturers:* Mark Algee-Hewitt, Molly Antopol-Johnson, Harriet Clark, Marvin Diogenes, Steffi Dippold, Keith Ekiss, John Evans, Sarah Frisch, Jillian Hess, Maria Hummel, Scott Hutchins, Tom Kealey, Dana Kletter, Peter Kline, Hilton Obenzinger, Brittany Perham, Phoebe Putnam, Kirstin Quade, Nina Schloesser, Bruce Snider, Stephanie Soileau, Adena Spingarn, Alice Staveley, Shimon Tanaka, Greg Wrenn

*Consulting Professor:* Valerie Miner

*Visiting Professors:* Anne Carson, Richard Powers

## Overseas Studies Courses in English

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/english/http://bosp.stanford.edu>).

		Units
OSPOXFRD 17	Novels of Sensation: Gothic, Detective Story, Prohibition, and Transgression in Victorian Fiction	5
OSPOXFRD 57	The Rise of the Woman Writer 1660-1860	5
OSPOXFRD 60	Shakespeare and his Contemporaries	5
OSPOXFRD 163X	Shakespeare: Critical Commentary	5

## Ethics in Society Program

Courses offered by the Program in Ethics in Society are listed under the subject code ETHICSOC on the Stanford Bulletin's ExploreCourses (<https://explorecourses.stanford.edu/search?q=ETHICSOC&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-ETHICSOC=on&filter-catalognumber-ETHICSOC=on>) web site. There are many course offerings at Stanford that address moral and political questions only some of which are crosslisted by the Program in Ethics in Society.

The Program in Ethics in Society, which operates under the umbrella of the Bowen H. McCoy Family Center for Ethics in Society, is designed to foster scholarship, teaching, and moral reflection on fundamental issues in personal and public life. The program is grounded in moral and political philosophy, but it extends its concerns across a broad range of traditional disciplinary domains. The program is guided by the idea that ethical thought has application to current social questions and conflicts, and it seeks to encourage moral reflection and practice in areas such as business, international relations, law, medicine, politics, science, and public service.

The Program in Ethics in Society offers an interdisciplinary honors program that is open to undergraduate students in all majors and a minor.

## Honors in Ethics in Society

The Program in Ethics in Society offers undergraduates the opportunity to write a senior honors thesis within a community of interdisciplinary scholars. The course of study combines the analytical rigor of moral and political philosophy with the subject matter of each student's self-chosen major to develop a sophisticated understanding of problems of social concern. Such problems include: the nature and implications of treating people with equal dignity and respect; the scope of liberty; the legitimacy of government; and the meaning of responsibility. The program poses these issues and others in the context of debates which arise in our common public life. It thus extends moral concern and reflection across disciplines such as medicine, law, economics, political science, sociology, international relations, and public policy.

Students in the program write honors theses on topics which use moral and political philosophy to address practical problems. Previous theses have considered questions such as the just distribution of health care, obligations to future generations, the role of moral values in education, the moral implications of genetic engineering, and the relationship between gender inequality and the structures of work and family. Students in the program have won scholarships to graduate study including Marshall, Rhodes, and Fulbright fellowships. Others have taken the step from moral analysis to moral commitment, pursuing careers of public service.

The honors program in Ethics in Society is open to majors in every field and must be taken in addition to a department major. Applicants should have a cumulative grade point average (GPA) of 3.3 (B+) or higher. They should also maintain this minimum average in the courses taken to satisfy the requirements. Required courses must be taken for a letter grade.

Students interested in pursuing honors in Ethics in Society can apply for early acceptance in June of their sophomore year or the regular deadline in mid November of their junior year. Students should contact the program coordinator for more information and to begin the application process.

### Requirements

	Units
ETHICSOC 20 Introduction to Moral Philosophy or ETHICSOC Ethical Theory 170	4-5
ETHICSOC 171 Justice	4-5
ETHICSOC 190 Ethics in Society Honors Seminar	3
Two 4- or 5-unit undergraduate courses on a subject approved by the faculty director, designed to support research conducted for or connected to the honors thesis.	8-10
ETHICSOC Ethics in Society Honors Thesis 200A	5
ETHICSOC Ethics in Society Honors Thesis 200B	5

Thesis subject must be approved by the honors adviser and students must receive a grade of 'B+' or higher on their thesis to receive honors in Ethics in Society.

Typically, ETHICSOC 20 or ETHICSOC 170 and ETHICSOC 171 are completed before the Winter Quarter of the junior year. ETHICSOC 190 is offered only in Winter Quarter and should be taken in the junior year. Specialization courses can be completed at any time and courses taken prior to acceptance in the Program can be used to fulfill this requirement.

The honors thesis is written during Autumn and Winter quarters of the senior year and is generally due the first Monday in May. Students also complete preliminary and final thesis presentations in the senior year and an oral examination after submission of the thesis. To receive honors in Ethics in Society, students must fulfill all requirements and receive a grade of 'B+' or higher on their thesis. Courses taken to fulfill the Ethics in Society honors requirements may be double-counted for any major. Exceptions to this must be approved by the faculty director.

## Minor in Ethics in Society

The Ethics in Society minor is open to students in any department who wish to explore moral issues in personal and public life.

Students must declare the minor in Access no later than the last day of Autumn Quarter of their senior year, although they are advised to declare sooner. The student should discuss the minor with an adviser and prepare a proposal that includes a list of courses planned to fulfill the requirements, theme of minor study, and the name of the faculty adviser. The faculty director approves this proposal. Students interested in pursuing a minor in Ethics in Society should contact the program coordinator for more information and to begin the planning process.

A minor in Ethics in Society requires six courses for a minimum of 25 and a maximum of 30 units and courses must be taken for a letter grade.

### Requirements

	Units
ETHICSOC 20 Introduction to Moral Philosophy or ETHICSOC Ethical Theory 170	4-5
ETHICSOC 171 Justice	4-5
Three courses at the 100-level or above that addresses some dimensions of moral or political problems, in either theory or practice, relating to theme of minor.	14-15
One course at the 200-level or above that addresses some dimensions of moral or political problems, in either theory or practice, relating to theme of minor.	3-5

The 100- and 200-level courses should be focused around a central theme such as biomedical ethics, ethics and economics, ethics and politics, or environmental ethics (or a theme approved by the faculty director). The courses at the 100 and 200 level are normally taken after completion of the core courses.

See the course list in the "Related Courses (p. 391)" section of this bulletin for approved 100- and 200-level courses taken by students in recent years. The faculty director may approve additional courses.

Courses credited to the Ethics in Society minor may not be double-counted toward major requirements.

*Faculty Director:* Rob Reich

*Affiliated Faculty:* Kenneth Arrow (Economics, emeritus), Donald Barr (Pediatrics), Barton Bernstein (History), Michael Bratman (Philosophy), Eamonn Callan (Education), Albert Camarillo (History), Joshua Cohen (Philosophy, Political Science, Law), Barbara Fried (Law), Leah Gordon (Education), Nadeem Hussain (Philosophy), Allyson Hobbs (History), Aishwary Kumar (History), Scotty McLennan (Dean of Religious Life), Benoit Monin (Psychology, Graduate School of Business), Josiah Ober (Classics, Political Science), Eric Roberts (Computer Science), Debra Satz (Philosophy), Tamar Schapiro (Philosophy, on leave), Mitchell Stevens

(Education), David K. Stevenson (Pediatrics), Allen Wood (Philosophy, emeritus), Sylvia Yanagisako (Anthropology), Lee Yearley (Religious Studies)

## Related Courses

This is a partial list of courses that have been counted as specialization courses (honors requirement) or 100- and 200-level courses (minor requirement) in recent years. Courses not on this list may be submitted to the faculty director for approval.

		<b>Units</b>
ANTHRO 90B	Theory of Cultural and Social Anthropology	5
ANTHRO 179	Cultures of Disease: Cancer	5
BIOMEDIN 109Q	Genomics: A Technical and Cultural Revolution	3
CLASSGEN 81	Philosophy and Literature	5
COMM 131	Media Ethics and Responsibility	4-5
COMM 182	Virtual Communities and Social Media	4-5
CS 181	Computers, Ethics, and Public Policy	4
ECON 118	Development Economics	5
EDUC 165/265	History of Higher Education in the U.S.	3-5
EDUC 201	History of Education in the United States	3-5
EDUC 216X	Education, Race, and Inequality in African American History, 1880-1990	3-5
EDUC 220C	Education and Society	4-5
EDUC 247	Moral Education	3
HISTORY 209C	Liberalism and Violence	5
HUMBIO 122S	Social Class, Race, Ethnicity, and Health	4
HUMBIO 129	Critical Issues in International Women's Health	4
HUMBIO 172B	Children, Youth, and the Law	5
HUMBIO 174	Foundations of Bioethics	3
IPS 241	International Security in a Changing World	5
INTNLREL 140A	International Law and International Relations	5
MS&E 254	The Ethical Analyst	1-3
POLISCI 1	Introduction to International Relations	5
POLISCI 122	Introduction to American Law	3-5
POLISCI 123	Politics and Public Policy	4-5
PUBLPOL 106	Law and Economics	4-5
PUBLPOL 183	Philanthropy and Social Innovation	4
URBANST 131	Social Innovation and the Social Entrepreneur	1

Ethics in Society (ETHICSOC) courses given this year are listed here by quarter offered. Each quarter is linked to ExploreCourses where you can find times and locations.

## Autumn Quarter

ExploreCourses: ETHICSOC courses offered Autumn Quarter (<https://explorecourses.stanford.edu/search?q=ethicsoc&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-ethicsoc=on&filter-catalognumber-ethicsoc=on>)

		<b>Units</b>
ETHICSOC 171	Justice	4-5
ETHICSOC 183M	Family, Friends, and Groups: The Ethics of Association	4

ETHICSOC 184M	Population Ethics	4
ETHICSOC 200A	Ethics in Society Honors Thesis	5

## Winter Quarter

ExploreCourses: ETHICSOC courses offered Winter Quarter (<https://explorecourses.stanford.edu/search?q=ethicsoc&view=catalog&page=0&catalog=71&filter-term-Winter=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-ethicsoc=on&filter-catalognumber-ethicsoc=on>)

		<b>Units</b>
ETHICSOC 20	Introduction to Moral Philosophy	5
ETHICSOC 174A	Moral Limits of the Market	4
ETHICSOC 178M/278M	Introduction to Environmental Ethics	5
ETHICSOC 180M	Collective Action: Ethics and Policy	4
ETHICSOC 190	Ethics in Society Honors Seminar	3
ETHICSOC 200B	Ethics in Society Honors Thesis	5

## Spring Quarter

ExploreCourses: ETHICSOC courses offered Spring Quarter (<https://explorecourses.stanford.edu/search?q=ethicsoc&view=catalog&page=0&catalog=71&filter-term-Spring=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-ethicsoc=on&filter-catalognumber-ethicsoc=on>)

		<b>Units</b>
ETHICSOC 131S	Modern Political Thought	5
ETHICSOC 136R	Introduction to Global Justice	5
ETHICSOC 170	Ethical Theory	4
ETHICSOC 182M	Business Ethics	4
ETHICSOC 185M	Contemporary Moral Problems	5
ETHICSOC 232T	Theories of Civil Society, Philanthropy, and the Nonprofit Sector	5
ETHICSOC 237M	Politics and Evil	5
ETHICSOC 280	Transitional Justice, International Criminal Tribunals, and the International Criminal Court	3-5

## Feminist Studies

Courses offered by the Program in Feminist Studies are listed under the subject code FEMST on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=FEMST&filter-catalognumber-FEMST=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=FEMST&filter-catalognumber-FEMST=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=FEMST&filter-catalognumber-FEMST=on>).



The Program in Feminist Studies offers an undergraduate major and minor, and an interdisciplinary honors program that is open to students in all majors. Each Feminist Studies student builds an individual program of study around a self-defined thematic focus, integrating courses from multiple departments. The program encourages work in the arts and supports creative honors theses. Feminist Studies majors may declare LGBT/Queer Studies as a subplan. The LGBT/Queer Studies subplan is appropriate for fields of study focusing on history and theories of lesbian, gay, bisexual, transgender, and queer identities, communities, cultural practices, politics, and legal and medical issues.

Curriculum guidelines and forms for the undergraduate major, minor, and honors programs are available on the program web site (<https://feminist.stanford.edu/undergraduates>). See the program web site for additional contact information (<https://feminist.stanford.edu/about>).

Feminist Studies awards the annual Michelle Z. Rosaldo Prizes (<https://feminist.stanford.edu/undergraduates/prizes>) and Francisco Lopes Prize (<https://feminist.stanford.edu/undergraduates/prizes>) for the best undergraduate scholarship on women, feminism, gender, or sexuality. The Rosaldo Prizes are awarded for the best essay and honors thesis or master's paper in the social sciences, and the Lopes Prize for the best essay and honors thesis or master's paper in the humanities. The Diane Middlebrook Graduate Teaching Prize (<https://feminist.stanford.edu/graduate-students/prizes>) is awarded each year to an outstanding graduate student teaching assistant or teaching fellow for their feminist pedagogy in classes on feminism, gender, and sexuality studies.

## Mission of the Undergraduate Program in Feminist Studies

The interdepartmental Program in Feminist Studies provides students with knowledge and skills to investigate the significance of gender and sexuality in all areas of human life. Feminist Studies examines how societies structure gender roles, relations, and identities, and how these intersect with other hierarchies of power, such as class, race, nationality, ethnicity, sexuality, ability, and age. The program coordinates courses offered across the University in feminist and lesbian, gay, bisexual, transgender, and queer studies. Students learn to employ critical gender and sexuality studies methodologies to analyze the assumptions about gender and sexuality that inform the study of individuals, cultures, social institutions, policy, and areas of scholarly inquiry. The program prepares majors for graduate study in humanities and social sciences, and for professional schools.

## Learning Outcomes (Undergraduate)

The program expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the undergraduate program. Students are expected to demonstrate:

1. knowledge of the histories of feminist and/or LGBT/queer social movements and their intersections with other social justice movements.
2. understanding of how social hierarchies related to gender, sexuality, race and ethnicity have developed historically, cross-culturally, and transnationally.
3. knowledge and comprehension of feminist and/or LGBT/queer theories and methods for social, historical, literary, and cultural analysis.
4. skill in making and communicating feminist and/or LGBT/queer analyses of data, texts, and arguments.

## Bachelor of Arts in Feminist Studies

The major in Feminist Studies requires 63 units and may be taken as a single major, as one of multiple majors, or as a secondary major. If taken as one of multiple majors, none of the 63 units counted toward the major in Feminist Studies may overlap with units counted toward the major in another department or program. If taken as a secondary major, up to 30 of the units counted toward the Feminist Studies major may also be counted as fulfilling the major requirements in another department or program if that department or program consents. A maximum of 10 of the 63 units for the major may be taken on a credit/no credit or satisfactory/no credit basis; a maximum of 10 units may be taken as independent study or directed reading. FEMST core courses must be taken for a letter grade.

The major should be declared before the beginning of the junior year. Students declare the major by developing a proposal with the help of the Program Coordinator and a faculty adviser from the list of resource faculty. The proposal describes the student's thematic focus and outlines a course of study. The proposal must be approved by the faculty adviser and the Program Director.

### Curriculum

The major in Feminist Studies includes a total of at least 12 courses at the 100 level or above for 63 units. The courses are divided among the core, the focus, and electives to reach the total course requirement.

### The Core

		Units
<b>1. Introductory Course (4-5)</b>		
FEMST 101	Introduction to Feminist Studies	4-5
<b>2. Feminist Theories and Method (2-5)</b>		
FEMST 103	Feminist Theories and Methods Across the Disciplines (Offered again 2013-14; FEMST 101 is a prerequisite)	2-5
<b>3. Junior and Senior Seminars and Practica (3)</b>		
FEMST 104A	Junior Seminar and Practicum	1
FEMST 104B	Senior Seminar and Practicum	2
<b>4. One feminist theory course from approved course list below. (3-5)</b>		
Consult the program mentor for past approved theory courses.		
FEMST 120	Introduction to Queer Studies	
AMSTUD 210	Critical Theory and The Environment	
AMSTUD 261F	Gender and Sexuality in Asian American Literature	
ANTHRO 90A	History of Archaeological Thought	
COMPLIT 133	Gender and Modernism	
COMPLIT 250	Literature, History and Memory	
ENGLISH 261F	Gender and Sexuality in Asian American Literature	
ENGLISH 362S	Trauma Theory, Psychoanalysis and Asian American Literature	
FEMST 110	Introduction to Comparative Queer Literary Studies	
FEMST 140E	Black (W)holes: Queering Afro-Futurism	
FEMST 140P	Queer Art and Performance	

**5. One Feminist Studies or a related course in the social sciences (3-5)** 3-5

Subjects include Anthropology, Communication, Education, History, Human Biology, Law, Medicine, Political Science, Psychology, or Sociology

**6. One Feminist Studies or a related course in the humanities (3-5)** 3-5

Subjects include English, Linguistics, Philosophy, Religious Studies, the arts, and languages

Total Units 18-28

## Practicum

The practicum courses (FEMST 104A Junior Seminar and Practicum, FEMST 104B Senior Seminar and Practicum) bring together theory and practical experience. The practicum involves field research, community service, or other relevant experience such as a public service internship. Students plan their practicum during Winter Quarter of the junior year in FEMST 104A Junior Seminar and Practicum (1 unit). The practicum is normally done over the summer between junior and senior year, and may be taken for additional units. It is followed by FEMST 104B Senior Seminar and Practicum (2 units), in Autumn Quarter of the senior year. During 2012-13 both 104A and 104B are scheduled in Winter Quarter.

## The Focus

Every student designs a thematic focus consisting of at least five courses in addition to the core. The thematic focus is not declared in Axess. It does not appear on the transcript or diploma. Note: Majors focusing on LGBT/Queer Studies may declare the LGBT/Queer Studies subplan. See section below.

- The student designs his/her thematic focus in consultation with a faculty adviser. The following are examples, and students are encouraged to develop new ones:
  - Chicana Feminisms
  - Crosscultural Perspectives on Gender
  - Feminist Perspectives on Science and Technologies
  - Gender and Education
  - Gender, Race, and Nation/Transnational Feminisms
  - Gender Justice and Human Rights
  - Race, Class and Gender
  - Women, Creativity, and the Arts
  - Gender, Health and Medicine
  - Gender, Spirituality and Religion

2. At least three of the focus courses should be Feminist Studies or related courses.

3. At least one course should be a major survey, methodology, or theory course offered by a department or interdepartmental program as an initiation into the practice of study in the field.

4. At least one course within the thematic focus should address race/ethnicity and/or global perspectives.

## Electives

Students are encouraged to take electives that provide intellectual breadth and contribute to the 63-unit requirement.

## Writing in the Major (WIM)

Majors in Feminist Studies may satisfy the Writing in the Major (WIM) requirement by taking FEMST 153 Women and the Creative Imagination, or one of the approved WIM courses in the list below. Honors students satisfy the WIM requirement through their honors work.

**WIM Courses for Majors (4-5)** 4-5

AMSTUD 160	Perspectives on American Identity	
ANTHRO 90A	History of Archaeological Thought	
ANTHRO 90B	Theory of Cultural and Social Anthropology	
FEMST 153	Women and the Creative Imagination	
LINGUIST 150	Language in Society	

Total Units 4-5

## LGBT/Queer Studies Subplan

Feminist Studies majors may declare LGBT/Queer Studies as a subplan. The LGBT/Queer Studies subplan is appropriate for fields of study focusing on history and theories of lesbian, gay, bisexual, transgender, and queer identities, communities, cultural practices, politics, and legal and medical issues. Transnational and comparative perspectives on LGBT/Queer identities and politics are particularly encouraged. The subplan is declared in AXESS and subplan designations appear on the official transcript, but are not printed on the diploma.

Students declaring the LGBT/Queer Studies subplan must meet all the Feminist Studies major requirements. In addition to all Feminist Studies core courses required for the major, the LGBT/Queer Studies subplan requires that students complete FEMST 120 Introduction to Queer Studies. At least 3 of the focus courses should be in the area of LGBT/Queer studies, chosen in consultation with and approved by the student's faculty adviser.

## Curriculum

A total of at least 12 courses at the 100 level or above for 63 units are required for the LGBT/Queer Studies subplan. The courses are divided among the core, the focus, and electives to reach the total course requirement.

## The Core

Units

**1. Introductory Courses (8-10)**

FEMST 101	Introduction to Feminist Studies	4-5
FEMST 120	Introduction to Queer Studies	4-5

**2. Theory and Methods (FEMST 101 is a prerequisite of FEMST 103) (2-5)**

FEMST 103	Feminist Theories and Methods Across the Disciplines (Taught in 13-14; FEMST 101 is a prerequisite of FEMST 103)	2-5
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**3. Junior and Senior Seminars and Practica (3)**

FEMST 104A	Junior Seminar and Practicum	1
FEMST 104B	Senior Seminar and Practicum	2

**4. One feminist theory course from approved course list below. (3-5)**

Consult the program mentor for current and past approved theory courses.

AMSTUD 210	Critical Theory and The Environment	
AMSTUD 261F	Gender and Sexuality in Asian American Literature	
ANTHRO 90A	History of Archaeological Thought	

COMPLIT 133	Gender and Modernism	
COMPLIT 250	Literature, History and Memory	
ENGLISH 261F	Gender and Sexuality in Asian American Literature	
ENGLISH 362S	Trauma Theory, Psychoanalysis and Asian American Literature	
FEMST 110	Introduction to Comparative Queer Literary Studies	
FEMST 140E	Black (W)holes: Queering Afro-Futurism	
FEMST 140P	Queer Art and Performance	
<b>5. One Feminist Studies or a related course in the social science (3-5)</b>		3-5
Subjects include Anthropology, Communication, Education, History, Human Biology, Law, Medicine, Political Science, Psychology, or Sociology		
<b>6. One Feminist Studies or a related course in the humanities (3-5)</b>		3-5
Subjects include English, Linguistics, Philosophy, Religious Studies, the arts, and languages		
Total Units		22-33

At least one course should be a major survey, methodology, or theory course offered by a department or IDP as an initiation into the practice of study in the field.

## Practicum

The practicum courses (FEMST 104A Junior Seminar and Practicum, FEMST 104B Senior Seminar and Practicum) bring together theory and practical experience. The practicum involves field research, community service, or other relevant experience such as a public service internship. Students plan their practicum during Winter Quarter of the junior year in FEMST 104A Junior Seminar and Practicum (1 unit). The practicum is normally done over the summer between junior and senior year, and may be taken for additional units. It is followed by FEMST 104B Senior Seminar and Practicum (2 units), in Autumn Quarter of the senior year. During 2012-13 both 104A and 104B are scheduled in Winter Quarter.

## The Focus

Students in the LGBT/Queer Studies subplan design their thematic focus in LGBT/Queer Studies. The focus consists of at least five courses in addition to the core. At least three of the five focus courses should be FEMST or related courses with significant LGBT/Queer Studies content and at least one course should address race/ethnicity and/or global perspectives on LGBT/Queer issues. The focus is designed in consultation with the student's adviser.

## Electives

Students are encouraged to take electives that provide intellectual breadth and contribute to the 63-unit requirement.

## Overseas Studies Courses in Feminist Studies

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/feministstudies/http://explorecourses.stanford.edu>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/feministstudies/http://bosp.stanford.edu>) web site. Students should consult the Program Coordinator for applicability of Overseas Studies courses to a major or minor program.

# Honors Program in Feminist Studies

## For Majors in Feminist Studies

**Admission**—The honors program offers an opportunity to do independent research for a senior thesis. It is open to students with a grade point average (GPA) of 3.3 or better in course work in Feminist Studies. Students must begin the application process for honors certification by consulting with the Program Director by May 1 of their junior year, but are encouraged to apply earlier. During the application process, students will design a project in consultation with their proposed thesis adviser and the Feminist Studies staff. A proposal describing the project and the number of units to be taken toward the honors directed project must be submitted to the Program Director for final approval. All projects must have a primary focus on gender or sexuality. See the Honors section of our web site for details.

## Requirements

1. In addition to the normal requirements for the major, students enroll with their honors thesis adviser for 10-15 units of FEMST 105 Honors Work towards the preparation of the honors thesis. These units may be distributed throughout the academic year.
2. Throughout the senior year, students work with faculty advisers and meet quarterly as a group. A semifinal draft of the thesis will be due during the 5th week of spring quarter of their senior year. The final thesis must be submitted by the Monday of the last week of classes in the Spring. The completed thesis must be submitted with the Thesis Completion Form, which requires the adviser's signature of approval. Creative projects must include a section of critical analysis. For guidelines, see the Honors section of our web site.

## For Majors in Other Departments

Interdisciplinary Honors in Feminist Studies for majors in other departments or programs, as distinguished from honors for students pursuing a major in Feminist Studies, is intended to complement study in any major. Feminist Studies minors who wish to pursue honors in Feminist Studies should apply through the process for non-majors.

## Admission

The Feminist Studies honors program is open to students majoring in any field with a GPA of 3.3 or better.

As a prerequisite, students must complete the following with a grade of 'B+' or better:

1. Either FEMST 101 Introduction to Feminist Studies *or* FEMST 120 Introduction to Queer Studies, *and* one designated feminist theory course, *or*
2. Three Feminist Studies courses and/or related courses relevant to the topic of their proposed honors research.

Students must begin the application process for honors by consulting with the Program Director by May 1st of their junior year, but are encouraged to begin earlier. During the application process, students outline a plan for course work and design an honors project in consultation with their proposed thesis adviser. The final proposal describing the project and the number of units to be taken toward the honors directed project must be submitted to the Program Director for final approval. See the Honors section of our web site for more details.

## Requirements

1. Students enroll with their honors thesis adviser for 10-15 units of FEMST 105 Honors Work towards the preparation of the honors thesis. These units may be distributed throughout the academic year.
2. Throughout the senior year, students work with faculty advisers and meet quarterly as a group. The final thesis must be submitted by the Monday of the last week of classes in the Spring of their senior year. The completed thesis must be submitted with the Thesis Completion Form, which requires the adviser's signature of approval. Creative projects must include a section of critical analysis. For additional guidelines, see the honors section of the program web site (<https://feminist.stanford.edu/undergraduates/honors-program>).

## Minor in Feminist Studies

Students interested in minoring in Feminist Studies should consult the Program Coordinator. The minor proposal should be drafted in discussion with a faculty adviser selected from the Feminist Studies resource faculty list.

The minor in Feminist Studies consists of at least six courses at the 100 level or above for a minimum of 30 and a maximum of 36 units. None of the units for the minor may count towards the student's major. The minor in Feminist Studies should be declared by Winter Quarter of a student's junior year.

## Requirements

	Units
<b>1. Introductory Course (4-5)</b>	
FEMST 101 Introduction to Feminist Studies	4-5
<b>2. One of the feminist theory courses from the approved course list below (3-5)</b>	
FEMST 103 (FEMST 101 is a prerequisite of FEMST 103)	
FEMST 120 Introduction to Queer Studies	
AMSTUD 210 Critical Theory and The Environment	
AMSTUD 261F Gender and Sexuality in Asian American Literature	
ANTHRO 90A History of Archaeological Thought	
COMPLIT 133 Gender and Modernism	
COMPLIT 250 Literature, History and Memory	
ENGLISH 261F Gender and Sexuality in Asian American Literature	
ENGLISH 362S Trauma Theory, Psychoanalysis and Asian American Literature	
FEMST 110 Introduction to Comparative Queer Literary Studies	
FEMST 140E Black (W)holes: Queering Afro-Futurism	
FEMST 140P Queer Art and Performance	
Total Units	7-10

## The Focus

At least 4 of the courses for the minor should relate to a thematic focus defined by the student and faculty adviser. See the suggested clusters listed in the "Bachelor of Arts in Feminist Studies (p. 392)" section of this bulletin. At least one course within the thematic focus should address race/ethnicity and/or global perspectives on feminist, gender, and sexuality.

## Interim Program Director 2012-13

Christine Min Wotipka (Education)

## Program Committee

The Interim Program Director, whose term begins September 1, will announce the membership of the 2012-13 Program Committee here on September 1, 2012.

## Resource Faculty

*American Studies:* Shelley Fisher Fishkin

*Anthropology:* Kathleen Coll, Paulla Ebron, Miyako Inoue, S. Lochlann Jain, Matthew Kohrman, Barbara Voss, Sylvia Yanagisako

*Art and Art History:* Terry Berlier, Pamela Lee, Jean Ma, Richard Meyer

*Comparative Literature:* Petra Dierkes-Thrun, Patricia Parker

*Developmental Biology:* Ellen Porzig

*East Asian Languages and Cultures:* Haiyan Lee, Yoshiko Matsumoto, James Reichert, Melinda Takeuchi

*Education:* Susanna Loeb, Myra Strober (emerita), Christine Min Wotipka

*English:* Eavan Boland, Helen Brooks, Terry Castle, Michele Elam, Shelly Fisher Fishkin, Barbara Gelpi (emerita), Claire Jarvis, Andrea Lunsford, Paula Moya, Stephen Orgel, Ramón Saldívar, Stephen Hong Sohn, Jennifer Summit, Elizabeth Tallent

*Feminist Studies:* Nicole Baran, Kathleen Coll, Andrea Rees Davies, Shana Goldin-Perschbacher, Susan Krieger, Valerie Miner, Rabbi Patricia Karlin-Neumann

*French and Italian:* Cecile Alduy, Marisa Galvez, Carolyn Springer

*German Studies:* Russell Berman, Adrian Daub, Kathryn Strachota

*History:* Philippe Buc, Carolyn Lougee Chappell, Paula Findlen, Estelle Freedman, Allyson Hobbs, Katherine Jolluck, Nancy Kollmann, Ana Minian, Paul Robinson (emeritus), Londa Schiebinger, Matthew Sommer, Laura Stokes, Kären Wigen

*Human Biology:* Anne Firth Murray

*Iberian and Latin American Cultures:* Yvonne Yarbro-Bejarano

*Law:* Deborah Rhode, Jane Schachter

*Linguistics:* Penelope Eckert, Rob Podesva

*Medical School:* Ann Arvin, Helen Blau, Gabriel Garcia, Roy King, Cheryl Koopman, Iris Litt (emerita), Leah Millheiser

*Music:* Heather Hadlock

*Philosophy:* Helen Longino, Debra Satz

*Political Science:* Lisa Blaydes, Terry Karl

*Psychology:* Laura Carstensen, Hazel Markus

*Religious Studies:* Charlotte Fonrobert, Hester Gelber, Linda Hess

*Slavic Languages and Literatures:* Monika Greenleaf

*Sociology:* Shelley Correll, Cecilia Ridgeway

*Theatre and Performance Studies:* Jennifer Brody, Harry J. Elam, Leslie Hill, Jisha Menon, Cherríe Moraga, Helen Paris, Peggy Phelan

# Overseas Studies Courses in Feminist Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/feministstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program. Students may count one course from the following list toward a Feminist Studies major or minor.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/feministstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/feministstudies/http://bosp.stanford.edu>).

		Units
OSPBER 174	Sports, Culture, and Gender in Comparative Perspective	5
OSPFLOR 34	The Woman in Florentine Art	4
OSPFLOR 67	Women in Italian Cinema: Maternity, Sexuality, and the Image	4
OSPMADRD 45	Women in Art: Case Study in the Madrid Museums	4
OSPOXFRD 57	The Rise of the Woman Writer 1660-1860	5
OSPOXFRD 117W	Gender and Social Change in Modern Britain	4-5
OSPPARIS 60	Representations of Women in Christian Art: Boldness and Virtue	4
OSPSANTG 14	Women Writers of Latin America in the 20th Century	4-5

## Related Courses

The following is a partial list of related courses for Feminist Studies scheduled for 2012-13. See ExploreCourses for course descriptions and General Education Requirements (GER) information. See degree requirements above or check with the program mentor for applicability of these courses toward specific major or minor program requirements.

		Units
AFRICAAM 54N	African American Women's Lives	3-4
AFRICAAM 255	Racial Identity in the American Imagination	4-5
AMSTUD 114N	Visions of the 1960s	5
AMSTUD 150C	The United States in the Twentieth Century	5
AMSTUD 156H	Women and Medicine in US History: Women as Patients, Healers and Doctors	5
AMSTUD 161	Women in Modern America	4-5
AMSTUD 183	Border Crossings and American Identities	5
AMSTUD 201	History of Education in the United States	3-5
AMSTUD 210	Critical Theory and The Environment	3-5
AMSTUD 214	The American 1960s: Thought, Protest, and Culture	5
AMSTUD 255D	Racial Identity in the American Imagination	4-5
AMSTUD 258	Topics in the History of Sexuality: Sexual Violence	4-5
AMSTUD 261F	Gender and Sexuality in Asian American Literature	5
AMSTUD 265	Writing Asian American History	5

AMSTUD 267	Religion in Twentieth Century American Life	5
ANTHRO 132	Religion and Politics in the Muslim World	5
ANTHRO 201	Introduction to Cultural and Social Anthropology	5
ANTHRO 282	Medical Anthropology	3-5
ANTHRO 349	Anthropology of Capitalism	5
ARTHIST 176	Feminism and Contemporary Art	4
ASNAMST 100C	EAST House Seminar: Current Issues and Debates in Education	1
CHILATST 176S	Religion and the Politics of Culture in Chicana/o & Latina/o America	5
CHINGEN 135	Chinese Bodies, Chinese Selves	3-5
CHINGEN 150	Sex, Gender, and Power in Modern China	3-5
CLASSGEN 134	Early Christianity, Early Judaism, and Gender	4
COMPLIT 133	Gender and Modernism	3-5
COMPLIT 250	Literature, History and Memory	3-5
CSRE 127B	The Pleasure Principle: A Post-Hip Hop Search for a Black Feminist Politics of Pleasure	3
CSRE 162	Women in Modern America	4-5
CSRE 177	Writing for Performance: The Fundamentals	5
CSRE 179G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5
CSRE 183	Border Crossings and American Identities	5
CSRE 192E	Topics in the History of Sexuality: Sexual Violence	4-5
CSRE 200	Latin@ Literature	3-5
CSRE 255D	Racial Identity in the American Imagination	4-5
EDUC 100A	EAST House Seminar: Current Issues and Debates in Education	1
EDUC 100B	EAST House Seminar: Current Issues and Debates in Education	1
EDUC 100C	EAST House Seminar: Current Issues and Debates in Education	1
EDUC 143	Boys' Psychosocial Development	3
EDUC 173	Gender and Higher Education: National and International Perspectives	4
EDUC 193G	Psychological Well-Being on Campus: A Focus on Gender and Sexual Identities	1
ENGLISH 115A	Shakespeare and Modern Critical Developments	5
ENGLISH 134	The Marriage Plot	5
ENGLISH 153J	Virginia Woolf: Form, Function, Feminism	5
ENGLISH 261F	Gender and Sexuality in Asian American Literature	5
ENGLISH 362S	Trauma Theory, Psychoanalysis and Asian American Literature	5
FAMMED 245	Women and Health Care	1
FILMSTUD 102	Theories of the Moving Image	4
HISTORY 93	Late Imperial China	3
HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present	5
HISTORY 139	Modern Britain and the British Empire	5
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering	5
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 161	Women in Modern America	4-5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 175B	Transnational Latin American Migration to the United States	5
HISTORY 193	Late Imperial China	5
HISTORY 220G	Demons, Witches, and Priests: Religion and Popular Culture in Russia	4-5

HISTORY 221B	The Woman Question in Modern Russia	5
HISTORY 227	East European Women and War in the 20th Century	4-5
HISTORY 255D	Racial Identity in the American Imagination	4-5
HISTORY 258	Topics in the History of Sexuality: Sexual Violence	4-5
HISTORY 263G	History Through a Life: The Allure of American Biography	4-5
HISTORY 295J	Chinese Women's History	5
HUMBIO 87Q	Women and Aging	5
HUMBIO 125	Current Controversies in Women's Health	2-3
HUMBIO 129	Critical Issues in International Women's Health	4
HUMBIO 140	Sex and Gender Differences in Human Physiology and Disease	2-3
HUMBIO 142	Adolescent Development	4
HUMBIO 143	Adolescent Sexuality	4
ILAC 280	Latin@ Literature	3-5
ILAC 380E	Critical Concepts in Chican@ Literature	3-5
ILAC 389E	Queer of Color Critique: Race, Sex, Gender in Cultural Representations	3-5
INDE 215	Queer Health and Medicine	1
JAPANGEN 187	Romance, Desire, and Sexuality in Modern Japanese Literature	3-4
JAPANGEN 287	Romance, Desire, and Sexuality in Modern Japanese Literature	3-4
LAW 255	Constitutional Law: The Fourteenth Amendment	3
LINGUIST 150	Language in Society	4
MED 108Q	Human Rights and Health	3
MED 242	Physicians and Human Rights	1
OBGYN 216	Current Issues in Reproductive Health	1
OSPFLOR 67	Women in Italian Cinema: Maternity, Sexuality, and the Image	4
OSPKYOCT 198	Gender Issues in Japan	6
OSPOXFRD 57	The Rise of the Woman Writer 1660-1860	5
PEDS 223	Human Rights and Global Health	3
PUBLPOL 125	Law and Public Policy	5
SOC 118	Social Movements and Collective Action	5
SOC 120	Interpersonal Relations	5
SOC 135	Poverty, Inequality, and Social Policy in the United States	5
SOC 140	Introduction to Social Stratification	5
SOC 142	Sociology of Gender	5
SOC 145	Race and Ethnic Relations in the USA	5
SOC 155	The Changing American Family	5

Feminist Studies (FEMST) classes given this year are listed here by quarter offered. Each quarter is linked to ExploreCourses where you can find times and locations.

## Autumn Quarter

ExploreCourses: FEMST courses given Autumn Quarter (<https://explorecourses.stanford.edu/search?q=FEMST&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-FEMST=on&filter-catalognumber-FEMST=on>)

		Units
EDUC 193G	Psychological Well-Being on Campus: A Focus on Gender and Sexual Identities	1
FEMST 105	Honors Work	1-15

FEMST 106	Queer Studies Colloquium	1
FEMST 108	Internship in Feminist Studies	1-5
FEMST 129	Critical Issues in International Women's Health	4
FEMST 138	Violence Against Women: Theory, Issues, and Prevention	3-4
FEMST 140E	Black (W)holes: Queering Afro-Futurism	5
FEMST 153	Women and the Creative Imagination	4-5
FEMST 188N	Imagining Women: Writers in Print and in Person	4-5
FEMST 195	Directed Reading	1-15
FEMST 238	Violence Against Women: Theory, Issues, and Prevention	3-4
FEMST 253	Women and the Creative Imagination	4-5
LAW 255	Constitutional Law: The Fourteenth Amendment	3

## Winter Quarter

ExploreCourses: FEMST courses given Winter Quarter (<https://explorecourses.stanford.edu/search?q=FEMST&view=catalog&page=0&catalog=71&filter-term-Winter=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-FEMST=on&filter-catalognumber-FEMST=on>)

		Units
AMSTUD 261F	Gender and Sexuality in Asian American Literature	5
CSRE 127B	The Pleasure Principle: A Post-Hip Hop Search for a Black Feminist Politics of Pleasure	3
EDUC 100B	EAST House Seminar: Current Issues and Debates in Education	1
ENGLISH 261F	Gender and Sexuality in Asian American Literature	5
FEMST 52N	Spoken Sexuality: Language and the Social Construction of Sexuality	3
FEMST 101	Introduction to Feminist Studies	4-5
FEMST 104A	Junior Seminar and Practicum	1
FEMST 104B	Senior Seminar and Practicum	2
FEMST 105	Honors Work	1-15
FEMST 108	Internship in Feminist Studies	1-5
FEMST 110	Introduction to Comparative Queer Literary Studies	3-5
FEMST 120	Introduction to Queer Studies	4-5
FEMST 129	Critical Issues in International Women's Health	4
FEMST 195	Directed Reading	1-15

## Spring Quarter

ExploreCourses: FEMST courses given Spring Quarter (<https://explorecourses.stanford.edu/search?q=FEMST&view=catalog&page=0&catalog=71&filter-term-Spring=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-FEMST=on&filter-catalognumber-FEMST=on>)

		Units
EDUC 173	Gender and Higher Education: National and International Perspectives	4
FEMST 105	Honors Work	1-15
FEMST 108	Internship in Feminist Studies	1-5
FEMST 139	Rereading Judaism in Light of Feminism	4
FEMST 140D	LGBT/Queer Life in the United States	4-5
FEMST 140P	Queer Art and Performance	4-5
FEMST 195	Directed Reading	1-15
FEMST 210	Queer Almodovar	3-5
FEMST 260	Seminar in Women's Health: Women and Disabilities	5

FEMST 360	Seminar in Women's Health: Women and Disabilities	5
FEMST 389E	Queer of Color Critique: Race, Sex, Gender in Cultural Representations	3-5
HISTORY 175B	Transnational Latin American Migration to the United States	5
LAW 255	Constitutional Law: The Fourteenth Amendment	3
OSPOXFRD 57	The Rise of the Woman Writer 1660-1860	5
PUBLPOL 125	Law and Public Policy	5

# Financial Mathematics

The departments of Mathematics and Statistics (<http://www-stat.stanford.edu>), in close cooperation with the departments of Economics and Management, Science, and Engineering, and the Graduate School of Business, offer an interdisciplinary Master of Science degree in Financial Mathematics. The Financial Mathematics program provides a master's-level education in applied and computational mathematics, statistics, and financial applications.

## Graduate Program in Financial Mathematics

The department offers a Master of Science in Financial Mathematics. University requirements for the M.S. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Financial Mathematics and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

## Master of Science in Financial Mathematics

### Admission

Graduate applicants applying from outside Stanford must visit Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>) before beginning the application process for complete application information and instructions. The department only offers a master's degree in Financial Mathematics. It is the applicant's responsibility to ensure he or she meets all eligibility requirements before applying. Students applying from within Stanford (coterminal undergraduates and Ph.D. students who have passed their qualifying exams) should pay special attention to the "Graduate Degrees (<https://exploreddegrees-nextyear.stanford.edu/graduatedegrees/#text>)" section of this bulletin regarding residency and unit requirements. To be eligible for admission, students are expected to have excelled in the following courses or their equivalent:

### Linear algebra at the level of: (3)

MATH 104	Applied Matrix Theory	3
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### Real analysis (Advanced Calculus) at the level of: (3)

MATH 115	Functions of a Real Variable	3
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### Probability at the level of: (3-5)

STATS 116	Theory of Probability	3-5
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### Theory of statistics at the level of: (3)

STATS 200	Introduction to Statistical Inference	3
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### Stochastic processes at the level of: (3)

STATS 217 or MATH 136	Introduction to Stochastic Processes Stochastic Processes	3
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### Computer programming at the level of: (6-10)

CS 106A	Programming Methodology	3-5
CS 106B	Programming Abstractions	3-5

Some of these courses (e.g., STATS 116 Theory of Probability, STATS 217 Introduction to Stochastic Processes) are usually offered during the Summer Quarter so candidates lacking the required background may consider taking them then. We strongly recommend that current Stanford students apply after mastering the majority of material covered in the prerequisites, and after completing two of the required or elective courses.

For further information on application requirements and instructions, see Admissions (<http://finmath.stanford.edu/admissions/requirements.html>) on the department web site.

## Degree Requirements

The program requires completion of 45 units of course work. With the advice of the faculty adviser and of peer students, each student selects his or her own set of electives and pace of study. All requirements for the Financial Mathematics master's degree must be completed within three years after the student's first term of enrollment in the master's program. Units for a given course may not be counted to meet the requirements of more than one degree, that is, no units may be double-counted. Students pursuing a coterminal master's degree must complete their requirements within three years of their first quarter of graduate standing. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit university minimum requirement for the master's degree. Students who do not complete all requirements within three years of admission will have their program terminated. Ordinarily, four or five quarters are needed to complete all requirements.

Students must fulfill the following requirements for the M.S. degree:

1. Six courses must be taken from the list of required courses (<http://finmath.stanford.edu/academics/required.html>) and six must be taken from the list of elective courses (<http://finmath.stanford.edu/academics/electives.html>), available below. These courses must be taken for a letter grade, but students may elect to take one of the 12 courses for credit/no credit. An overall grade point average (GPA) of 2.75 is required. There is no thesis requirement.

2. Any remaining units required to complete the 45 total must be taken from the following options, and may be taken for a letter grade or CR/NC:

a. Choose from the approved list of electives (<http://finmath.stanford.edu/academics/electives.html>) with emphasis on computation, information technology or finance.

b. Choose from the following courses:

		Units
STATS 200	Introduction to Statistical Inference	3
STATS 217	Introduction to Stochastic Processes	3
STATS 218	Introduction to Stochastic Processes	3
MATH 131P	Partial Differential Equations I	3

MATH 132	Partial Differential Equations II	3
ECON 140	Introduction to Financial Economics	5

c. Choose from CS (practical) courses; must be approved by the Program Director.

d. In the form of an industrial internship in the Bay Area or elsewhere, with the approval and supervision of a faculty member. A written report must be submitted upon completion of the internship. Students who choose to take credit for practical training must sign up for STATS 297 Practical Training (1-3 units).

3. Submission of approved Masters Program Proposal ([http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/financialmathematics/FM-MS\\_Program\\_Proposal\\_Form\\_2012.pdf](http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/financialmathematics/FM-MS_Program_Proposal_Form_2012.pdf)) by the Program Director to the Student Services Officer by the end of the first quarter of the master's degree program.

## Required Courses

In partial fulfillment of the M.S. degree in Financial Mathematics, students must fulfill six required courses, with two from each of the following three core areas:

1. Statistical Methods and Models
2. Modeling, Simulation and Computing
3. Finance

The selection of these courses is to be done in consultation with the Program Director. The following courses can be counted toward the six required courses:

### Mathematics:

		Units
MATH 236	Introduction to Stochastic Differential Equations	3
MATH 238	Mathematical Finance	3
MATH 239	Computation and Simulation in Finance	3

### Statistics:

		Units
STATS 240	Statistical Methods in Finance	3-4
STATS 241	Financial Modeling Methodology and Applications	3-4
STATS 242	Algorithmic Trading and Quantitative Strategies	3
STATS 243	Statistical Models and Methods for Risk Management and Surveillance	3-4
STATS 315B	Modern Applied Statistics: Data Mining	2-3
STATS 362	Monte Carlo	2-3

### Management Science & Engineering:

		Units
MS&E 347	Credit Risk: Modeling and Management	3

### Graduate School of Business:

		Units
FINANCE 622	Dynamic Asset Pricing Theory	4

At the Program Director's discretion, courses taken previously that are equivalent to the above may be waived; in which case they must be replaced by elective courses in the same subject area.

### Elective Courses

Each candidate must take at least six approved elective courses from the list below, with two from each of the three core areas:

1. Statistical Methods and Models
2. Modeling, Simulation and Computing
3. Finance

Other elective courses may be authorized by the Program Director if they provide skills relevant to financial mathematics and do not overlap with courses in the candidate's program.

### Mathematics:\*

		Units
MATH 136	Stochastic Processes	3
MATH 180	Introduction to Financial Mathematics	3
MATH 205A/205B	Real Analysis	3
MATH 227	Partial Differential Equations and Diffusion Processes	3
MATH 256A/265B	Partial Differential Equations	3
MATH 261A/261B	Functional Analysis	3
MATH 266	Computational Signal Processing and Wavelets	3

\* MATH 237 is not offered this year, but the department may offer it next year. If so, this course may be used in fulfillment of this requirement.

### Statistics:

		Units
STATS 202	Data Mining and Analysis	3
STATS 206	Applied Multivariate Analysis	3
STATS 207	Introduction to Time Series Analysis	3
STATS 212	Applied Statistics with SAS	3
STATS 219	Stochastic Processes	3
STATS 237	Theory of Investment Portfolios and Derivative Securities	3
STATS 238	Policy & Strategy Issues in Financial Engineering	3
STATS 240	Statistical Methods in Finance	3-4
STATS 305	Introduction to Statistical Modeling	2-4
STATS 306A	Methods for Applied Statistics	2-4
STATS 310A/310B/310C	Theory of Probability	2-4
STATS 315A/315B/315C	Modern Applied Statistics: Learning	2-3
STATS 317	Stochastic Processes	3
STATS 318	Modern Markov Chains	3
STATS 322	Function Estimation in White Noise	3

### Computer Science:\*

		Units
CS 106B	Programming Abstractions	3-5
CS 106X	Programming Abstractions (Accelerated)	3-5
CS 224M	Multi-Agent Systems	3
CS 295	Software Engineering	2-3
CS 229	Machine Learning	3-4
CS 249A	Object-Oriented Programming from a Modeling and Simulation Perspective	3
CS 261	Optimization and Algorithmic Paradigms	3
CS 365	Randomized Algorithms	3



\* CS 339 may be used to fulfill this requirement; this course is offered occasionally.

## Economics:"

		Units
ECON 190	Introduction to Financial Accounting	5
ECON 202N/203N	202 For Non-Economics Ph.D. Students	2-5
ECON 210	Core Economics: Modules 3 and 7	2-5
ECON 211	Core Economics: Modules 11 and 12	2-5
ECON 275	Time Series Econometrics	2-5

\* ECON 268, ECON 281 are not offered this year, but the department may offer them next year. If so, these courses may be used in fulfillment of this requirement.

## Management Science & Engineering:\*

		Units
MS&E 242H	Investment Science Honors	3
MS&E 247G	International Financial Management	4
MS&E 247S	International Investments	3
MS&E 310	Linear Programming	3
MS&E 311	Optimization	3
MS&E 312	Advanced Methods in Numerical Optimization	3
MS&E 313	Vector Space Optimization	3
MS&E 322	Stochastic Calculus and Control	3
MS&E 323	Stochastic Simulation	3
MS&E 342	Advanced Investment Science	3
MS&E 348	Optimization of Uncertainty and Applications in Finance	3
MS&E 349	Capital Deployment	3
MS&E 351	Dynamic Programming and Stochastic Control	3
MS&E 444	Investment Practice	3-4
MS&E 445	Projects in Wealth Management	3-4

\* MS&E 339, MS&E 345 are not offered this year, but the department may offer them next year. If so, these courses may be used in fulfillment of this requirement.

## Graduate School of Business (GSB), Finance:

		Units
FINANCE 320	Debt Markets <sup>1</sup>	4
FINANCE 326	Derivative Securities <sup>1</sup>	4
FINANCE 327	Financial Markets	4
FINANCE 620	Financial Markets I <sup>1</sup>	3
FINANCE 621	Financial Markets II <sup>1</sup>	4
FINANCE 622	Dynamic Asset Pricing Theory <sup>1</sup>	4
FINANCE 625	Empirical Asset Pricing	3

## Graduate School of Business (GSB), Economic Analysis and Policy:

		Units
MGTECON 600	Microeconomic Analysis I <sup>1</sup>	4

MGTECON 604	Econometric Methods II <sup>1</sup>	4
MGTECON 609	Applied Econometrics and Economic Research <sup>1</sup>	4

<sup>1</sup> Indicates courses of limited enrollment and/or that instructor consent is required for registration.

For further information about the Financial Mathematics master's degree program requirements, see the department web site (<http://finmath.stanford.edu/academics/requirements.html>).

Director: Tze Leung Lai

## Steering Committee

Amir Dembo, Kay Giesecke, Tze Leung Lai, Art Owen, George Papanicolaou, Bala Rajaratnam, Kenneth Singleton

## Core Faculty

*Business:* Darrell Duffie, J. Michael Harrison, Kenneth Singleton

*Economics:* Monika Piazzesi, Martin Schneider, John Shoven

*Electrical Engineering:* Stephen Boy, Benjamin Van Roy

*Management Science and Engineering:* Kay Giesecke, Peter Glynn, David Luenberger, Benjamin Van Roy

*Mathematics:* Simon Brendle, Isabelle Camilier, Amir Dembo, Persi Diaconis, George Papanicolaou

*Statistics:* Amir Dembo, Persi Diaconis, David Donoho, Tze Leung Lai, Art Owen, Bala Rajaratnam

## French and Italian

Courses offered by the Department of French and Italian are listed on the Stanford Bulletin's ExploreCourses web site under the subject codes FRENCH (French General and Literature) and ITALIAN (Italian General and Literature). For courses in French or Italian language instruction with the subject code FRENLANG or ITALLANG, see the "Language Center (<http://www.stanford.edu/dept/registrar/bulletin/5966.htm>)" section of this bulletin.

## French Section

The French section provides students with the opportunity to pursue course work at all levels in French language, literature, cultural and intellectual history, theory, film, and Francophone studies. It understands the domain of French Studies as encompassing the complex of cultural, political, social, scientific, commercial, and intellectual phenomena associated with French-speaking parts of the world, from France and Belgium to Canada, Africa, and the Caribbean.

Three degree programs are available in French: a B.A., a terminal M.A., and a Ph.D. A Ph.D. in French and Italian is also available.

Visiting faculty and instructors contribute regularly to the life of the French section. The section maintains contacts with the Ecole Normale Supérieure, the Institut d'Etudes Politiques, and the Ecole Polytechnique.

A curator for Romance languages oversees the extensive French collection at Green Library. The Hoover Institute on War, Revolution, and Peace also includes materials on 20th-century France and French social and political movements.

## France

### Stanford Center for Interdisciplinary Studies

The center, founded in partnership with the French Ministry of Foreign Affairs, aims to bridge the disciplines of the humanities, social sciences, sciences, engineering, business, and law, to address historical and contemporary issues. Its programs bring faculty and students from across Stanford's departments and schools in contact with colleagues in France to explore issues of common intellectual concern. The center invites French-speaking scholars to offer courses or give lectures or seminars on campus. It facilitates internships for Stanford students in computer science and engineering in Sophia-Antipolis, France's new high-tech center near Nice.

### Stanford in Paris

The Bing Overseas Studies Program in Paris offers undergraduates the opportunity to study in France during Autumn, Winter, and Spring quarters. It provides a wide range of academic options, including course work at the Stanford center and at the University of Paris, independent study projects, and internships. In addition, the program promotes interaction with the local community through volunteer employment, homestays, and internships. The minimum language requirement for admission into Stanford in Paris is one year of French at the college level.

Courses offered in Paris may count toward fulfillment of the requirements of the French major or minor. Students should consult with the Chair of Undergraduate Studies before and after attending the program, in order to ensure that course work and skills acquired abroad can be coordinated appropriately with their degree program. Detailed information, including program requirements and curricular offerings, may be obtained from the "Overseas Studies" section of this bulletin, the Stanford in Paris (<http://osp.stanford.edu/program/paris>) web site, or the Overseas Studies Program Office in Sweet Hall.

### La Maison Française

La Maison Française, 610 Mayfield, is an undergraduate residence that serves as a campus French cultural center, hosting in-house seminars as well as social events, film series, readings, and lectures by distinguished representatives of French and Francophone intellectual, artistic, and political life. Assignment is made through the regular housing draw.

## Mission of the Undergraduate Program in French

The mission of the undergraduate program in French is to expose students to a variety of perspectives in French language, culture, and history by providing majors with training in writing and communication as well as cultural, textual, and historical analysis in order to develop students into critical and global thinkers prepared for careers in business, social service, and government, or for graduate study in French.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to develop effective and nuanced lines of interpretation.

2. improved critical thinking skills using French literary materials.
3. facility with the methodologies and presuppositions underlying interpretive positions in secondary literature and in their own work.
4. improvement in analytical writing skills and close reading skills.
5. skills in active listening and productive intellectual discussion in class.
6. proficiency in the French language.
7. familiarity with the French literary canon and its historical and cultural context.

## Italian Section

The Italian section offers graduate and undergraduate programs in Italian language, literature, culture, and intellectual history. Course offerings range from small, specialized graduate seminars to general courses open to all students on authors such as Dante, Boccaccio, and Machiavelli.

Two degree programs are available in Italian: a B.A., and a Ph.D. A Ph.D. in French and Italian is also available.

Collections in Green Research Library are strong in the medieval, Renaissance, and contemporary periods; the Italian section is one of the larger constituents of the western European collection at the Hoover Institution for the Study of War, Revolution, and Peace; and the Music Library has excellent holdings in Italian opera.

### La Casa Italiana

La Casa Italiana, 562 Mayfield, is an undergraduate residence devoted to developing an awareness of Italian language and culture. It works closely with the Italian Cultural Institute in San Francisco and with other local cultural organizations. It hosts visiting representatives of Italian intellectual, artistic, and political life. A number of departmental courses are taught at the Casa, which also offers in-house seminars. Assignment is made through the regular undergraduate housing draw.

### Stanford in Florence

The Bing Overseas Studies Program in Florence affords undergraduates with at least three quarters of Italian language and the opportunity to take advantage of the unique intellectual and visual resources of the city and to focus on two areas: Renaissance history and art, and contemporary Italian and European studies. The program is structured to help integrate students into Italian culture through homestays, Florence University courses, the Language Partners Program, research, internship and public service opportunities, and by conducting some of the program's classes in Italian. Many courses offered in Florence may count toward the fulfillment of requirements for the Italian major or minor. Students are encouraged to consult with the Italian undergraduate adviser before and after a sojourn in Florence to ensure that their course selections meet Italian section requirements. Information on the Florence program is available in the "Overseas Studies" section of this bulletin, the Stanford in Florence (<http://osp.stanford.edu/program/florence>) web site, or at the Overseas Studies office in Sweet Hall.

## Mission of the Undergraduate Program in Italian

The mission of the undergraduate program in Italian is to expose students to a variety of perspectives in Italian language, culture, and history by providing majors with training in writing and communication as well as cultural, textual, and historical analysis in order to develop students into critical and global thinkers prepared for careers in business, social service, and government, or for graduate study in Italian.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to develop effective and nuanced lines of interpretation.
2. improved critical thinking skills using Italian literary materials.
3. facility with the methodologies and presuppositions underlying interpretive positions in secondary literature and in their own work.
4. improvement in analytical writing skills and close reading skills.
5. skills in active listening and productive intellectual discussion in class.
6. proficiency in the Italian language.
7. familiarity with the Italian literary canon and its historical and cultural context.

## Graduate Programs in French and Italian

The department offers a Ph.D. and terminal M.A. in French, a Ph.D. in Italian, and a Ph.D. in French and Italian.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in French or Italian and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in French, Italian, or French and Italian. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of French, Italian, or French and Italian and to interpret and present the results of such research.

## Bachelor of Arts in French

The French section offers a major and a minor in French. Students are encouraged to pursue a course of study tailored to their individual needs and interests. A degree in French serves as a stepping stone to entering international business, law, translation, and teaching, or as preparation for graduate studies in French, history, or comparative literature.

The French major allows students to combine their work in French with work from another field such as African studies, linguistics, art history, music, economics, history, education, medicine, international relations, political science, or other foreign languages and literatures. The literature and philosophy specialization offers students the opportunity to pursue interdisciplinary studies at the intersection of literature and philosophy in a structured manner and alongside similarly interested students from a variety of humanistic disciplines.

## French

To graduate with a major in French, students must complete a minimum of 56 units of course work in the major. These 56 units may not be used towards any other major or minor. Courses applied to the major must be taken for a letter grade, and a grade point average (GPA) of 2.0 or better must be achieved in each course. Relevant courses from other departments or programs may also earn credit toward the major with the prior consent of the Chair of Undergraduate Studies. To enroll in all French literature courses, students must have successfully completed FRENLANG 124 Mastering Advanced French Grammar: Grammar through Contemporary Literature and Culture, or successfully tested above this level through the Language Center.

1. Gateway Courses. Students are recommended to take two courses in the FRENCH 120 series.

		Units
FRENCH 65N/122	Nation in Motion: Film, Race and Immigration in Contemporary French Cinema	3
FRENCH 120	Coffee and Cigarettes: The Making of French Intellectual Culture	4-5
FRENCH 125	Religion, The Self, and Society in 20th-Century French Novels and Film	3-5

2. Introductory Culture and Literature Courses. Students must take a minimum of three of the following courses. Any one of these courses fulfills the Writing in the Major (WIM) requirement.

		Units
FRENCH 130	Introduction to Medieval and Renaissance French Literature	4
FRENCH 131	Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France	4
FRENCH 132	Literature, Revolutions, and Changes in 19th- and 20th-Century France	4
FRENCH 133	Literature and Society in Africa and the Caribbean	4

3. Medieval/Early Modern Courses. Students must take two courses that concern the period before 1800. Courses from the department must be at or above the 140 level. Courses chosen from outside the department must be pre-approved by the Chair of Undergraduate Studies.
4. Capstone Course. Students must take at least one 200 level FRENCH culture or literature course.

Students must complete a total of 56 units towards the major. A maximum of 28 units can be elective courses. Elective Courses can be taken within the following parameters.

- Coursework within the department. Additional French literature or general courses at the 100- or 200- level taught by French faculty.
- Language Coursework. Up to three language courses in French at or above FRENLANG 21C for a maximum of 15 units.
- Bing Overseas program. Courses taken at the Bing Overseas Studies in Paris program with prior approval of the Chair of Undergraduate Studies.
- IHUM or Thinking Matters courses taught at least partially by a faculty member of the French and Italian Department. Maximum of 10 units. (IHUM courses are no longer offered)
- Structured Liberal Education. Students may count 10 units of SLE towards the major electives. Maximum of 10 units.

# French and Philosophy

The French and Philosophy option requires a total of 65 units as described below. This option is not declared in Axess and does not appear on the transcript nor the diploma. Substitutions and transfer credit are not normally permitted. Up to 10 units of courses taken in the Philosophy department may be taken CR/NC or S/NC; the remainder must be taken for a letter grade. Students interested in this option should review the Philosophy and Literature web site (<http://philit.stanford.edu>).

## Required French Coursework:

- Advanced Language. FRENLANG 124 Mastering Advanced French Grammar: Grammar through Contemporary Literature and Culture
- Introductory Culture and Literature courses. Students must take three of the following core courses.

		Units
FRENCH 130	Introduction to Medieval and Renaissance French Literature	4
FRENCH 131	Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France	4
FRENCH 132	Literature, Revolutions, and Changes in 19th- and 20th-Century France	4
FRENCH 133	Literature and Society in Africa and the Caribbean	4

- Upper division French Courses. At least three courses numbered FRENCH 140 or higher.

## Required Philosophy Coursework:

- Philosophy Writing in the Major.

		Units
PHIL 80	Mind, Matter, and Meaning	5

- Philosophy and Literature Gateway Course. This course should be taken as early as possible in the student's career, normally in the sophomore year.

		Units
FRENCH 181	Philosophy and Literature	5

- Aesthetics, Ethics, Political Philosophy. One course from the PHIL 170 Ethical Theory series.
- Language, Mind Metaphysics, and Epistemology. One course from the PHIL 180 series.
- History of Philosophy. Two courses in the history of Philosophy, numbered above PHIL 100.
- Two additional elective courses of special relevance to the study of philosophy and literature. Students must consult with their advisers, the Chair of Undergraduate Studies, and the undergraduate adviser of the program in philosophical and literary thought.
- Capstone. One of the courses must be taken in the student's senior year.

		Units
ENGLISH 117A	Irony: From Socrates to David Foster Wallace	5
COMPLIT 199	Senior Seminar	3-5
GERMAN 282	Martin Heidegger	3-5

# Honors Program

French majors with an overall grade point average (GPA) of 3.3 or above, and who maintain a 3.5 (GPA) in major courses, are eligible to participate in the DLCL's honors program. Prospective honors students must choose a senior thesis adviser from among their home department's regular faculty, in their junior year, preferably by March 1, but no later than May 1.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Honors theses range from 40-90 pages not including bibliography and notes.

During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies of their home department to submit a thesis proposal (2-5 pages), DLCL Honors application and an outline of planned course work for their senior year. During this quarter, students may enroll for 2 units in DLCL 189C Honors Thesis Seminar for the drafting or revision of the thesis proposal. The proposal is reviewed by the Chair of Undergraduate Studies and the Director of the department and will be approved or returned for submission.

Honors students are encouraged to participate in the honors college hosted by Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) and coordinated by the Division of Literatures, Cultures, and Languages. The honors college is offered at the end of the summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted through the Bing program. For more information, view the Bing Honors ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) website.

In Autumn Quarter of the senior year, the students must enroll in DLCL 189A Honors Thesis Seminar, a 5 unit seminar that focuses on researching and writing the honors thesis. During Winter Quarter students then enroll for 5 units in DLCL 189B Honors Thesis Seminar while composing their thesis. Students who did not enroll in DLCL 189C Honors Thesis Seminar during their Spring Quarter junior year may do so in the Spring Quarter of their senior year while revising the thesis, if approved by the thesis supervisor. A total of 10-12 units will be awarded for completion of honors course work, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15th of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

# Bachelor of Arts in Italian Italian

To graduate with a major in Italian, students must complete a minimum of 60 units of course work in the major. These 60 units may not be used towards any other major or minor. Courses applied to the major must be taken for a letter grade, and a grade point average (GPA) of 2.0 or better must be achieved in each course. Relevant courses from other departments or programs may also earn credit toward the major with the prior consent of the Chair of Undergraduate Studies. To enroll in all Italian literature courses at or above 127, students must have successfully completed ITALLANG 113 or above, or successfully tested above this level through the Language Center.

- Gateway Courses: Students are recommended to take two courses in the Italian gateway series (8 units maximum).

		Units
ITALIAN 120	Love Italian Style	4
ITALIAN 155	The Mafia in Society, Film, and Fiction	4

- Advanced Language: Students must enroll in one of the following advanced language courses.

		Units
ITALLANG 113	Italian Cultural Studies	3-4
ITALLANG 114	Advanced Stylistics and Composition	3-4
ITALLANG 115	Academic and Creative Writing	3-4

3. Introductory Culture and Literature Courses: Students must take all three of the following core courses at Stanford (12 units). Any one of these courses fulfills the Writing in the Major (WIM) requirement.

		Units
ITALIAN 127	Inventing Italian Literature: Dante, Boccaccio, Petrarca	4
ITALIAN 128	The Italian Renaissance and the Path to Modernity	4
ITALIAN 129	Modern Italian History and Literature	4

4. Advanced Literature Courses: Students must complete one course on each of the following topics (12 units)
- Dante / The Middle Ages (14th - 16th century)
  - Early Modern (16th - 18th century)
  - Modern (18th to the present)

Electives—A maximum of 24 elective units dealing with Italy above the 100 level may be applied to the major. Prior approval from the Chair of Undergraduate Studies is required. The following courses have been pre-approved as electives:

- Coursework within the department. Additional ITALIAN literature or general courses at the 100- or 200- level taught by Italian faculty.
- Bing Overseas program. Courses taken at the Bing Overseas Studies in Paris program with prior approval of the Chair of Undergraduate Studies.
- IHUM or Thinking Matters courses taught at least partially by a faculty member of the French and Italian Department. Maximum of 10 units.
- Structured Liberal Education. Students may count 10 units of SLE towards the major electives. Maximum of 10 units.

## Italian and Philosophy

The Italian and Philosophy option requires a total of 65 units as described below. This option is not declared in Axxess and does not appear on the transcript or diploma. Substitutions and transfer credit are not normally permitted. Up to 10 units of courses taken in the Philosophy department may be taken CR/NC or S/NC; the remainder must be taken for a letter grade. Students interested in this option should review the Philosophy and Literature webpage (<http://philit.stanford.edu>).

1. Advanced Language. Students must complete one of the following advanced Italian language courses.

		Units
ITALLANG 113	Italian Cultural Studies	3-4
ITALLANG 114	Advanced Stylistics and Composition	3-4
ITALLANG 115	Academic and Creative Writing	3-4

2. Introductory Culture and Literature Courses. Students must complete all three courses.

		Units
ITALIAN 127	Inventing Italian Literature: Dante, Boccaccio, Petrarca	4
ITALIAN 128	The Italian Renaissance and the Path to Modernity	4
ITALIAN 129	Modern Italian History and Literature	4

3. Upper Division Italian Courses (ca. 12 units): at least three courses numbered ITALIAN 100 or higher.

Required Philosophy Coursework:

1. Philosophy Writing in the Major:

		Units
PHIL 80	Mind, Matter, and Meaning	5

2. Philosophy and Literature Gateway Course: This course should be taken as early as possible in the student's career, normally in the sophomore year:

		Units
ITALIAN 181	Philosophy and Literature	5

3. Aesthetics, Ethics, Political Philosophy. One course from the PHIL 170 Ethical Theory series.
4. Language, Mind, Metaphysics, and Epistemology. One course from the PHIL 180 Metaphysics series.
5. History of Philosophy. Two courses in the history of philosophy, numbered above PHIL 100.
6. Two additional elective courses of special relevance to the study of philosophy and literature. Students must consult with their advisers, the Chair of Undergraduate Studies, and the undergraduate adviser of the program in philosophical and literary thought.
7. Capstone Seminar (ca. 4 units): One of these courses must be taken in the student's senior year.

		Units
ENGLISH 117A	Irony: From Socrates to David Foster Wallace	5
COMPLIT 199	Senior Seminar	3-5
COMPLIT 213A	Martin Heidegger	3-5

## Honors Program

Italian majors with an overall grade point average (GPA) of 3.3 or above, and who maintain a 3.5 (GPA) in major courses, are eligible to participate in the DLCL's honors program. Prospective honors students must choose a senior thesis adviser from among their home department's regular faculty, in their junior year, preferably by March 1, but no later than May 1.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Honors theses range from 40-90 pages not including bibliography and notes.

During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies of their home department to submit a thesis proposal (2-5 pages), DLCL Honors application and an outline of planned course work for their senior year. During this quarter, students may enroll for 2 units in DLCL 189C Honors Thesis Seminar for the drafting or revision of the thesis proposal. The proposal is reviewed by the Chair of Undergraduate Studies and the Director of the department and will be approved or returned for submission.

Honors students are encouraged to participate in the honors college hosted by Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) and coordinated by the Division of Literatures, Cultures, and Languages. The honors college is offered at the end of the summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted through the Bing program. For more information, view the Bing Honors ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) website.

In Autumn Quarter of the senior year, the students must enroll in DLCL 189A Honors Thesis Seminar, a 5 unit seminar that focuses on researching and writing the honors thesis. During Winter Quarter students then enroll for 5 units in DLCL 189B Honors Thesis Seminar while composing their thesis. Students who did not enroll in DLCL 189C Honors Thesis Seminar during their Spring Quarter junior year may do so in the Spring Quarter of their senior year while revising the thesis, if approved by the thesis

supervisor. A total of 10-12 units will be awarded for completion of honors course work, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15th of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

## Minor in French

To earn a minor in French, students must complete a minimum of 24 units of course work in the department. These 24 units may not be used towards any other major or minor. Courses applied to the minor must be taken for a letter grade, and a grade point average (GPA) of 2.0 or better must be achieved in each course. To enroll in all French literature courses, students must have successfully completed FRENLANG 124 Mastering Advanced French Grammar: Grammar through Contemporary Literature and Culture or successfully tested above this level through the Language Center.

1. Introductory Culture and Literature Courses: Students must take a minimum of three French General or French Literature courses. Two must be from the FRENCH 130 sequence (8 units):

		Units
FRENCH 130	Introduction to Medieval and Renaissance French Literature	4
FRENCH 131	Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France	4
FRENCH 132	Literature, Revolutions, and Changes in 19th- and 20th-Century France	4
FRENCH 133	Literature and Society in Africa and the Caribbean	4

2. Electives: A maximum of 12 elective units may be applied to the minor. Prior approval from the Chair of Undergraduate Studies is required. The following courses have been pre-approved as electives:

		Units
FRENLANG 21C	Second-Year French: Cultural Emphasis, First Quarter	4-5
FRENLANG 22C	Second-Year French: Cultural Emphasis, Second Quarter	4-5
FRENLANG 23C	Second-Year French: Cultural Emphasis, Third Quarter	4-5
FRENLANG 120	Advanced French Oral Communication	3
FRENLANG 124	Mastering Advanced French Grammar: Grammar through Contemporary Literature and Culture	4-5

OSPPARIS courses. Courses taken at the Bing Overseas Studies in Paris program with prior approval of the Chair of Undergraduate Studies (language of instruction must be French) IHUM, Thinking Matters, and SLE. A maximum of 5 units from select IHUM or Thinking Matters courses, or SLE. 5

## Minor in Italian

To earn a minor in Italian, students must complete a minimum of 24 units of course work in the department. These 24 units may not be used towards any other major or minor. Courses applied to the minor must be taken for a letter grade, and a grade point average (GPA) of 2.0 or better must be achieved in each course. To enroll in all ITALIAN literature courses at or above 127, students must have successfully completed ITALLANG 113 Italian Cultural Studies or above, or successfully tested above this level through the Language Center.

1. Language: Students may earn 12 units in second-year and above language courses (maximum 12 units)

		Units
ITALLANG 21	Second Year Italian, First Quarter	3-4
ITALLANG 22	Second-Year Italian, Second Quarter	3-4
ITALLANG 23	Second-Year Italian, Third Quarter	3-4
ITALLANG 113	Italian Cultural Studies	3-4
ITALLANG 114	Advanced Stylistics and Composition	3-4
ITALLANG 115	Academic and Creative Writing	3-4

2. Introductory Culture and Literature Courses: Students must take two of the following core courses at Stanford (8 units)

		Units
ITALIAN 127	Inventing Italian Literature: Dante, Boccaccio, Petrarca	4
ITALIAN 128	The Italian Renaissance and the Path to Modernity	4
ITALIAN 129	Modern Italian History and Literature	4

3. Electives: A maximum of 8 elective units may be applied to the minor. Prior approval from the Chair of Undergraduate Studies is required. The following courses have been pre-approved as electives: OSPFLOR courses. Courses taken in Italian at the Bing Overseas Studies in Florence program with prior approval of the Chair of Undergraduate Studies (language of instruction must be Italian). IHUM, Thinking Matters, and SLE. A maximum of 5 units from select IHUM or Thinking Matters courses, or SLE.

## Minor in Modern Languages

The Division of Literatures, Cultures, and Languages offers a minor in Modern Languages. This minor draws on literature and language courses offered through this and other literature departments. See the "Literatures, Cultures, and Languages (p. )" section of this bulletin for further details about the minor and its requirements.

## Coterminal Bachelor's and Master's Program in French or Italian

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsocieties/frenchanditalian/cotermdegrees>)" section of this bulletin.

Each year the department admits a small number of undergraduates to the coterminal B.A. and M.A. degree in French or in Italian. Applications for Autumn quarter must be submitted by January 31 of the senior year to the Director of the Department and must include:

- a written statement of purpose
- two letters of recommendation from faculty at Stanford
- a transcript.

Students accepted into the coterminal program must have been undergraduate majors in the relevant language and must meet all requirements both for the B.A. and the M.A.

# Master of Arts in French

University regulations pertaining to the M.A. are listed in the "Graduate Degrees (p. 38)" section of this bulletin.

The terminal M.A. in French provides a flexible combination of language, literature, cultural history, and methodology course work designed to enhance the preparation of secondary school, junior college, or college teachers.

Candidates must complete a minimum of 45 units of graduate work, all courses being taken for a letter grade, with a minimum grade point average (GPA) of 3.3, as well as pass the master's examination at the end of their studies. To fulfill the requirements in a single year, enrollment must be for an average of 15 units per quarter.

Candidates must take one cultural history course (to be taken either inside or outside the Department of French and Italian). All remaining units are to be taken in advanced French literature courses (200 level or above), three of which must be concerned with the pre-revolutionary period of French cultural history.

Applicants should consult Graduate Admissions (<http://gradadmissions.stanford.edu>) for information related to the application process. Candidates for this degree are not eligible for financial aid or for teaching assistantships.

## Examination

The terminal M.A. examination is administered between the third and fifth week of Spring Quarter by a three-member committee, selected each year by the Chair of Graduate Studies. It consists of two parts:

### 1. Written Exam

The two-hour written exam tests the candidate's general knowledge of French literature and is based on the French Ph.D. reading list which may be obtained from the chair of Graduate Studies, Student Affairs Officer, or by referencing the French and Italian Graduate Student Handbook.

The exam requires that the candidate answer two questions (out of three) in a manner that demonstrates his/her ability to synthesize and draw parallels between periods, genres, and systems of representation on the basis of the standard reading list. One question must be answered in French. Use of a dictionary is allowed.

If the student's performance on the exam is deemed a 'pass' by two out of three of the members of the examining committee, the student is then permitted to go on to the oral examination (taken later the same week). Should the candidate fail the M.A. written exam, he/she is given a second chance at the end of Spring Quarter.

### 2. Oral Exam

The 90-minute oral exam is based upon the student's answers on the written exam. It examines the candidate's knowledge and understanding of French literary history on the basis of the standard reading list.

At the conclusion of the oral exam, the examination committee meets in closed session and discusses the student's performance on the written and the oral portions of the examination. If it is judged adequate, the M.A. degree is granted. In no event may the master's written and oral exams be taken more than twice.

## Doctor of Philosophy in French

University regulations pertaining to the Ph.D. are listed in the "Graduate Degrees" section of this bulletin.

## Degree Requirements

### 1. Course Work

A candidate for the Ph.D. degree must complete at least 135 units of graduate-level study. 72 of the 135 units must be taken within the department. All course work should be selected in consultation with the Chair of Graduate Studies.

Required Courses—

		Units
FRENCH 369	Introduction to Graduate Studies: Criticism as Profession (must be taken in first year of studies)	5
DLCL 301	The Learning and Teaching of Second Languages (must be taken in the first year of studies)	3

A minimum of five literature courses taught in French at the graduate level. Three of the required five courses must be taken within the first year.

Elective Courses— Apart from the required courses above, students are granted considerable freedom in structuring a course of study appropriate to their individual needs. During the first year, most course work is done within the French and Italian department, in order to ensure an adequate preparation for the qualifying examination. Students are encouraged to take a variety of courses in order to be exposed to different periods and issues. Students are not allowed to take Independent Study during their first year. In the second and third years, however, the program of study is tailored to the specific interests of the student.

### 2. Examinations

Successful completion of all department and University examinations. Students may not take any department or University exam while coursework is incomplete.

### 3. Dissertation

Submission and approval of a dissertation.

### 4. Teaching

Ph.D. students are required to teach a minimum of five courses within their five years of funding.

### 5. Language Requirements

Attaining a native or near-native fluency in French is a requirement to qualify for the Ph.D. degree. Upon entering the program, candidates must contact the Language Center and arrange to take the OPI (Oral Proficiency Interview) to determine their fluency in French. An advanced level or above must have been reached by the time candidates take their qualifying exam in Autumn Quarter of the second year of study. If a student fails to score in the advanced bracket of the OPI test upon entering, he/she is tested again at the beginning of the second year. It is the responsibility of the candidates to design a course of study to improve his or her proficiency in French. Candidates who do not meet the minimum language requirement must discuss their plans to meet this requirement with the Chair of Graduate Studies.

In addition, candidates are required to achieve a high level of proficiency in one additional foreign language, with the language in question to be determined by the student and adviser as a function of the student's area of specialization. Such proficiency may be demonstrated either by completing a graduate seminar in the language in question, or by passing an exam that establishes a third-year or above level of competence in writing, reading, and speaking. In the

case of ancient Greek and Latin, a high level of proficiency means a level superior to a second-year collegiate level of proficiency in reading and writing. The second foreign language requirement must be completed by the end of the third year.

## 6. Candidacy

At the end of the second year of residency, students who are performing well, as indicated by their advanced language proficiency, course work, performance on the Qualifying Exam, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded an M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for Autumn Quarter of the student's third year. At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student.

## 7. TGR Status

Doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the dissertation, completed 135 units, and submitted a Doctoral Dissertation Reading Committee form, must request Terminal Graduate Registration status to complete their dissertations. Each quarter, all TGR students must enroll in FRENCH 802 TGR Dissertation for zero units, in the appropriate section for their adviser.

## Grading

Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course. Any grade of 'B' or below is considered to be less than satisfactory. Grades of 'B' or below are reviewed by faculty: while the grade will stand, the student may be required to revise and resubmit the work associated with that course.

## Examinations

There are three examinations: the Qualifying Examination, the Field Examination, and the University Oral Examination. Students may not take any department or University exam while coursework is incomplete.

## Qualifying Examination

The first oral examination, which takes place in the first two weeks of October of the second year of study, tests the student's knowledge of language and literature and his/her aptitude for critical thinking. The examining committee, determined by the Director of French and Italian, schedules the precise exam date and time.

The exam is based on a standard reading list covering major works from all periods of literature in the language(s) of study, from the Middle Ages to present day. The list may be expanded to reflect a student's particular interests, but not abridged. The reading list may be obtained from the Chair of Graduate Studies, the Graduate Student Affairs Officer, or by referencing the French and Italian student handbook.

The exam is 90 minutes in length and consists of two parts:

1. A 20-minute presentation by the candidate on a topic to be determined by the student. This presentation may be given in English or in the language of study and should engage, in a succinct manner, an issue or set of issues of broad relevance to the literary history of the language(s) of study. The presentation must not simply be a text read aloud, but rather must be given from notes. It is meant to be suggesting and not exhaustive, so as to provoke further discussion.
2. A 70-minute question and answer period in which the examining committee follows up on the candidate's presentation and discusses the reading list with the student. At least part of this portion of the exam takes place in the language(s) of study. The student is expected to demonstrate a solid knowledge of the texts on the reading list and of the basic issues which they raise, as well as a broader sense of the cultural/literary context into which they fit and demonstrate the ability to formulate an original point of view on such texts and contexts.

Students who do not pass the Qualifying Exam their first time may be placed on probation with limited enrollment and be allowed to retake the exam at the end of Autumn Quarter. Should the student not pass the retake exam, his or her studies in the Ph.D. program will be concluded.

Students already holding an advanced degree in the relevant area may request to be excused from the Qualifying Exam. However, the student must present a formal request for a waiver to the Chair of Graduate Studies upon arrival at Stanford. Such a request must document the course work completed elsewhere and include all relevant reading lists. Only in cases where taking the Qualifying Exam would involve considerable repetition of already completed work is such a waiver likely to be granted.

## Field Examination

The second oral examination takes place in the Autumn Quarter of the third year of study. The exam is 100 minutes in length and consists of two parts:

1. A 20-minute presentation by the student on a topic (a particular literary genre or a broad theoretical, historical, or interdisciplinary question) freely chosen and developed by the individual student working in collaboration with his/her adviser and the Chair of Graduate Studies. The student should design this research project so that it has the focus of an article or a seminar he/she might teach. The student should discuss the proposed topic with the Chair of Graduate Studies before the end of the quarter preceding the quarter in which he/she plans to take the exam; together they choose a committee of two faculty members with interests close to the proposed topic. (In most cases, one of these committee members is the student's adviser.) In addition to these two members, the examination committee includes the Chair of Graduate Studies, who serves in an ex officio capacity as the third member of the examination committee. This presentation is followed by a 20-minute discussion.
2. A 60-minute discussion of a reading list, assembled by the student, which covers about a century of writing. The reading list should include works in all genres relevant to the period covered and should be around two single-spaced pages in length. The list may well include critical and scholarly works or texts from outside the traditional domain of literary studies in the chosen tradition (such as film, philosophy, other literary traditions), but such coverage should be regarded as supplemental except in rare instances where the chair and faculty advisers have agreed to define these materials as the student's field. Students are required to discuss the reading list for the examination with the Chair of Graduate Studies and with members of their committee during the quarter preceding the examination. A final reading list must be submitted to the committee no later than two weeks preceding the examination. Each member of the committee is assigned a 20-minute period to question the candidate on the reading list and its intellectual-historical implications. The aim of these questions is to establish the student's credentials as a specialist in the period of his/her choosing, so the core of the reading list must be made up of texts that are essential to any specialist.



It follows that reading lists must not focus on the narrow area of the student's research interest. The tendency to bias reading lists towards the dissertation topic, be it an author or a genre, does not cancel the obligation to cover the major figures and genres. It is understandable that some students, by their third year, have become so deeply committed to their work toward the dissertation that they wish to use the preparation period for the examination as part of their dissertation research. Certainly, some of the exam work may prove relevant, but students should also remember that the examination is the central means of certifying their expertise in a literary period.

## The University Oral Examination

This examination takes the form of a dissertation proposal defense. It is to be taken no later than Autumn Quarter of the student's fourth year. Students must have completed all course work and language requirements before the quarter in which they take the University Oral examination. One quarter prior to the University Oral examination, students must schedule the exam date and time as well as work with their primary adviser to obtain an outside chair for the examination.

Two weeks before the exam, the student must submit to the committee a 25-35 page proposal, which must contain the following parts:

1. a clear presentation of the student's central thesis
2. a synthetic overview of the dissertation
3. a description of the methodology that is used in the dissertation
4. an in-depth discussion of current secondary sources on the topic.

The student must also append a bibliography, but this does not take the place of number 4. The proposal must be prepared in close consultation with the dissertation director during the months preceding the exam.

The exam committee consists of four members, in addition to a committee chair from outside the Division of Literatures, Cultures, and Languages, whose principal functions are to keep track of time and to call on the four members of the committee who question the candidate on the talk and on the reading list.

After a 20-minute presentation on the part of the candidate, each member of the committee (apart from the committee chair) questions the student for 20 minutes. At the end of the hour and forty minutes, the faculty readers vote on the outcome of the exam. If the outcome is favorable, (four out of five votes in favor of the student passing), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory, the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second exam. A student who fails a second time will be released from the Ph.D. program and awarded a terminal M.A. degree.

## Advising

Given the interdisciplinary nature of the Ph.D. programs and the opportunity they afford each student to create an individualized program of study, regular consultation with an adviser is of the utmost importance. The adviser for all entering graduate students is the Chair of Graduate Studies, whose responsibility it is to assist students with their course planning and to keep a running check on progress in completing the course, teaching, and language requirements. By the end of the second year of study, each student should have chosen a faculty adviser whose expertise is appropriate to his/her own area of research and interests.

## Yearly Review

The faculty provide students with timely and constructive feedback on their progress toward the Ph.D. In order to evaluate students' progress and to identify potential problem areas, the department's faculty reviews the academic progress of each student at the end of the academic year. The yearly reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may

be placed on probation with specific guidelines for addressing the problems detected. Possible outcomes of the yearly review include (1) continuation of the student in good standing, or (2) placing the student on probation, with specific guidelines for the period on probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: (1) restoration to good standing; (2) continued probation, again with guidelines for necessary remedial steps; or (3) termination from the program. Students leaving the program at the end of the first or second year are usually allowed to complete the requirements to receive an M.A. degree, if this does not involve additional residency or financial support.

## Doctor of Philosophy in Italian

University regulations pertaining to the Ph.D. are listed in the "Graduate Degrees" section of this bulletin.

## Degree Requirements

### 1. Course Work

A candidate for the Ph.D. degree must complete at least 135 units of graduate-level study. 72 of the 135 units must be taken within the department. All course work should be selected in consultation with the Chair of Graduate Studies.

Required Courses—

		Units
ITALIAN 369	Introduction to Graduate Studies: Criticism as Profession (must be taken in the first year of studies)	5
A minimum of five literature courses taught in Italian at the graduate level. Three of the required five courses must be taken within the first year.		15-25
DLCL 301	The Learning and Teaching of Second Languages (must be taken in the first year of studies)	3

Elective Courses— Apart from the required courses above, students are granted considerable freedom in structuring a course of study appropriate to their individual needs. During the first year, most course work is done within the French and Italian department, in order to ensure an adequate preparation for the qualifying examination. Students are encouraged to take a variety of courses in order to be exposed to different periods and issues. Students are not allowed to take Independent Study during their first year. In the second and third years, however, the program of study is tailored to the specific interests of the student.

### 2. Examinations

Successful completion of all department and University examinations. Students may not take any department or University exam while coursework is incomplete.

### 3. Dissertation

Submission and approval of a dissertation.

### 4. Teaching

Ph.D. students are required to teach a minimum of five courses within their five years of funding.

### 5. Language Requirements

Attaining a native or near-native fluency in Italian is a requirement to qualify for the Ph.D. degree. Upon entering the program, candidates must contact the Language Center and arrange to take the OPI (Oral Proficiency Interview) to determine their fluency in Italian.

An advanced level or above must have been reached by the time candidates take their qualifying exam in the Autumn Quarter of the second year of study. If a student fails to score in the advanced bracket of the OPI test upon entering, he/she is tested again at the beginning of the second year. It is the responsibility of the candidates to design a course of study to improve their proficiency in Italian. Candidates who do not meet the minimum language requirement must discuss their plans to meet this requirement with the Chair of Graduate Studies. By the end of the third year, students must have passed reading examinations in two additional foreign languages. If the candidate's period of concentration is earlier than the Romantic period, one of these must be Latin; if Romantic or later, French.

## 6. Candidacy

At the end of the second year of residency, students who are performing well, as indicated by their course work, performance on the Qualifying Exam, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded an M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for the autumn quarter of the student's third year. At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student.

## 7. TGR Status

Doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the dissertation, completed 135 units, and submitted a Doctoral Dissertation Reading Committee form, must request Terminal Graduate Registration status to complete their dissertations. Each quarter, all TGR students must enroll in ITALIAN 802 TGR Dissertation for zero units, in the appropriate section for their adviser.

## Grading

Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course. Any grade of 'B' or below is considered to be less than satisfactory. Grades of 'B' or below are reviewed by faculty: while the grade will stand, the student may be required to revise and resubmit the work associated with that course.

## Examinations

There are three examinations: the Qualifying Examination, the Field Examination, and the University Oral Examination. Students may not take any department or University exam while coursework is incomplete.

### Qualifying Examination

The first oral examination, which takes place in the first two weeks of October of the second year of study, tests the student's knowledge of language and literature and his/her aptitude for critical thinking. The examining committee, determined by the Director of French and Italian, schedules the precise exam date and time.

The exam is based on a standard reading list covering major works from all periods of literature in the language(s) of study, from the Middle Ages

to present day. The list may be expanded to reflect a student's particular interests, but not abridged. The reading list may be obtained from the Chair of Graduate Studies, the Graduate Student Affairs Officer, or by referencing the French and Italian student handbook.

The exam is 90 minutes in length and consists of two parts:

1. A 20-minute presentation by the candidate on a topic to be determined by the student. This presentation may be given in English or in the language of study and should engage, in a succinct manner, an issue or set of issues of broad relevance to the literary history of the language(s) of study. The presentation must not simply be a text read aloud, but rather must be given from notes. It is meant to be suggesting and not exhaustive, so as to provoke further discussion.
2. A 70-minute question and answer period in which the examining committee follows up on the candidate's presentation and discusses the reading list with the student. At least part of this portion of the exam takes place in the language(s) of study. The student is expected to demonstrate a solid knowledge of the texts on the reading list and of the basic issues which they raise, as well as a broader sense of the cultural/literary context into which they fit and demonstrate the ability to formulate an original point of view on such texts and contexts.

Students who do not pass the Qualifying Exam their first time may be placed on probation with limited enrollment and be allowed to retake the exam at the end of Autumn Quarter. Should the student not pass the retake exam, his/her studies in the Ph.D. program will be concluded.

Students already holding an advanced degree in the relevant area may request to be excused from the Qualifying Exam. However, the student must present a formal request for a waiver to the Chair of Graduate Studies upon arrival at Stanford. Such a request must document the course work completed elsewhere and include all relevant reading lists. Only in cases where taking the Qualifying Exam would involve considerable repetition of already completed work is such a waiver likely to be granted.

### Field Examination

The second oral examination takes place in the Autumn Quarter of the third year of study. The exam is 100 minutes in length and consists of two parts:

1. A 20-minute presentation by the student on a topic (a particular literary genre or a broad theoretical, historical, or interdisciplinary question) freely chosen and developed by the individual student working in collaboration with his/her adviser and the Chair of Graduate Studies. The student should design this research project so that it has the focus of an article or a seminar he/she might teach. The student should discuss the proposed topic with the Chair of Graduate Studies before the end of the quarter preceding the quarter in which he/she plans to take the exam; together they choose a committee of two faculty members with interests close to the proposed topic. (In most cases, one of these committee members is the student's adviser.) In addition to these two members, the examination committee includes the Chair of Graduate Studies, who serves in an ex officio capacity as the third member of the examination committee. This presentation is followed by a 20-minute discussion.
2. A 60-minute discussion of a reading list, assembled by the student, which covers about a century of writing. The reading list should include works in all genres relevant to the period covered and should be around two single-spaced pages in length. The list may well include critical and scholarly works or texts from outside the traditional domain of literary studies in the chosen tradition (such as film, philosophy, other literary traditions), but such coverage should be regarded as supplemental except in rare instances where the chair and faculty advisers have agreed to define these materials as the student's field. Students are required to discuss the reading list for the examination with the Chair of Graduate Studies and with members of their committee during the quarter preceding the examination. A final reading list must be submitted to the committee no later

than two weeks preceding the examination. Each member of the committee is assigned a 20-minute period to question the candidate on the reading list and its intellectual-historical implications. The aim of these questions is to establish the student's credentials as a specialist in the period of his/her choosing, so the core of the reading list must be made up of texts that are essential to any specialist. It follows that reading lists must not focus on the narrow area of the student's research interest. The tendency to bias reading lists towards the dissertation topic, be it an author or a genre, does not cancel the obligation to cover the major figures and genres. It is understandable that some students, by their third year, have become so deeply committed to their work toward the dissertation that they wish to use the preparation period for the examination as part of their dissertation research. Certainly, some of the exam work may prove relevant, but students should also remember that the examination is the central means of certifying their expertise in a literary period.

## The University Oral Examination

This examination takes the form of a dissertation proposal defense. It is to be taken no later than Autumn Quarter of the student's fourth year. Students must have completed all course work and language requirements before the quarter in which they take the University Oral examination. One quarter prior to the University Oral examination, students must schedule the exam date and time as well as work with their primary adviser to obtain an outside chair for the examination.

Two weeks before the exam, the student must submit to the committee a 25-35 page proposal, which must contain the following parts:

1. a clear presentation of the student's central thesis
2. a synthetic overview of the dissertation
3. a description of the methodology that is used in the dissertation
4. an in-depth discussion of current secondary sources on the topic.

The student must also append a bibliography, but this does not take the place of number 4. The proposal must be prepared in close consultation with the dissertation director during the months preceding the exam.

The exam committee consists of four members, in addition to a committee chair from outside the Division of Literatures, Cultures, and Languages, whose principal functions are to keep track of time and to call on the four members of the committee who question the candidate on the talk and on the reading list.

After a 20-minute presentation on the part of the candidate, each member of the committee (apart from the committee chair) questions the student for 20 minutes. At the end of the hour and forty minutes, the faculty readers vote on the outcome of the exam. If the outcome is favorable, (four out of five votes in favor of the student passing), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory, the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second exam. A student who fails a second time will be released from the Ph.D. program and awarded a terminal M.A. degree.

## Advising

Given the interdisciplinary nature of the Ph.D. programs and the opportunity they afford each student to create an individualized program of study, regular consultation with an adviser is of the utmost importance. The adviser for all entering graduate students is the Chair of Graduate Studies, whose responsibility it is to assist students with their course planning and to keep a running check on progress in completing the course, teaching, and language requirements. By the end of the second year of study, each student should have chosen a faculty adviser whose expertise is appropriate to his/her own area of research and interests.

## Yearly Review

The faculty provide students with timely and constructive feedback on their progress toward the Ph.D. In order to evaluate students' progress and to identify potential problem areas, the department's faculty reviews the academic progress of each student at the end of the academic year. The yearly reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may be placed on probation with specific guidelines for addressing the problems detected. Possible outcomes of the yearly review include (1) continuation of the student in good standing, or (2) placing the student on probation, with specific guidelines for the period on probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: (1) restoration to good standing; or (2) continued probation, again with guidelines for necessary remedial steps; or (3) termination from the program. Students leaving the program at the end of the first or second year are usually allowed to complete the requirements to receive an M.A. degree, if this does not involve additional residency or financial support.

## Doctor of Philosophy in French and Italian

University regulations pertaining to the Ph.D. are listed in the "Graduate Degrees" section of this bulletin.

## Degree Requirements

### 1. Course work—

A candidate for the Ph.D. degree must complete at least 135 units of graduate-level study. 72 of the 135 units must be taken within the department. All course work should be selected in consultation with the Chair of Graduate Studies. Required courses—

		Units
FRENCH/ ITALIAN 369	Introduction to Graduate Studies: Criticism as Profession (must be taken in first year of studies)	5
DLCL 301	The Learning and Teaching of Second Languages (must be taken in first year of studies)	3

A minimum of four advanced courses on French literature and culture, and four advanced courses on Italian literature and culture. Four of the required eight courses must be taken within the first year.

Elective Courses— Apart from the required courses above, students are granted considerable freedom in structuring a course of study appropriate to their individual needs. During the first year, most course work is done within the French and Italian department, in order to ensure an adequate preparation for the qualifying examination. Students are encouraged to take a variety of courses in order to be exposed to different historical periods and issues. Students are not allowed to take Independent Study during their first year. In the second and third years, however, the program of study is tailored to the specific interests of the student.

### 2. Examinations

Successful completion of all department and University examinations. Students may not take any department or University exam while coursework is incomplete.

### 3. Dissertation

Submission and approval of a dissertation. The dissertation topic must include a substantial quotient of material from both the French and Italian tradition, and the dissertation must include either (1) at least one chapter on French materials and one chapter on Italian materials, or (2) at least two chapters focusing on a comparison between French and Italian materials.

### 4. Teaching

Ph.D. students are required to teach a minimum of five courses within their five years of funding. Of these five courses the student is required to teach at least one French language course and one Italian language course.

### 5. Language Requirements

Attaining a native or near-native fluency in both French and Italian is the individual responsibility of all candidates in the Ph.D. program, and remedial course work needed to achieve such fluency cannot count towards the Ph.D. degree.

For students specializing in areas (a) medieval and renaissance and (b) renaissance and early modern, proficiency in Latin equivalent to a second year collegiate level of proficiency (the equivalent of CLASSLAT 101 Intermediate Latin: Introduction to Literature, CLASSLAT 102 Intermediate Latin: Catullus and Pliny, and CLASSLAT 103 Intermediate Latin: Cicero and Ovid) in reading is also required. Such proficiency may be demonstrated by successfully completing a course in the language in question (at least second-year level, but preferably a graduate seminar); or by passing an exam that establishes a second-year or above level of competence. In no case is passage of a standard reading competence exam considered sufficient.

For students specializing in area (c) modern and contemporary, proficiency in a third language (beyond French and Italian) is not required; students are, however, encouraged to acquire competency in a third language or area that is relevant to their research (e.g. German).

The language requirements should be completed as soon as possible, but in any case not later than the end of the third year.

### 6. Candidacy

At the end of the second year of residency, students who are performing well, as indicated by their course work, performance on the Qualifying Exam, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded an M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for Autumn Quarter of the student's third year. At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student.

### 7. TGR Status

Doctoral students who have been admitted to candidacy, completed all required courses and degree requirements other than the dissertation, completed 135 units, and submitted a Doctoral

Dissertation Reading Committee form, must request Terminal Graduate Registration status to complete their dissertations. Each quarter, all TGR students must enroll in FRENCH 802 TGR Dissertation or ITALIAN 802 TGR Dissertation for zero units, in the appropriate section for their adviser.

## Grading

Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course. Any grade of 'B' or below is considered to be less than satisfactory. Grades of 'B' or below are reviewed by faculty: while the grade will stand, the student may be required to revise and resubmit the work associated with that course.

## Examinations

There are three examinations: the Qualifying Examination, the Field Examination, and the University Oral Examination. Students may not take any department or University exam while coursework is incomplete.

## Qualifying Examination

The first oral examination, which takes place in the first two weeks of October of the second year of study, tests the student's knowledge of language and literature and his/her aptitude for critical thinking. The examining committee, determined by the Director of French and Italian, schedules the precise exam date and time.

Students may take either two qualifying exams, one in French and one in Italian, or a single qualifying exam in French and Italian. The combined French and Italian qualifying exam covers one of three periods, (a) medieval and renaissance, (b) renaissance and early modern, or (c) modern and contemporary. For each period it is based on a standard reading list. The list may be expanded to reflect a student's particular interests, but not abridged. One third of the combined exam takes place in English, one third in French, and one third in Italian (with the student free to choose which portion transpires in which language). The reading lists may be obtained from the Chairs of Graduate Studies, the Graduate Student Affairs Officer, or by referencing the French and Italian student handbook.

The exam is 90 minutes in length and consists of two parts:

1. A 20-minute presentation by the candidate on a topic to be determined by the student. This presentation may be given in English or in the language of study and should engage, in a succinct manner, an issue or set of issues of broad relevance to the literary history of the language(s) of study. The presentation must not simply be a text read aloud, but rather must be given from notes. It is meant to be suggesting and not exhaustive, so as to provoke further discussion.
2. A 70-minute question and answer period in which the examining committee follows up on the candidate's presentation and discusses the reading list with the student. At least part of this portion of the exam takes place in the languages of study. The student is expected to demonstrate a solid knowledge of the texts on the reading list and of the basic issues which they raise, as well as a broader sense of the cultural/literary context into which they fit, and demonstrate the ability to formulate an original point of view on such texts and contexts.

Students who do not pass the Qualifying Exam their first time may be placed on probation with limited enrollment and be allowed to retake the exam at the end of Autumn Quarter. If the student does not pass the second exam, his/her studies in the Ph.D. program will be concluded.

If, at the qualifying exam stage, a student's work is judged insufficient for admission to candidacy for the Ph.D., the student may petition to continue in French only or Italian only. This petition is reviewed by the qualifying exam committee, the relevant Chair of Graduate Studies, and the Director of the Department of French and Italian.

Students already holding an advanced degree in the relevant area may request to be excused from the Qualifying Exam. However, the student must present a formal request for a waiver to the Chair of Graduate Studies upon arrival at Stanford. Such a request must document the course work completed elsewhere and include all relevant reading lists. Only in cases where taking the Qualifying Exam would involve considerable repetition of already completed work is such a waiver likely to be granted.

## Field Examination

The second oral examination takes place in the Autumn quarter of the third year of study. The exam is 100 minutes in length and consists of two parts:

1. A 20-minute presentation by the student on a topic (a particular literary genre or a broad theoretical, historical, or interdisciplinary question) freely chosen and developed by the individual student working in collaboration with his/her adviser and the Chair of Graduate Studies. The student should design this research project so that it has the focus of an article or a seminar he/she might teach. The student should discuss the proposed topic with the Chairs of Graduate Studies before the end of the quarter preceding the quarter in which he/she plans to take the exam; together they choose a committee of two faculty members with interests close to the proposed topic. (In most cases, one of these committee members is the student's adviser.) In addition to these two members, the examination committee includes the Chair of Graduate Studies, who serves in an ex officio capacity as the third member of the examination committee. This presentation is followed by a 20-minute discussion.
2. A 60-minute discussion of a reading list, assembled by the student, which covers about a century of writing. The reading list should include works in all genres relevant to the period covered and should be around two single-spaced pages in length. The list may well include critical and scholarly works or texts from outside the traditional domain of literary studies in the chosen tradition (such as film, philosophy, other literary traditions), but such coverage should be regarded as supplemental except in rare instances where the chair and faculty advisers have agreed to define these materials as the student's field. Students are required to discuss the reading list for the examination with the Chairs of Graduate Studies and with members of their committee during the quarter preceding the examination. A final reading list must be submitted to the committee no later than two weeks preceding the examination. Each member of the committee is assigned a 20-minute period to question the candidate on the reading list and its intellectual-historical implications. The aim of these questions is to establish the student's credentials as a specialist in the period of his/her choosing, so the core of the reading list must be made up of texts that are essential to any specialist. It follows that reading lists must not focus on the narrow area of the student's research interest. The tendency to bias reading lists towards the dissertation topic, be it an author or a genre, does not cancel the obligation to cover the major figures and genres. It is understandable that some students, by their third year, have become so deeply committed to their work toward the dissertation that they wish to use the preparation period for the examination as part of their dissertation research. Certainly, some of the exam work may prove relevant, but students should also remember that the examination is the central means of certifying their expertise in a literary period.

## The University Oral Examination

This examination takes the form of a dissertation proposal defense. It is to be taken no later than Autumn Quarter of the student's fourth year. Students must have completed all course work and language requirements before the quarter in which they take the University Oral examination. One quarter prior to the University Oral examination, students must schedule the exam date and time as well as work with their primary adviser to obtain an outside chair for the examination.

Two weeks before the exam, the student must submit to the committee a 25-35 page proposal. This proposal must contain the following parts:

1. a clear presentation of the student's central thesis
2. a synthetic overview of the dissertation
3. a description of the methodology that is used in the dissertation
4. an in-depth discussion of current secondary sources on the topic.

The student must also append a bibliography, but this does not take the place of number 4. The reading list should include works in both French and Italian in all genres relevant to the period covered. The proposal must be prepared in close consultation with the dissertation director during the months preceding the exam.

The exam committee consists of four members, in addition to a committee chair from outside the Division of Literatures, Cultures, and Languages, whose principal functions are to keep track of time and to call on the four members of the committee who question the candidate on the talk and on the reading list.

After a 20-minute presentation on the part of the candidate, each member of the committee (apart from the committee chair) questions the student for 20 minutes. At the end of the hour and forty minutes, the faculty readers vote on the outcome of the exam. If the outcome is favorable (four out of five votes in favor of the student passing), the student is free to proceed with work on the dissertation. If the proposal is found to be unsatisfactory, the dissertation readers may ask the student to revise and resubmit the dissertation prospectus and to schedule a second exam. A student who fails a second time will be released from the Ph.D. program and awarded a terminal M.A. degree.

## Advising

Given the interdisciplinary nature of the Ph.D. programs and the opportunity they afford each student to create an individualized program of study, regular consultation with an adviser is of the utmost importance. The adviser for all entering graduate students is the Chair of Graduate Studies, whose responsibility it is to assist students with their course planning and to keep a running check on progress in completing the course, teaching, and language requirements. By the end of the second year of study, each student should have chosen a faculty adviser whose expertise is appropriate to his/her own area of research and interests.

## Yearly Review

The faculty provide students with timely and constructive feedback on their progress toward the Ph.D. In order to evaluate students' progress and to identify potential problem areas, the department's faculty reviews the academic progress of each student at the end of the academic year. The yearly reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may be placed on probation with specific guidelines for addressing the problems detected. Possible outcomes of the yearly review include (1) continuation of the student in good standing, or (2) placing the student on probation, with specific guidelines for the period on probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: (1) restoration to good standing; or (2) continued probation, again with guidelines for necessary remedial steps; or (3) termination from the program. Students leaving the program at the end of the first or second year are usually allowed to complete the requirements to receive an M.A. degree, if this does not involve additional residency or financial support.

## Ph.D. Minor in French or Italian

The Ph.D. may be combined with a minor in a related field, including Comparative Literature, Linguistics, Modern Thought and Literature, Art History, History, Music, Philosophy, and Spanish. Ph.D. candidates in

French may minor in Italian, and vice versa. Students interested in a minor should design their course of study with their adviser(s).

## Ph.D. Minor in French Literature

The department offers a minor in French Literature. The requirement for a minor in French is completion of 24 units of graduate course work in the French section. Interested students should consult the graduate adviser.

## Ph.D. Minor in Italian Literature

The department offers a minor in Italian Literature. The requirement for a minor in Italian is a minimum of 24 units of graduate course work in Italian literature. Interested students should consult the graduate adviser.

*Emeriti:* (Professors) John G. Barson, Marc Bertrand, Robert G. Cohn, John Freccero, René Girard, Ralph M. Hester, Elisabeth Mudimbe-Boyi, Roberto B. Sangiorgi

*Director:* Carolyn Springer

*Chairs of Graduate Studies:* Cécile Alduy (French), Carolyn Springer (Italian)

*Chairs of Undergraduate Studies:* Dan Edelstein (French), Laura Wittman (Italian)

*Professors:* Jean-Marie Apostolidès, Jean-Pierre Dupuy, Hans U. Gumbrecht, Robert Harrison (on leave, Autumn), Michel Serres, Carolyn Springer

*Associate Professors:* Cécile Alduy, Dan Edelstein, Joshua Landy, Laura Wittman

*Assistant Professors:* Marisa Galvez (on leave), David Lummus

*Courtesy Professors:* Keith Baker, Margaret Cohen, Paula Findlen, Michael Marrinan

*Lecturers:* Sarah Carey, Marie-Pierre Ulloa

*Visiting Associate Professors:* Ewa Domanska (Spring)

## Overseas Studies Courses in French

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/frenchanditalian/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/frenchanditalian/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/frenchanditalian/http://bosp.stanford.edu>).

		Units
OSPPARIS 29	Colonization, Decolonization and Immigration in France	5
OSPPARIS 30	The Avant Garde in France through Literature, Art, and Theater	4
OSPPARIS 32	Understanding French Politics	4-5
OSPPARIS 54	The Artist's World: The Workshop, Patronage and Public in 19th and 20th Century France	4

OSPPARIS 60	Representations of Women in Christian Art: Boldness and Virtue	4
OSPPARIS 81	France During the Second World War: Between History and Memory	5
OSPPARIS 92	Building Paris: Its History, Architecture, and Urban Design	4
OSPPARIS 186F	Contemporary African Literature in French	4

## Overseas Studies Courses in Italian

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/frenchanditalian/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

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		Units
OSPFLOR 34	The Woman in Florentine Art	4
OSPFLOR 41	The Contemporary Art Scene in Tuscany: Theory and Practice	3-5
OSPFLOR 44	The Revolution in Science: Galileo and the Birth of Modern Scientific Thought	5
OSPFLOR 48	Sharing Beauty: Florence and the Western Museum Tradition	4
OSPFLOR 49	The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema	5
OSPFLOR 54	High Renaissance and Maniera	5
OSPFLOR 58	Space as History: Urban Change and Social Vision in Florence 1059 to the Present	4
OSPFLOR 67	Women in Italian Cinema: Maternity, Sexuality, and the Image	4
OSPFLOR 71	Becoming an Artist in Florence: Contemporary Art in Tuscany and New Tendencies in the Visual Future	3-5
OSPFLOR 75	Florence in the Renaissance	5
OSPFLOR 111Y	From Giotto to Michelangelo: Introduction to the Renaissance in Florence	4
OSPFLOR 115Y	The Duomo and Palazzo della Signoria: Symbols of a Civilization	4
OSPFLOR 134F	Modernist Italian Cinema	5

## German Studies

Courses offered by the Department of German Studies are listed on the *Stanford Bulletin's* ExploreCourses web site under the subject code GERMAN. For courses in German language instruction with the subject code GERLANG, see the "Language Center" section of this bulletin.

The department's goal is to provide students with the linguistic and analytic ability to explore the significance of the cultural traditions and political

histories of the German-speaking countries of Central Europe. At the same time, the interdisciplinary study of German culture, which can include art, history, literature, media theory, philosophy, and political science, encourages students to evaluate broader and contradictory legacies of modernity, such as how the literary, artistic, and cultural responses to the belated and rapid modernization of Germany allow for reflection on the modern condition in general.

Similarly, the German experience of national identity and political unification sheds light on wider issues of cultural cohesion and difference, as well as on the causes and meaning of phenomena such as racial prejudice, anti-Semitism, and the Holocaust. In general, an education in German Studies not only encourages the student to consider the effects of German-speaking thinkers and artists on the modern world, but also provides a lens through which the contours of the present and past can be evaluated.

The department offers students the opportunity to pursue course work at all levels in the languages, cultures, literatures, and intellectual histories of the German-language traditions. Whether interested in German literature or the influence of German thought on other fields in the humanities, students find a broad range of courses covering language acquisition and refinement, literary history and criticism, cultural history and theory, history of thought, continental philosophy, and linguistics.

By carefully planning their programs, students may fulfill the B.A. requirements for a double major in German Studies and another subject. A coterminous program is offered for the B.A. and M.A. degrees in German Studies. Doctoral students may elect Ph.D. minors in Comparative Literature, Humanities, Linguistics, and Modern Thought and Literature.

Special collections and facilities at Stanford offer possibilities for extensive research in German Studies and related fields pertaining to Central Europe. Facilities include the Stanford University Libraries and the Hoover Institution on War, Revolution, and Peace. Special collections include the Hildebrand Collection (texts and early editions from the 16th to the 19th century), the Austrian Collection (with emphasis on source material to the time of Maria Theresa and Joseph II, the Napoleonic wars, and the Revolution of 1848), and the Stanford Collection of German, Austrian, and Swiss Culture. New collections emphasize culture and cultural politics in the former German Democratic Republic. The Hoover Institution has a unique collection of historical and political documents pertaining to Germany and Central Europe from 1870 to the present. The department also has its own reference library.

Haus Mitteleuropa, the German theme house at 620 Mayfield, is an undergraduate residence devoted to developing an awareness of the culture of Central Europe. A number of department courses are regularly taught at the house, and there are in-house seminars and conversation courses. Assignment is made through the regular undergraduate housing draw.

## Mission of the Undergraduate Program in German Studies

The mission of the undergraduate program in German Studies is to provide students with the linguistic and analytic background necessary to explore the significance of cultural traditions and political histories of the German-speaking countries of Central Europe. In addition, its interdisciplinary component prepares students to evaluate how the literary, artistic, and cultural responses to the belated yet rapid modernization of Germany allow for reflection on the modern condition. Students pursue course work at all levels in the languages, literatures, and intellectual histories of the Germanic nations. The program prepares students for careers in business, social service, and government, and for graduate work in German Studies.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. oral proficiency beyond the interpersonal level with presentational language abilities.
2. writing proficiency beyond the interpersonal level with presentational language abilities.
3. close reading skills of authentic texts in German.
4. the ability to develop effective and nuanced lines of interpretation.

## Graduate Programs in German Studies

The University requirements for the M.A. and Ph.D. degrees are described in the "Graduate Degrees" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in German Studies and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in German Studies. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of German Studies and to pursue career tracks in higher education and in other sectors.

## German Studies and a Minor Field

Students may work toward a Ph.D. in German Studies with minors in such areas as Comparative Literature, History, Humanities, Linguistics, or Modern Thought and Literature. Students obtaining a Ph.D. in such combinations may require additional training.

## Bachelor of Arts in German Studies

Majors must demonstrate basic language skills, either by completing GERLANG 1,2,3, First-Year German, or the equivalent such as an appropriate course of study at the Stanford in Berlin Center. Students then enroll in intermediate and advanced courses on literature, culture, thought, and language. Courses counted toward degree requirements must be taken for a letter grade unless that grading option is not available. Students can combine a major in German Studies with a major in any other field.

## Degree Requirements

1. Completion of 60 units. All classes taken towards this major must be taken for a letter grade unless the only option is C/NC. Units earned towards the Bachelor of Arts in German Studies with Honors degree may be applied to the 60 unit total.

2. Completion of two GERMAN Literature courses at the 120-level:

		<b>Units</b>
GERMAN 120Q	Contemporary Politics in Germany	3
GERMAN 121N	Memory in the Modernist Novel	3
GERMAN 123	German Culture and Film	3-5
GERMAN 124	Introduction to German Poetry	4
GERMAN 128N	Medicine, Modernism, and Mysticism in Thomas Mann's the Magic Mountain	3

3. Completion of German Studies Core series:

		<b>Units</b>
GERMAN 131	Intro to 18th Century German Literature: The Age of Reason, Feeling and Revolution	3-5
GERMAN 132	Intro to Nineteenth-Century German Literature	3-5
GERMAN 133	Twentieth Century and Contemporary Literature and Culture	3-5
or GERMAN 134	Freud's Vienna	

4. Senior Capstone:

		<b>Units</b>
GERMAN 190	German Capstone: Reading Franz Kafka	3-5

5. Remaining units to be completed through elective courses approved in consultation with the Chair of Undergraduate Studies. A maximum of 27 units of GERLANG courses and/or 25 units from courses covering German material taught in other departments may be applied to these elective units. IHUM or Thinking Matters courses approved by the Chair of Undergraduate Studies for a maximum of 10 units. As well as Structured Liberal Education, students may count 10 units of SLE towards the major electives.

GERMAN 133	Twentieth Century and Contemporary Literature and Culture	3-5
or GERMAN 134	Freud's Vienna	

3. German Studies Senior Capstone:

		<b>Units</b>
GERMAN 190	German Capstone: Reading Franz Kafka	3-5

Philosophy:

- PHIL 80 Mind, Matter, and Meaning
- GERMAN 181 Philosophy and Literature
- Aesthetics, Ethics, Political Philosophy: one course from PHIL 170 series.
- Language, Mind Metaphysics, and Epistemology: one course from PHIL 180 series.
- History of Philosophy: one course in the history of Philosophy, numbered above PHIL 100.
- Two additional elective courses of special relevance to the study of philosophy and literature as identified by the committee in charge of the program. Students must consult with their advisers, the Chair of Undergraduate Studies, and the undergraduate adviser of the program in philosophical and literary thought.
- Capstone: One of the courses must be taken in the student's senior year. When choosing courses, students must consult with their advisers, the Chair of Undergraduate Studies, and the undergraduate adviser of the program in philosophical and literary thought:

		<b>Units</b>
ENGLISH 117A	Irony: From Socrates to David Foster Wallace	5
COMPLIT 199	Senior Seminar	3-5
GERMAN 282	Martin Heidegger	3-5

Units devoted to meeting the department's language requirement are not counted toward the 65-unit requirement.

The capstone seminar and the two related courses must be approved by both the German Studies Chair of Undergraduate Studies and the undergraduate adviser of the program in philosophical and literary thought administered through the DLCL. Substitutions, including transfer credit, are not normally permitted for items 3b, 3c, and 3d, and are not permitted under any circumstances for items 2, 3a, and 5. Up to 10 units taken in the Philosophy Department may be taken CR/NC or S/NC; the remainder must be taken for a letter grade.

## German and Philosophy

The German and Philosophy major option offers students the opportunity to combine studies in literature and philosophy. Students take most of their courses from departments specializing in the intersection of literature and philosophy. This option is not declared in Axess; it does not appear on the transcript or diploma. This option requires a minimum of 16 courses, for a minimum total of 65 units.

### Degree Requirements

German Studies:

1. Completion of two GERMAN Literature courses at the 120-level:

		<b>Units</b>
GERMAN 120Q	Contemporary Politics in Germany	3
GERMAN 121N	Memory in the Modernist Novel	3
GERMAN 123	German Culture and Film	3-5
GERMAN 124	Introduction to German Poetry	4
GERMAN 128N	Medicine, Modernism, and Mysticism in Thomas Mann's the Magic Mountain	3

2. Completion of German Studies Core series:

		<b>Units</b>
GERMAN 131	Intro to 18th Century German Literature: The Age of Reason, Feeling and Revolution	3-5
GERMAN 132	Intro to Nineteenth-Century German Literature	3-5

## Honors

German majors with an overall grade point average (GPA) of 3.3 or above, and who maintain a 3.5 (GPA) in major courses, are eligible to participate in the DLCL's honors program. Prospective honors students must choose a senior thesis adviser from among their home department's regular faculty, in their junior year, preferably by March 1, but no later than May 1.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Honors theses range from 40-90 pages not including bibliography and notes.

During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies of their home department to submit a thesis proposal (2-5 pages), DLCL Honors application and an outline of planned course work for their senior year. During this quarter, students may enroll for 2 units in DLCL 189C Honors Thesis Seminar for the drafting or revision of the thesis proposal. The



proposal is reviewed by the Chair of Undergraduate Studies and the Director of the department and will be approved or returned for submission.

Honors students are encouraged to participate in the honors college hosted by Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) and coordinated by the Division of Literatures, Cultures, and Languages. The honors college is offered at the end of the summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted through the Bing program. For more information, view the Bing Honors website.

In Autumn Quarter of the senior year, the students must enroll in DLCL 189A Honors Thesis Seminar, a 5 unit seminar that focuses on researching and writing the honors thesis. During Winter Quarter students then enroll for 5 units in DLCL 189B Honors Thesis Seminar while composing their thesis. Students who did not enroll in DLCL 189C Honors Thesis Seminar during their Spring Quarter junior year may do so in the Spring Quarter of their senior year while revising the thesis, if approved by the thesis supervisor. A total of 10-12 units will be awarded for completion of honors course work, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15th of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

## Overseas Studies and Internships in German Studies

All students who are planning to study at Stanford in Berlin or engage in an internship are encouraged to consult with the Chair of Undergraduate Studies and the Overseas Studies office about integrating work done abroad into their degree program. Through the Center, students with at least two years of college-level German can also take courses at the Freie Universität, Technische Universität, or Humboldt Universität. Most credits earned in Berlin can be applied to the undergraduate major in German Studies. For course descriptions and additional offerings, see the listings in the *Stanford Bulletin's* ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/germanstudies/> <http://explorecourses.stanford.edu>) web site, or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/germanstudies/http://bosp.stanford.edu>) web site.

Internships in Germany are arranged through the Bing Overseas Studies Program. In addition, students may consult with the department to arrange local internships involving German language use or issues pertaining to Germany or Central Europe. Returning interns who wish to develop a paper based on their experience should enroll in GERMAN 298 Writing Workshop.

## Minor in German Studies

The department offers two minor options; the DLCL offers one additional minor option.

## Minor in German Language and Culture

Students may choose to minor in German Language and Culture if they are particularly interested in developing a strong ability in the German language, or in pursuing linguistic issues pertinent to German. Students satisfy the requirements for the minor in German Language and Culture by completing 35 units of course work, including at least three courses at

the GERMAN 100-139, with coursework taught in German. Study at the Stanford in Berlin Center for at least one quarter is highly recommended.

## Minor in German Cultural Studies

Students who wish to study German literature, culture, or thought, without necessarily acquiring facility in the German language, may pursue a minor in German Cultural Studies. Students meet the requirements for the minor in German Cultural Studies by completing 35 units of course work in German literature, culture, and thought in translation, including at least three courses at the GERMAN 130- or 140- level.

## Minor in Modern Languages

The Division of Literatures, Cultures, and Languages offers a minor in Modern Languages. This minor draws on literature and language courses offered through this and other literature departments. See the "Literatures, Cultures, and Languages" section of this bulletin for further details about this minor and its requirements.

## Master of Arts in German Studies

This program is designed for those who do not intend to continue studies through the Ph.D. degree. Students desiring the M.A. degree must complete a minimum of 45 units of graduate work. If students enroll for three quarters for a minimum of 15 units per quarter, they can fulfill the M.A. requirements in one year. The program normally includes at least one course in each of the three areas of concentration: language and linguistics, literature, and thought.

In addition, students must take graduate-level courses in German and/or approved courses in related fields such as art history, comparative literature, linguistics, history, or philosophy.

M.A. candidates must take an oral examination toward the end of their last quarter.

## Coterminal Programs

Students may elect to combine programs for the B.A. and M.A. degrees in German Studies. University requirements and forms for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin.

## Doctor of Philosophy in German Studies

The requirements for the Ph.D. in German Studies include:

1. Required Courses. A total of 135 units is required for the Ph.D.; doctoral candidates must complete at least one course with each member of the department. During each quarter in year one and year two, enrollment in and completion of at least two graduate courses taught by German Studies faculty are required.
  - A. First Year. Students must enroll in a minimum of 54 graduate units during their first year of graduate study as well as 10 units during the first summer. During the first year of work, the student should select courses that provide an introduction to the major areas of the discipline. First year required coursework:

		<b>Units</b>
GERMAN 320	German Literature Pre 1700: Medieval and Early Modern German Literature	3-5
GERMAN 321	German Literature 1700-1900: From Enlightenment to Realism	4
GERMAN 322	German Literature and Thought from 1900 to the Present: Wrestling with Modernity	3-5
GERMAN 298	Writing Workshop (summer quarter)	1-12
DLCL 301	The Learning and Teaching of Second Languages	3

B. Second Year. Students must enroll in a minimum of 30 units during their second year of graduate study as well as 10 units during their second summer. Second year required coursework:

		<b>Units</b>
GERMAN 298	Writing Workshop (autumn and summer quarters)	1-12

C. Third Year. Students that have not reached TGR status must complete a minimum of 30 units during their third year of graduate study. Third year required coursework:

		<b>Units</b>
GERMAN 398	Dissertation Prospectus Colloquium (autumn quarter)	1-12
GERMAN 399	Individual Work (winter and spring quarters)	1-12

2. Canon Exam. On June 7 of spring quarter, all first year Ph.D. students must take their first-year examination. During the one-hour oral examination, the student is questioned by three faculty members on work undertaken in specific graduate courses. Students who fail this examination may request to retake it once before October 15. A second fail of the Cannon Exam will result in dismissal from the Ph.D. program.
3. Language Requirement. A reading knowledge of one language other than English and German is required. Students in Medieval Studies must also have a reading knowledge of Latin.
4. Article Submission. Based upon summer independent study and progress in GERMAN 298 Writing Workshop, the Ph.D. student will submit and defend an article in Autumn quarter of their second year. Article must be submitted by October 15 and defended on December 7.
5. Dissertation Prospectus. Based upon work in Winter and Spring quarters of the students second year, a preliminary dissertation prospectus must be completed by the end of Spring quarter of the second year.
6. The University Oral examination. The University Oral examination in the Department of German Studies involves a presentation of a dissertation prospectus. The prospectus, normally 25 pages plus bibliography, elaborates on the topic, the proposed argument, and the organization of the dissertation. It must be distributed to the committee members and the outside chair at least two weeks before the formal University Oral examination. Students should plan this examination for winter quarter of the third year. The examination lasts approximately two hours, permitting each of the four examiners a 25-minute question period and reserving an optional ten minutes for questions from the chair of the examination. Should a student fail the University Oral exam, they will be allowed an opportunity to retake the exam. A second fail of the University Oral exam will result in dismissal from the Ph.D. program.
7. Submission and approval of a dissertation.
8. Teaching Assistant. The teaching requirement is four quarters during the second and third years of study and mandatory for continued enrollment or support in the program. Students must teach a fifth

course which may be a language course, but they may alternatively request to teach an additional literature course at a later time in the course of study, normally once their dissertation has reached an advanced stage, contingent upon department need and subject to approval of the director. Such teaching does not extend the length or scope of support.

9. Research Assistant. The department expects candidates to demonstrate research skills appropriate to their special areas of study. The requirement can be fulfilled in the capacity of either a University Fellow or a Research Assistant. Graduate students are also advised to start developing skills in the teaching of literature by participating in the teaching of undergraduate literature courses. Students may enroll in independent studies with faculty members to gain experience as apprentices in undergraduate literature teaching.
10. Department Colloquium. Regular attendance at the departmental colloquium is mandatory. Each student is expected to make a formal presentation at the colloquium for public discussion. The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of University, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements results in corrective measures which may include a written warning, academic probation, and/or the possible release from the program.
11. Candidacy. At the end of the second year of residency, students who are performing well, as indicated by their adviser, performance on the Qualifying Exam, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded a terminal M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for the fall quarter of the student's third year.
12. Yearly Review. In order to evaluate student progress and to identify potential problem areas, the department's faculty reviews the academic progress of each first-year student at the beginning of Winter and Spring quarters and again at the end of the academic year. The first two reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may be placed on probation with specific guidelines for addressing the problems detected. The review at the end of Spring Quarter is more thorough; each student's performance during the first year is reviewed and discussed. All students are given feedback from their advisers at the end of their first year of graduate work, helping them to identify areas of strength and potential weakness. At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student. Possible outcomes of the spring review include: continuation of the student in good standing, or placing the student on probation, with specific guidelines for the period of probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: restoration to good standing; continued probation, again with guidelines for necessary remedial steps; or termination from the program.
13. Grading. Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course offered by the DLCL. Any grade of 'B' or below is considered to be less than satisfactory. Grades of

'B' or below are reviewed by faculty and the following actions may be taken: the grade stands and the student's academic performance is monitored to ensure that satisfactory progress is being made; the grade stands and the student is required to revise and resubmit the work associated with that course; or the student may be required to retake the course.

*Emeriti: (Professors)* Theodore M. Andersson, Gerald Gillespie, Katharina Mommsen, Kurt Müller-Vollmer, Orrin W. Robinson III

*Director:* Russell A. Berman

*Chair of Graduate Studies:* Amir Eshel

*Chair of Undergraduate Studies:* Márton Dornbach

*Professors:* Russell A. Berman, Elizabeth Bernhardt, Amir Eshel, Kathryn Starkey

*Assistant Professors:* Adrian Daub (on leave), Márton Dornbach, Charitini Douvaldzi

*Courtesy Professor:* Thomas Sheehan (on leave, Spring)

*Senior Lecturers:* William E. Petig, Kathryn Strachota

*Visiting Professors:* Karl Heinz Bohrer (Autumn)

*Visiting Assistant Professor:* Falk Cammin (Autumn)

*Visiting Lecturers:* Stefan Willer (Autumn)

## Overseas Studies Courses in German Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/germanstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/germanstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/germanstudies/http://bosp.stanford.edu>).

		Units
OSPBER 15	Shifting Alliances? The European Union and the U.S.	4-5
OSPBER 17	Split Images: A Century of Cinema	4
OSPBER 52	European Modernism in Art	4
OSPBER 53	The Brothers Grimm and their Fairy Tales	4
OSPBER 66	Theory from the Bleachers: Reading German Sports and Culture	3
OSPBER 70	The Long Way to the West: German History from the 18th Century to the Present	4-5
OSPBER 101A	Contemporary Theater	5
OSPBER 115X	The German Economy: Past and Present	4-5
OSPBER 126X	A People's Union? Money, Markets, and Identity in the EU	4-5
OSPBER 161X	The German Economy in the Age of Globalization	4-5

OSPBER 174	Sports, Culture, and Gender in Comparative Perspective	5
OSPBER 177A	Culture and Politics in Modern Germany	4-5

# History and Philosophy of Science

Courses offered by the Program in History and Philosophy of Science and Technology are listed under the subject code HPS on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HPS&filter-catalognumber-HPS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HPS&filter-catalognumber-HPS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HPS&filter-catalognumber-HPS=on>).

The Program in History and Philosophy of Science and Technology (HPS) teaches students to examine the sciences, medicine and technology from a number of perspectives, conceptual, historical and social. The community of scholars includes core faculty and students in History and Philosophy and affiliated members in Classics, Anthropology, English, Political Science, Communication, and other disciplines. Together, they draw upon the multiple methods of their disciplines to study the development, functioning, applications, and social and cultural engagements of the sciences.

Stanford's Program in History and Philosophy of Science and Technology is a collaborative enterprise of the departments of History and Philosophy. Each department has its own undergraduate and graduate degree programs in this area, but these overlap and interact through the structure of requirements, advising, team-taught courses, an active graduate student community and a shared colloquium series (<http://HPST.stanford.edu/colloquia.html>).

The program's courses span from antiquity to the late 20th century, with emphasis on:

- ancient science
- Renaissance science
- the Scientific Revolution
- Enlightenment and transatlantic science
- history of medicine and the body
- history and philosophy of biology
- history and philosophy of modern physics
- history of the philosophy of science from the early modern period to the present
- central issues in contemporary philosophy of science
- gender, science, and technology

## Undergraduate Degrees

HPS offers undergraduates the opportunity to study science, medicine and technology by combining scientific and humanistic perspectives in a single program. Students can pursue HPS through the two departments (History and Philosophy) that coordinate this interdisciplinary program. The HPS Program offers students an in-depth understanding of the nature and evolution of scientific ideas, practices, and institutions; their contemporary significance to intellectual life; and their material transformation of the modern world.

The Department of History offers an interdisciplinary track in History of Science, and Medicine (<http://www.stanford.edu/dept/registrar/bulletin/7071.htm>). This track is especially well suited to students who wish to combine history and science, or who are interested in studying the history of science and medicine in combination with premed science requirements in preparation for a future career in medicine and public health.

The Department of Philosophy offers a special program in History and Philosophy of Science (<http://www.stanford.edu/dept/registrar/bulletin/6562.htm>). This program is especially well suited to students who want to combine their concentration in Philosophy with the study of science and its history.

Students interested in HPS should contact the faculty advisors (in 2012-13 Jessica Riskin for History and Michael Friedman for Philosophy) to discuss the undergraduate program.

## Graduate Degrees

Graduate students in the Program in History and Philosophy of Science can pursue a Ph.D. either in History, through its Ph.D. concentration in History of Science, Medicine, and Technology, or in Philosophy, through its Ph.D. subplan in History and Philosophy of Science. Diplomas will be issued by the respective departments, but the HPS study will not be noted on the transcript nor on the diploma. Ph.D. students completing the requirements of the HPS program will receive a certificate issued by the Program.

Graduate students in the Program in History and Philosophy of Science that wish to pursue a Ph.D. in Philosophy must fulfill Departmental degree requirements (<http://www.stanford.edu/dept/registrar/bulletin/6568.htm>) and the following requirements:

1. HPS colloquium series attendance
2. One of the following graduate level Philosophy of Science courses: 263, 264, 264A, or 266
3. One elective seminar in the history of science
4. One elective seminar (in addition to the course satisfying requirement 2) in philosophy of science

Philosophy Ph.D. students declaring the HPS subplan in Access will have it appear on the official transcript but is not printed on the diploma.

The Program in History and Philosophy of Science degree requirements for the Ph.D. in History of Science, Medicine and Technology, in addition to the general History Department Ph.D. degree requirements (<http://www.stanford.edu/dept/registrar/bulletin/7084.htm>), are:

1. HPS colloquium series attendance
2. the History Department core seminar in History of Science, Medicine and Technology
3. Four other courses in the history of science, technology and/or medicine
4. One course in the philosophy of science
5. Four additional courses in a given geographical or national field of research, one of which must be a core course

The courses described above must include two research seminars, at least one of which must be in the history of science, technology and/or medicine. Students are expected to write papers on substantially different topics for each seminar. You should also aim to present your research at the annual meeting of a professional society associated with the history of science, technology and/or medicine sometime during your third or fourth year. For more information, see the program's (<http://HPST.stanford.edu/grad.html>) web site.

## Bachelor of Arts Programs

HPS offers undergraduates the opportunity to study science, medicine and technology by combining scientific and humanistic perspectives in a single program. Students can pursue HPS through the two departments (History and Philosophy) that coordinate this interdisciplinary program. The HPS Program offers students an in-depth understanding of the nature and

evolution of scientific ideas, practices, and institutions; their contemporary significance to intellectual life; and their material transformation of the modern world.

The Department of History offers an interdisciplinary track in History of Science, and Medicine (<http://www.stanford.edu/dept/registrar/bulletin/7071.htm>). This track is especially well suited to students who wish to combine history and science, or who are interested in studying the history of science and medicine in combination with premed science requirements in preparation for a future career in medicine and public health.

The Department of Philosophy offers a special program in History and Philosophy of Science (<http://www.stanford.edu/dept/registrar/bulletin/6562.htm>). This program is especially well suited to students who want to combine their concentration in Philosophy with the study of science and its history.

Students interested in HPS should contact the faculty advisors (in 2012-13 Jessica Riskin for History and Michael Friedman for Philosophy) to discuss the undergraduate program.

## Course Sequences

The following courses are offered in 2012-2013 in the area of History and Philosophy of Science.

### Introductory

		Units
HPS/PHIL 60	Introduction to Philosophy of Science	5
PHIL 15N	Freedom, Community, and Morality	3
HPS 61	Science, Religion, and the Birth of Modern Philosophy	5

### Science in History

This sequence is designed to introduce students to the history of Science from antiquity to the 20th century. Students are advised to take most or all of this sequence as a core foundation.

		Units
CLASSGEN 22N	Technologies of Civilization: Writing, Number, and Money	4-5
HISTORY 40/140	World History of Science	3
OSPFLOR 44	The Revolution in Science: Galileo and the Birth of Modern Scientific Thought	5
HISTORY 142	Darwin in the History of Life	5
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering	5
HISTORY 244C	The History of the Body in Science, Medicine, and Culture	4-5
HISTORY 332G	When Worlds Collide: The Trial of Galileo	4-5
HISTORY 342	Darwin in the History of Life	4-5
HISTORY 44	History of Women and Gender in Science, Medicine, and Engineering	3
HISTORY 208A	Science and Law in History	4-5
HISTORY 308A	Science and Law in History	4-5

### Medicine in History

This sequence is designed to introduce students to the history of medicine from antiquity to the 20th century.

		Units
HISTORY 243G/343G	Tobacco and Health in World History	4-5

HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present	5
HISTORY 40	World History of Science	3
AMSTUD 156H	Women and Medicine in US History: Women as Patients, Healers and Doctors	5
CLASSGEN 149	Ancient and Modern Medicine	3-4
HISTORY 244C	The History of the Body in Science, Medicine, and Culture	4-5
HISTORY 243C	Colonial Science and Medicine	4-5
HUMBIO 175	Health Care as Seen Through Medical History, Literature, and the Arts	3
HISTORY 264G	The Social History of Mental Illness in the United States	5

## Philosophical Perspectives on Science, Medicine, and Technology

This sequence is designed to introduce students to the philosophy of science. Students are advised to take HPS 60 Introduction to Philosophy of Science above as a starting point, and combine a number of the electives listed below in conjunction with courses in the other concentrations that address their specific interests.

		Units
FEMST 166/ PHIL 184F/284F	Feminist Theories of Knowledge	4
PHIL 107/207	Plato's Metaphysics and Epistemology	4
PHIL 163/263	Significant Figures in Philosophy of Science	4
PHIL 263	Significant Figures in Philosophy of Science	4
PHIL 324	Kant's System of Nature and Freedom	4
PHIL 164/264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 167A/267A	Philosophy of Biology	2-4
PHIL 167B/267B	Philosophy, Biology, and Behavior	4
PHIL 224	Kant's Philosophy of Physical Science	2-4
PHIL 224A	Mathematics in Kant's Philosophy	4
PHIL 348	Evolution of Signals	2-4
PHIL 360	Core Seminar in Philosophy of Science	4
PHIL 365	Seminar in Philosophy of Science: Time	4
PHIL 165	Philosophy of Physics	4
PHIL 227B	Kant's Anthropology and Philosophy of History	4
PHIL 264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 265	Philosophy of Physics	4
PHIL 265C	Philosophy of Physics: Probability and Relativity	4
PHIL 267A	Philosophy of Biology	2-4

## Advanced Course Sequences

### Contemporary Perspectives on Science, Medicine and Technology

The following courses focus on contemporary cultural and social science approaches to science, technology, and medicine.

		Units
HPS 199	Directed Reading	1-15

HPS 299	Graduate Individual Work	1-15
ANTHRO 180	Science, Technology, and Gender	3-5
HISTORY 44Q	Gendered Innovations in Science, Medicine, and Engineering	4-5
HISTORY 205A/305A	The History of Information	4-5
HISTORY 243S/443A	Human Origins: History, Evidence, and Controversy	4-5

## Graduate Degrees

Graduate students in the Program in History and Philosophy of Science can pursue a Ph.D. either in History, through its Ph.D. concentration in History of Science, Medicine, and Technology, or in Philosophy, through its Ph.D. subplan in History and Philosophy of Science. Diplomas will be issued by the respective departments, but the HPS study will not be noted on the transcript nor on the diploma. Ph.D. students completing the requirements of the HPS program will receive a certificate issued by the Program.

Graduate students in the Program in History and Philosophy of Science that wish to pursue a Ph.D. in Philosophy must fulfill Departmental degree requirements (<http://www.stanford.edu/dept/registrar/bulletin/6568.htm>) and the following requirements:

1. HPS colloquium series attendance
2. One of the following graduate level Philosophy of Science courses: 263, 264, 264A, or 266
3. One elective seminar in the history of science
4. One elective seminar (in addition to the course satisfying requirement 2) in philosophy of science

Philosophy Ph.D. students declaring the HPS subplan in Aclass will have it appear on the official transcript but is not printed on the diploma.

The Program in History and Philosophy of Science degree requirements for the Ph.D. in History of Science, Medicine and Technology, in addition to the general History Department Ph.D. degree requirements (<http://www.stanford.edu/dept/registrar/bulletin/7084.htm>), are:

1. HPS colloquium series attendance
2. the History Department core seminar in History of Science, Medicine and Technology
3. Four other courses in the history of science, technology and/or medicine
4. One course in the philosophy of science
5. Four additional courses in a given geographical or national field of research, one of which must be a core course

The courses described above must include two research seminars, at least one of which must be in the history of science, technology and/or medicine. Students are expected to write papers on substantially different topics for each seminar. You should also aim to present your research at the annual meeting of a professional society associated with the history of science, technology and/or medicine sometime during your third or fourth year. For more information, see the program's (<http://HPST.stanford.edu/grad.html>) web site.

## Course Sequences

See the Bachelors tab for all History and Philosophy of Science courses offered in 2012-2013.

*Co-chairs:* Paula Findlen (History), Michael Friedman (Philosophy)

*Committee-in-Charge:* Paula Findlen (History), Michael Friedman (Philosophy), Helen Longino (Philosophy), Reviel Netz (Classics), Robert Proctor (History), Jessica Riskin (History), Thomas Ryckman (Philosophy)

*Program Committee:* Paula Findlen (History), Michael Friedman (Philosophy), Helen Longino (Philosophy), Tom Mullaney (History),

Reviel Netz (Classics), Robert Proctor (History), Jessica Riskin (History), Thomas Ryckman (Philosophy), Londa Schiebinger (History)

*Professors:* Keith Baker (History), Paula Findlen (History), Michael Friedman (Philosophy), David Holloway (History, Institute for International Studies, Political Science), Helen Longino (Philosophy), Reviel Netz (Classics), Robert Proctor (History), Londa Schiebinger (History), Richard White (History), Caroline Winterer (History)

*Associate Professors:* Thomas Mullaney (History), Jessica Riskin (History), Fred Turner (Communication), Sarah Jain (Anthropology), Priya Satia (History)

*Professor (Teaching):* Thomas Ryckman (Philosophy)

*Professor (Research):* Rega Wood (Philosophy, emerita)

*Lecturer:* Margo Horn

*Other Affiliation:* Henry Lowood (Stanford University Libraries), Larry Lagerstrom (UAR)

*Visiting Scholar:* Adrienne Mayor (Classics)

## Overseas Studies Courses in History and Philosophy of Science

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/hps/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/hps/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/hps/http://bosp.stanford.edu>).

Units

OSPFLOR 44 The Revolution in Science: Galileo and the Birth of Modern Scientific Thought 5

## History

Courses offered by the Department of History are listed under the subject code HISTORY on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HISTORY&filter-catalognumber-HISTORY=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HISTORY&filter-catalognumber-HISTORY=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HISTORY&filter-catalognumber-HISTORY=on>).

## Mission of the Department of History

History courses teach the analytical, interpretive, and writing knowledge and skills necessary for understanding the connections between past and present. History is a pragmatic discipline in which the analysis of change

over time involves sifting the influences and perspectives that affect the course of events, and evaluating the different forms of evidence historians exploit to make sense of them. Teaching students how to weigh these sources and convert the findings into persuasive analysis lies at the heart of the department's teaching. Graduates with a History major pursue careers and graduate study in law, public service, business, writing, education, and journalism.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of what it means to think historically: locating subjects in time and place and being sensitive to the contingencies of context and to change over time.
2. critical and interpretive thinking skills using course's primary source materials.
3. the ability to identify different types of sources of historical knowledge.
4. analytical writing skills and close reading skills.
5. effective oral communication skills

## Degrees Offered

The Department of History offers the following degree programs: Bachelor of Arts, coterminal Bachelor of Arts and Master of Arts, Master of Arts, and Doctor of Philosophy.

## Graduate Programs in History

The primary goal of the Stanford Department of History's graduate program is the training of scholars. Most students who receive doctorates in the program go on to teach at colleges or universities. Other students have obtained positions in university administration and research.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in History and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in History. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of History and to interpret and present the results of such research.

# History Course Catalog

## Numbering System

Location	Introductory Seminars: F and Sophomore Methods Seminars	Sources	Lectures	Colloquia	Research Seminars and Workshops
International, Global, Thematic	4N, 10N, 17N, 44Q		102, 103D, E, F, 105C, 106A, 107C, 108B, 140, A, 144	201A, 202, C, E, 203E, 204E, F, G, 205A, C, G, 206, 207C, 208A, 209C, D, 243G, 252K, 266C, 293, 299X, 301A, 302C, E, G, 304, 305, A, G, 306E, 307A, B, C, E, 309C, 342, 343G, 399A	307A, B, 401A
Ancient and Medieval Europe			101, 102A, 110A	215K, 313E	438, 441A
Early Modern and Modern Europe	30Q	14S, 16S	110B, 132A, 133A, B, 134, 139, 141A, 142, 185B	213E, 230C, E, K, 231K, 232A, E, 233A, C, E, 234, K, 235K, 239D, 286C, 287E, 330A, E, K, 331B, 332B, E, 333A, C, E, 334, 338B, 339D, 386C, 387E	342, 430C, D, 432A, 433A, B, 438, 441A
Eastern Europe, Russia, Eurasia	20Q	23S	120A	204E, G, 221B, 224A, 227, 228, 304G, 307E, 320G, 322, 327, 328	424A

History of Science	41Q, 44Q		130A, 140, A, 142, 141A, 144	208A, 242A, 243C, G, 342, A, 343G	441A
Africa	48N, 48Q		145B, 147	245G, 246C, 248S, 345B, 346C, 348D	448A, B
United States	36N, 41Q, 54N	59S, 63S	103E, 130A, 150A, B, C, 152, 158C, 161, 166, B, 168, 169, 258E	201, 251C, 252K, 253K, 254, 255D, 256, 257C, 258, 260, E, 261G, 262G, 263G, 265, 264G, 266C, 267, 301, 351A, C, F, 352B, 353K, 355D, 358, 362G, 363G	460, 462A
Latin America		79S	108B, 170B, 175B	275B, 277B, 371, 375D	470A
Middle East	82N, 84N		181B, 182C, 187	282E, 284, 288, 289, 382E, 384, 388, 389	481, 482D
Jewish History				286C, 287D, E, 385A, B, 386C, 387D, E	486A, B
Asia		96S, 97S, 98S	191C, 193, 194D, 195, C, 196, 198	209C, 289, 290B, E, 291D, E, F, 292D, G, 293, D, 295F, J, 309C, 389, 390E, 391D, E, 392D, G, 393B, C, D, 395F, G, J, 396D	496A, B, 498C, D

## Bachelor of Arts in History

### Prerequisites for the Major

Before declaring the History major, students must take one lecture course. They must take a second lecture course within one year of declaring. Fulfilling this requirement are courses numbered HISTORY 101-199.

The choices for 2012-13 are:

		Units
HISTORY 102	The History of the International System since 1914	5
HISTORY 103D	Human Society and Environmental Change	4
HISTORY 103E	History of Nuclear Weapons	5
HISTORY 103F	Introduction to Military History	5
HISTORY 105C	Human Trafficking: Historical, Legal, and Medical Perspectives	5
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 107C	Social Democracy from Marx to Gross National Happiness	5
HISTORY 108B	The Great Divergence: Latin American and East Asian Historical Development	5
HISTORY 110A	Europe from Late Antiquity to 1500	5
HISTORY 110B	From Renaissance to Revolution: Early Modern Europe	5
HISTORY 110C	Introduction to Modern Europe	5
HISTORY 120A	The Russian Empire, 1450-1796	5
HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present	5
HISTORY 132A	Enlightenment and the Arts	5
HISTORY 133A	Blood and Roses: The Age of the Tudors	5
HISTORY 133B	Revolutionary England: The Stuart Age	5
HISTORY 139	Modern Britain and the British Empire	5
HISTORY 140	World History of Science	5
HISTORY 140A	The Scientific Revolution	5
HISTORY 142	Darwin in the History of Life	5
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering	5
HISTORY 145B	Africa in the 20th Century	5
HISTORY 147	History of South Africa	5
HISTORY 150A	Colonial and Revolutionary America	5
HISTORY 150B	19th-Century America	5
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 161	Women in Modern America	4-5
HISTORY 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 168	American History in Film: Since World War II	3-4
HISTORY 169	The Environmental History of North America	4-5
HISTORY 170B	Culture, Society and Politics in Latin America	5
HISTORY 175B	Transnational Latin American Migration to the United States	5
HISTORY 181B	Formation of the Contemporary Middle East	5
HISTORY 182C	The Making of the Islamic World, 600-1500	5
HISTORY 187	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	5
HISTORY 191C	Early Imperial China	5
HISTORY 193	Late Imperial China	5
HISTORY 194D	Japan and the World, 1543-1868	4-5
HISTORY 195	Modern Korean History	5
HISTORY 195C	Modern Japanese History: From Samurai to Pokemon	5
HISTORY 196	Worlds of Gandhi	5
HISTORY 198	The History of Modern China	5

## Bachelor of Arts Requirements

Completion of the major requires planning. History majors should plan to meet with their faculty advisers twice yearly, once in the Autumn and once

in the Winter or Spring quarters. These meetings should take place within the first three weeks of the quarter, before the final study list deadline.

History majors are required to complete of a minimum of 63 units and at least 13 courses of at least 3 units each, to include:

		Units
<b>1. One Sources and Methods Seminar (HISTORY 1S-99S) (5)</b>	<sup>1</sup>	5
Sources and Methods courses offered this year are:		
HISTORY 14S	Voices from Below: Commoners in Medieval and Early Modern Europe "In Their Own Words"	
HISTORY 16S	Inquisition: Faith and Identity in the Pre-Modern World	
HISTORY 23S	Onion Domes and Dirt Streets: Cities in Early Modern and Imperial Russia	
HISTORY 59S	The Digital Historian's Toolkit: Studying the West in an Age of Big Data	
HISTORY 63S	From Hysteria to Prozac: Diagnosing Bodies, Minds, and Cultures in 20th Century America	
HISTORY 79S	From Coffee to Cocaine: Commodities, Society, and Environment in Modern South America	
HISTORY 96S	City Between Empires: Nationalism, Colonialism, and Identity in Hong Kong 1841-1997	
HISTORY 97S	Urbicide: Air Raids and the Destruction of Urban Space during World War II	
HISTORY 98S	Forbidden Desires in China From Daoist Devotees to Dr. Sex	
<b>2. Two 200-level undergraduate colloquia (HISTORY 200-298) (10)</b>	<sup>2</sup>	10
<b>3. At least one other small group course (5)</b>		5
To be chosen among the department's undergraduate colloquia, research seminars, or Stanford Introductory Seminars		
<b>4. Two lecture courses (10)</b>	<sup>3</sup>	10
One of which must be either		
A Europe survey course such as:		
HISTORY 110A	Europe from Late Antiquity to 1500	
HISTORY 110B	From Renaissance to Revolution: Early Modern Europe	
HISTORY 110C	Introduction to Modern Europe	
Or, or a United States survey course such as:		
HISTORY 150A	Colonial and Revolutionary America	
HISTORY 150B	19th-Century America	
HISTORY 150C	The United States in the Twentieth Century	
The second must be a lecture course in African, Asian, Middle East, or Latin American History.		
<b>5. Completion of the Writing in the Major (WIM) requirement (5)</b>	<sup>4</sup>	5
HISTORY 209S	Research Seminar for Majors	5
<b>6. At least 6 additional courses to total a minimum of 63 units. (28)</b>		28
<b>Total Units</b>		<b>63</b>



- 1 Students must complete the Sources and Methods Seminar requirement prior to enrolling in the Research Seminar for Majors.
- 2 ExploreCourses lists all colloquia offered this year (<https://explorecourses.stanford.edu/search?q=HISTORY&view=catalog&page=0&catalog=72&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-component-COL=on&filter-academiclevel-UG=on&filter-coursestatus-Active=on&collapse=%2C6%2C7%2C&filter-catalognumber-HISTORY=on&filter-catalognumber-HISTORY=on>).
- 3 Students may count courses they took as prerequisites to the major for this requirement.
- 4 In completing this course, students must write a 20-25 page essay based on original research and including at least two drafts. HISTORY 209S Research Seminar for Majors may be taken in either the junior or the senior year. Students must complete the Sources and Methods seminar before enrolling in the Research Seminar.

## Additional Requirements

1. Courses comprising the 63 units must be taken for a letter grade, and the student must maintain a grade point average (GPA) in History courses of 2.0 or higher.
2. At least nine courses must be taken from within the Stanford Department of History. Transfer students and those who study abroad may be granted exemptions from this requirement at the discretion of the Director of Undergraduate Studies.
3. At least six quarters of enrollment in the major. Each candidate for the B.A. in History should declare the major by the Autumn Quarter of the third year of study or earlier, if possible.
4. One HISTORY 299S Undergraduate Directed Research and Writing taken for 3-5 units and for a letter grade may be applied toward the thirteen courses required for the B.A. in History.
5. *Capstone*: The History department organizes a series of luncheon workshops in May, at which students present their research essays and honors theses.
6. The department encourages students to acquire proficiency in foreign languages and study at one of Stanford's overseas programs. Such studies are not only valuable in themselves; they can provide an opportunity for independent research and a foundation for honors essays and graduate study.
7. Advanced Placement credits do not fulfill any major requirements.

For further information on History courses' satisfaction of major requirements, see the Department of History (<http://history.stanford.edu/programs/undergraduate>) web site.

## Writing in the Major (WIM) Requirement

History's Writing in the Major requirement is satisfied by completing HISTORY 209S Research Seminar for Majors.

This course may be taken in either the junior or senior year, but not before completing the sources and methods seminar requirement. Students write a 20-25 page research essay. Original research and revision are important parts of the research essay. Students must conduct substantial research in the libraries and must submit at least two drafts (a rough draft and a final draft) of the essay. Any student wishing to write an honors thesis should take HISTORY 209S Research Seminar for Majors in the junior year and use it to begin work on the thesis; this work can take the place of a research essay.

HISTORY 209S Research Seminar for Majors fulfills the WIM requirement only. It does not fulfill geographical requirements or small group course requirements.

Students select their research topics based on the general topics of each quarter's offerings.

- HISTORY 209S Research Seminar for Majors
  - Autumn: Early American History, 1500-1820; Europe Since 1500
  - Winter: Science, Politics and Revolution: America and France in the 18th Century; The Idea of Politics
  - Spring: American Identities; Gender, Sexuality and Race; Early Modern European Travel Accounts

## Honors Program

For a limited number of majors, the department offers a special program leading to Departmental Honors in History. Students accepted for this program, in addition to fulfilling the general requirements stated above, begin work on an essay in Spring Quarter of the junior year and complete the essay by mid-May of the senior year. In addition to HISTORY 299H Junior Honors Colloquium, students must enroll in 11-15 units of Senior Research in the senior year, to be distributed as best fits their specific project. For students in the Honors program, Senior Research units (HISTORY 299A Senior Research I, HISTORY 299B Senior Research II, HISTORY 299C Senior Research III) are taken in addition to the thirteen required courses in History.

To enter this program, the student must be accepted by a member of the department who agrees to advise the research and writing of the essay, and must complete the Junior Honors Colloquium (299H) offered in Winter Quarter. An exception to the latter requirement may be made for those studying overseas Winter Quarter of the junior year, but such students should consult with the director of the honors program, if possible, prior to going overseas. Students who study abroad for the entire junior year and want to write an honors thesis should plan to take the Research Seminar for Majors in the first quarter following completion of the study abroad program. Under exceptional circumstances, students are admitted to the program in Autumn Quarter of the senior year. Such students must not enroll in any HISTORY 299A Senior Research I, HISTORY 299B Senior Research II, HISTORY 299C Senior Research III, units until HISTORY 209S Research Seminar for Majors, has been completed.

In considering an applicant for such a project, the adviser and director of the honors program take into account general preparation in the field of the project and expect a GPA of at least 3.5 in the student's previous work in History and a 3.3 in overall University work. Students completing the thesis with a grade of 'B+' or higher are eligible for Departmental Honors in History. To enter the Honors program, apply at the Department of History office.

Outstanding Honors essays may be considered for the University's Robert M. Golden Medals, as well as for departmental James Birdsall Weter prizes.

Honors Program Requirements—To graduate with departmental honors in History, students must:

1. complete HISTORY 299H Junior Honors Colloquium in the junior year
2. maintain a GPA of at least 3.3 in overall University work and a 3.5 in the History major during the final 5 quarters of enrollment/thesis preparation, or obtain the consent of the Director of the Honors Program.
3. select both a primary thesis adviser (who is a member of the Stanford History faculty) and a secondary adviser (who is a Stanford University faculty member) no later than Autumn Quarter of the senior year
4. submit on May 13, 2013 by noon a 65-120 page honors thesis including bibliography that receives a grade of 'B+' or better
5. enroll in the 11-15 units of Senior Research as specified below

- participate in mandatory Honors Program activities throughout senior year (including, but not limited to, writing workshops and the annual Honors Day oral presentations) as specified in the Honors Program Handbook.

HISTORY 299A Senior Research I, HISTORY 299B Senior Research II, HISTORY 299C Senior Research III do not fulfill any history major requirements other than honors, but the units do count towards the 180 required for B.A. degree conferral.

Required Course—To be taken in the junior year:

HISTORY 299H Junior Honors Colloquium	<b>Units</b> 1
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Required Course—Recommended to be taken in junior year:

HISTORY 209S Research Seminar for Majors	<b>Units</b> 5
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An exception (for HISTORY 299H Junior Honors Colloquium) may be made for those studying overseas Winter Quarter of the junior year, but such students should consult with the Director of the Honors Program prior to going overseas.

To be taken in the senior year:

HISTORY 299A Senior Research I	<b>Units</b> 1-5
HISTORY 299B Senior Research II	1-5
HISTORY 299C Senior Research III	1-5

## Overseas Studies or Study Abroad

Courses offered by Stanford's Bing Overseas Studies Program and appearing on the History department's cognate course list automatically receive credit towards the major or minor in History. Course work completed in non-Stanford Study Abroad programs is evaluated for major/minor credit by designated History department faculty on a case-by-case basis. Students in non-Stanford Study Abroad programs are advised to take classes with reading and writing components comparable to History department course loads.

## History Fields of Study or Degree Options

The Department of History offers the following tracks to the B.A. in History. These tracks are not declared on Axxess; they do not appear on the transcript or on the diploma. The tracks are:

- General History
- Global Affairs and World History
- History, Literature, and the Arts
- History of Science and Medicine
- History and the Law
- Public History/Public Service

The General History track emphasizes breadth of study among historical areas and periods as well as concentration in one selected field. The Global Affairs and World History track emphasizes an understanding of today's world through a historical examination of its evolution, from the early modern to the contemporary era. The four tracks with interdisciplinary emphasis (History, Literature and the Arts; History of Science and Medicine; History and the Law; and Public History/Public Service) combine the study of history with the methods and approaches of other disciplines, and involve substantial course work outside of History.

## General History Track

In addition to completing the requirements for all History majors, the student in the General History track is required to satisfy breadth and concentration requirements.

- Breadth Requirements:** to ensure chronological and geographical breadth, at least two courses must be completed in a premodern chronological period and in each of three geographical fields:
  - Field I (Africa, Asia, and Middle East)
  - Field II (the Americas)
  - Field III (Europe, including Western Europe, Eastern Europe, and Russia).
  - Courses fulfilling the premodern chronological period (Field IV) may also count for Fields I-III.
- Courses for 2012-13 follow below.
- Concentration:** to develop some measure of expertise, students must complete four courses in a single area (including one undergraduate colloquium or research seminar). The proposed concentration must be approved by the major adviser; a proposal for a thematic concentration must be approved by both the adviser and the department's director of undergraduate studies. Areas of concentration are:
  - Africa
  - Asia
  - Eastern Europe and Russia
  - Europe before 1700
  - Europe since 1700
  - Jewish History
  - Latin America
  - Science and Medicine
  - The United States
  - The Middle East
  - International History
  - Comparative Empires and Cultures
  - or a thematic subject treated comparatively, such as war and revolution, work, gender, family history, popular culture, or high culture.
- Required course:** HISTORY 102 The History of the International System since 1914. The History of the International System is a required course for students who select the International History concentration. This course is offered in Spring Quarter.

## Field I: Africa/Asia/Middle East

	<b>Units</b>
HISTORY 45B Africa in the Twentieth Century	3
HISTORY 47 History of South Africa	3
HISTORY 48N African History through Literature and Film	3-4
HISTORY 48Q South Africa: Contested Transitions	3
HISTORY 81B Formation of the Contemporary Middle East	3
HISTORY 82C The Making of the Islamic World, 600-1500	3
HISTORY 82N Modern Islamic Movements	3
HISTORY 84N The American Empire in the Middle East since the Cold War: Afghanistan, Iraq, and Israel/Palestine	4-5
HISTORY 87 The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	3
HISTORY 91C Early Imperial China	3
HISTORY 93 Late Imperial China	3

HISTORY 95	Modern Korean History	3
HISTORY 95C	Modern Japanese History: From Samurai to Pokemon	3
HISTORY 96	Worlds of Gandhi	3
HISTORY 96S	City Between Empires: Nationalism, Colonialism, and Identity in Hong Kong 1841-1997	5
HISTORY 98	The History of Modern China	3
HISTORY 98S	Forbidden Desires in China From Daoist Devotees to Dr. Sex	5
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 145B	Africa in the 20th Century	5
HISTORY 147	History of South Africa	5
HISTORY 181B	Formation of the Contemporary Middle East	5
HISTORY 182C	The Making of the Islamic World, 600-1500	5
HISTORY 187	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	5
HISTORY 191C	Early Imperial China	5
HISTORY 193	Late Imperial China	5
HISTORY 194D	Japan and the World, 1543-1868	4-5
HISTORY 195	Modern Korean History	5
HISTORY 195C	Modern Japanese History: From Samurai to Pokemon	5
HISTORY 196	Worlds of Gandhi	5
HISTORY 198	The History of Modern China	5
HISTORY 215K	The Crusades: A Cultural History	5
HISTORY 245E	Health and Society in Africa	4-5
HISTORY 245G	Law and Colonialism in Africa	3-5
HISTORY 246C	Islam and Christianity in Africa	4-5
HISTORY 248S	African Societies and Colonial States, Part 1	4-5
HISTORY 282E	Jews, Christians and Muslims in the Ottoman World	4-5
HISTORY 284	The Ottoman Empire, 1300-1923	4-5
HISTORY 287D	Tel Aviv: Site, Symbol, City	4-5
HISTORY 288	Palestine and the Arab-Israeli Conflict	4-5
HISTORY 289	The Indian Ocean World: Winds, Merchants & Empires	4-5
HISTORY 290B	Tibet: A Place in Time	5
HISTORY 290E	Movies and Empire in East Asia	5
HISTORY 291D	Colonialism and Collaboration in East Asia	5
HISTORY 291E	Maps, Borders, and Conflict in East Asia	4-5
HISTORY 291F	Yangtze: Nature, History, and the River	5
HISTORY 291G	Pre-Modern Chinese Warfare	3-5
HISTORY 291K	Speaking Through Objects: Material Culture in Late Imperial China, 1550-1820	5
HISTORY 292D	Japan in Asia, Asia in Japan	4-5
HISTORY 292G	Modern Korea	4-5
HISTORY 293B	Homosexuality in Historical and Comparative Perspective	4-5
HISTORY 295F	Race and Ethnicity in East Asia	4-5
HISTORY 295J	Chinese Women's History	5
HISTORY 50C	The United States in the Twentieth Century	3
HISTORY 54N	African American Women's Lives	3-4
HISTORY 59S	The Digital Historian's Toolkit: Studying the West in an Age of Big Data	5
HISTORY 63S	From Hysteria to Prozac: Diagnosing Bodies, Minds, and Cultures in 20th Century America	5
HISTORY 70	Culture, Politics, and Society in Latin America	3
HISTORY 79S	From Coffee to Cocaine: Commodities, Society, and Environment in Modern South America	5
HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present	5
HISTORY 150A	Colonial and Revolutionary America	5
HISTORY 150B	19th-Century America	5
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 158B	History of Education in the United States	3-5
HISTORY 158C	History of Higher Education in the U.S.	3-5
HISTORY 161	Women in Modern America	4-5
HISTORY 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 168	American History in Film: Since World War II	3-4
HISTORY 169	The Environmental History of North America	4-5
HISTORY 170B	Culture, Society and Politics in Latin America	5
HISTORY 175B	Transnational Latin American Migration to the United States	5
HISTORY 201	Introduction to Public History in the U.S., 19th Century to the Present	4-5
HISTORY 251C	The American Enlightenment	5
HISTORY 252K	America as a World Power: U.S. Foreign Relations, 1914 to Present	5
HISTORY 254	Popular Culture and American Nature	5
HISTORY 255D	Racial Identity in the American Imagination	4-5
HISTORY 255E	Education, Race, and Inequality in African American History, 1880-1990	3-5
HISTORY 256	U.S.-China Relations: From the Opium War to Tiananmen	4-5
HISTORY 257C	LGBT/Queer Life in the United States	4-5
HISTORY 258	Topics in the History of Sexuality: Sexual Violence	4-5
HISTORY 258D	School: What Is It Good For?	3-4
HISTORY 258E	History of School Reform: Origins, Policies, Outcomes, and Explanations	3-5
HISTORY 260	California's Minority-Majority Cities	4-5
HISTORY 260E	Environmental Policy and the City in U.S. History	5
HISTORY 261G	Presidents and Foreign Policy in Modern History	5
HISTORY 262G	The Pivotal Decade in U.S. History: 1960's or 1970's?	4-5
HISTORY 263G	History Through a Life: The Allure of American Biography	4-5
HISTORY 264G	The Social History of Mental Illness in the United States	5
HISTORY 265	Writing Asian American History	5
HISTORY 267	Religion in Twentieth Century American Life	5
HISTORY 275B	Governance, Resistance, and Identity in Modern Mexico	5

## Field II: The Americas

		Units
HISTORY 41Q	Mad Women: Women and Mental Illness in U.S. History	3
HISTORY 50A	Colonial and Revolutionary America	3
HISTORY 50B	19th Century America	3

## Field III: Europe, Eastern Europe, and Russia

		Units
HISTORY 10A	Europe from Late Antiquity to 1500	3
HISTORY 10B	From Renaissance to Revolution: Early Modern Europe	3
HISTORY 14S	Voices from Below: Commoners in Medieval and Early Modern Europe "In Their Own Words"	5
HISTORY 16S	Inquisition: Faith and Identity in the Pre-Modern World	5
HISTORY 20A	The Russian Empire, 1450-1796	3
HISTORY 23S	Onion Domes and Dirt Streets: Cities in Early Modern and Imperial Russia	5
HISTORY 30Q	English Society Through Fiction	4
HISTORY 32A	Enlightenment and the Arts	3
HISTORY 33A	Blood and Roses: The Age of the Tudors	3
HISTORY 33B	Revolutionary England: The Stuart Age	3
HISTORY 39	Modern Britain and the British Empire	3
HISTORY 40A	The Scientific Revolution	3
HISTORY 42	Darwin in the History of Life	3
HISTORY 101	The Greeks	4-5
HISTORY 102A	The Romans	3-5
HISTORY 110A	Europe from Late Antiquity to 1500	5
HISTORY 110B	From Renaissance to Revolution: Early Modern Europe	5
HISTORY 110C	Introduction to Modern Europe	5
HISTORY 120A	The Russian Empire, 1450-1796	5
HISTORY 132A	Enlightenment and the Arts	5
HISTORY 133A	Blood and Roses: The Age of the Tudors	5
HISTORY 133B	Revolutionary England: The Stuart Age	5
HISTORY 139	Modern Britain and the British Empire	5
HISTORY 140A	The Scientific Revolution	5
HISTORY 142	Darwin in the History of Life	5
HISTORY 202E	The Great War	4-5
HISTORY 204E	Totalitarianism	4-5
HISTORY 207C	The Global Early Modern	4-5
HISTORY 213E	Spies, Fakes, and Forgers: The History of Deception, 1300-1650	5
HISTORY 220G	Demons, Witches, and Priests: Religion and Popular Culture in Russia	4-5
HISTORY 224A	The Soviet Civilization	4-5
HISTORY 227	East European Women and War in the 20th Century	4-5
HISTORY 228	Circles of Hell: Poland in World War II	5
HISTORY 230C	Paris: Capital of the Modern World	4-5
HISTORY 230E	Republic of Letters: Knowledge and Community, 1300-1800	4
HISTORY 231K	Emotion, Power, and the Making of Modern Europe	5
HISTORY 232E	Machiavelli	4-5
HISTORY 233	Reformation, Political Culture, and the Origins of the English Civil War	4-5
HISTORY 233A	Age of Light or Times of Crisis? Euro Intellectual History fr Sci Rev to Romanticism	4-5
HISTORY 233C	Two British Revolutions	4-5
HISTORY 233E	European Intellectual History: The Age of Grand Ideologies	4-5
HISTORY 234	Enlightenment Seminar	3-5

HISTORY 234K	Economic Miracles? Crisis and Recovery in Modern Europe	5
HISTORY 239D	Capital and Empire	4-5
HISTORY 286C	Jews and the Russian Revolution	5
HISTORY 287E	Jewish Intellectuals and the Crisis of Modernity	4-5

## Field IV: Pre-1700

		Units
HISTORY 10A	Europe from Late Antiquity to 1500	3
HISTORY 10B	From Renaissance to Revolution: Early Modern Europe	3
HISTORY 10N	Thinking About War	3
HISTORY 14S	Voices from Below: Commoners in Medieval and Early Modern Europe "In Their Own Words"	5
HISTORY 16S	Inquisition: Faith and Identity in the Pre-Modern World	5
HISTORY 20A	The Russian Empire, 1450-1796	3
HISTORY 23S	Onion Domes and Dirt Streets: Cities in Early Modern and Imperial Russia	5
HISTORY 32A	Enlightenment and the Arts	3
HISTORY 33A	Blood and Roses: The Age of the Tudors	3
HISTORY 33B	Revolutionary England: The Stuart Age	3
HISTORY 40	World History of Science	3
HISTORY 40A	The Scientific Revolution	3
HISTORY 82C	The Making of the Islamic World, 600-1500	3
HISTORY 91C	Early Imperial China	3
HISTORY 93	Late Imperial China	3
HISTORY 101	The Greeks	4-5
HISTORY 102A	The Romans	3-5
HISTORY 110A	Europe from Late Antiquity to 1500	5
HISTORY 110B	From Renaissance to Revolution: Early Modern Europe	5
HISTORY 120A	The Russian Empire, 1450-1796	5
HISTORY 132A	Enlightenment and the Arts	5
HISTORY 133A	Blood and Roses: The Age of the Tudors	5
HISTORY 133B	Revolutionary England: The Stuart Age	5
HISTORY 140	World History of Science	5
HISTORY 182C	The Making of the Islamic World, 600-1500	5
HISTORY 191C	Early Imperial China	5
HISTORY 193	Late Imperial China	5
HISTORY 194D	Japan and the World, 1543-1868	4-5
HISTORY 203E	Global Catholicism	5
HISTORY 207C	The Global Early Modern	4-5
HISTORY 208D	Pre-Modern Warfare	3-5
HISTORY 213E	Spies, Fakes, and Forgers: The History of Deception, 1300-1650	5
HISTORY 215K	The Crusades: A Cultural History	5
HISTORY 230E	Republic of Letters: Knowledge and Community, 1300-1800	4
HISTORY 232E	Machiavelli	4-5
HISTORY 233	Reformation, Political Culture, and the Origins of the English Civil War	4-5
HISTORY 233C	Two British Revolutions	4-5
HISTORY 282E	Jews, Christians and Muslims in the Ottoman World	4-5
HISTORY 284	The Ottoman Empire, 1300-1923	4-5

HISTORY 289	The Indian Ocean World: Winds, Merchants & Empires	4-5
HISTORY 291G	Pre-Modern Chinese Warfare	3-5

## Global Affairs and World History Track

The Global Affairs and World History track is designed to offer an empirically rich curriculum for Stanford students interested in international affairs. The goal is to impart an understanding of today's world through a historical examination of its evolution, from the early modern to the contemporary era. This track appeals to students who are aiming for a career in the international arena, and who seek to inform themselves about the complexities of cultural diversity and spatial differentiation on the ground. Deploying both connective and comparative modes of analysis, majors who choose this track will acquire a robust understanding of the relevance of the past to current events.

The Global Affairs and World History track features gateway courses in Global Human Geography, a recommended skills component, a geographical concentration, and a core cluster of global and comparative offerings. Students choosing this track also develop proficiency in a foreign language at the second-year level or above. Incorporating primary sources in a language other than English into the capstone seminar or honors thesis is encouraged.

*Gateway Courses (two courses):* All students in Global Affairs and World History complete the two quarter Global Human Geography sequence. HISTORY 106A Global Human Geography: Asia and Africa is offered in Spring Quarter 2012-13. HISTORY 106B is not offered in 2012-13.

*Geographical Cluster (four courses):* Students select four History courses in one geographic area, such as Europe, Latin America, Asia, Middle East, or Africa. The faculty coordinator must preapprove all courses in this cluster.

*Global and Comparative Courses (Methodological Cluster) (six courses):* Majors selecting this track take at least 6 thematic history courses of global scope. Courses offered in 2012-13 are:

		Units
HISTORY 4N	A World History of Genocide	3-5
HISTORY 5C	Human Trafficking: Historical, Legal, and Medical Perspectives	3
HISTORY 10N	Thinking About War	3
HISTORY 39	Modern Britain and the British Empire	3
HISTORY 40	World History of Science	3
HISTORY 40A	The Scientific Revolution	3
HISTORY 42	Darwin in the History of Life	3
HISTORY 44	History of Women and Gender in Science, Medicine, and Engineering	3
HISTORY 44Q	Gendered Innovations in Science, Medicine, and Engineering	4-5
HISTORY 79S	From Coffee to Cocaine: Commodities, Society, and Environment in Modern South America	5
HISTORY 81B	Formation of the Contemporary Middle East	3
HISTORY 82C	The Making of the Islamic World, 600-1500	3
HISTORY 82N	Modern Islamic Movements	3
HISTORY 84N	The American Empire in the Middle East since the Cold War: Afghanistan, Iraq, and Israel/Palestine	4-5
HISTORY 87	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	3
HISTORY 97S	Urbicide: Air Raids and the Destruction of Urban Space during World War II	5
HISTORY 102	The History of the International System since 1914	5
HISTORY 103D	Human Society and Environmental Change	4

HISTORY 103E	History of Nuclear Weapons	5
HISTORY 103F	Introduction to Military History	5
HISTORY 105C	Human Trafficking: Historical, Legal, and Medical Perspectives	5
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 106C	Global Historical Geography	5
HISTORY 107C	Social Democracy from Marx to Gross National Happiness	5
HISTORY 108B	The Great Divergence: Latin American and East Asian Historical Development	5
HISTORY 139	Modern Britain and the British Empire	5
HISTORY 140	World History of Science	5
HISTORY 140A	The Scientific Revolution	5
HISTORY 142	Darwin in the History of Life	5
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering	5
HISTORY 175B	Transnational Latin American Migration to the United States	5
HISTORY 181B	Formation of the Contemporary Middle East	5
HISTORY 182C	The Making of the Islamic World, 600-1500	5
HISTORY 187	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	5
HISTORY 201A	The Global Drug Wars	4-5
HISTORY 202	International History and International Relations Theory	5
HISTORY 202C	Heretics to Headscarves	5
HISTORY 202E	The Great War	4-5
HISTORY 203E	Global Catholicism	5
HISTORY 204E	Totalitarianism	4-5
HISTORY 204F	The Modern Tradition of Non-Violent Resistance	5
HISTORY 204G	War and Society	5
HISTORY 205A	The History of Information	4-5
HISTORY 205C	Capitalism and Its Discontents: From Adam Smith to Adbusters	4-5
HISTORY 206	History and Geography of Contemporary Global Issues	5
HISTORY 207C	The Global Early Modern	4-5
HISTORY 208A	Science and Law in History	4-5
HISTORY 208D	Pre-Modern Warfare	3-5
HISTORY 209C	Liberalism and Violence	5
HISTORY 224C	Genocide and Humanitarian Intervention	3
HISTORY 230E	Republic of Letters: Knowledge and Community, 1300-1800	4
HISTORY 230K	Left, Right, and the Intellectual Life: Politics and Intellectuals in the Short Twentieth Century	5
HISTORY 239D	Capital and Empire	4-5
HISTORY 243C	Colonial Science and Medicine	4-5
HISTORY 243G	Tobacco and Health in World History	4-5
HISTORY 246C	Islam and Christianity in Africa	4-5
HISTORY 248S	African Societies and Colonial States, Part 1	4-5
HISTORY 252K	America as a World Power: U.S. Foreign Relations, 1914 to Present	5
HISTORY 256	U.S.-China Relations: From the Opium War to Tiananmen	4-5
HISTORY 266C	The Cold War: An International History	5
HISTORY 282E	Jews, Christians and Muslims in the Ottoman World	4-5
HISTORY 284	The Ottoman Empire, 1300-1923	4-5

HISTORY 289	The Indian Ocean World: Winds, Merchants & Empires	4-5
HISTORY 290E	Movies and Empire in East Asia	5
HISTORY 291D	Colonialism and Collaboration in East Asia	5
HISTORY 291E	Maps, Borders, and Conflict in East Asia	4-5
HISTORY 292D	Japan in Asia, Asia in Japan	4-5
HISTORY 293B	Homosexuality in Historical and Comparative Perspective	4-5
HISTORY 293D	Global Intellectual History	4-5

**Proficiency in a foreign language:** Students electing the Global Affairs and World History track must acquire proficiency in a foreign language through two years of college-level course work (second-year, third-quarter) or by passing a proficiency exam. Language courses do not count toward the 13 required courses in the major; students may, however, find it appealing to pair this track in the History major with a foreign language minor.

**Skills Training:** Students in the Global Affairs and World History track are encouraged to acquire technical proficiencies relevant for geo-historical analysis and fieldwork abroad. Please see the Undergraduate Student Services Officer for further information on these courses.

Those planning to pursue research overseas are also advised to enroll in the one-credit workshop, HISTORY 299X Preparing for International Field Work: Public Service or Research in Spring Quarter.

**Overseas Study Experience:** Students electing this track are encouraged to study abroad, with a Stanford BOSP program or another program approved by the directors of the track. Course work taken overseas may be accepted for credit in the track on a case by case basis, in consultation with a faculty coordinator.

**Research Seminar for Majors:** HISTORY 209S Research Seminar for Majors fulfills Writing in the Major requirement.

**General Requirements:**

As for all History majors, students in this track must complete two lecture courses (one Europe or U.S., and one Africa, Asia, Middle East, or Latin America), two 200-level courses, a Sources and Methods seminar, and HISTORY 209S Research Seminar for Majors.

## History Tracks with Interdisciplinary Emphasis (HMIE)

There are four History Tracks with Interdisciplinary Emphasis:

- History, Literature and the Arts
- History of Science and Medicine
- History and the Law
- Public History/Public Service

These tracks are designed for students who are interested in other disciplines who want to focus on the historical aspects of the subject matter covered by that discipline, who want to understand how interdisciplinary approaches can deepen their understanding of history, or who are primarily interested in developing interdisciplinary approaches to historical scholarship by combining the careful attention to evidence and context that motivates historical research with the analytic and methodological tools of science and the humanities. In pursuing the above requirements for all History majors, students in HMIE are required to complete their thirteen courses for the major as follows:

**Gateway Course (one course):** Students are required to take the appropriate gateway course for their interdisciplinary track. This course introduces students to the application of particular interdisciplinary methods to the study of history. See the section on each HMIE for the gateway course appropriate to that major track. *Note:* The History and the Law track has no gateway course requirement.

**Methodological Cluster (three courses):** This cluster is designed to acquaint students with the ways in which interdisciplinary methods are

employed in historical scholarship, by practicing historians and scholars in other disciplines whose work is historical. This program of study must provide methodological coherence and must be approved in advanced by the student's adviser. See the section on each HMIE for the appropriate historical methods courses. (Note: The History and the Law track requires four methodology courses.)

**Geographic Cluster (four courses):** History is embedded in time and place. This cluster is designed to emphasize that the purpose of studying methodology is to more fully understand the history of a particular region of the world. Students select a particular geographic region, as specified in the History major, and complete four courses in that area.

**Interdisciplinary Cluster (four courses):** These courses, taken outside the Department of History, acquaint students with the methods and approaches of another discipline appropriate for the interdisciplinary study of history. This program of study must provide methodological coherence and must be approved in advance by the student's adviser. See the section on each HMIE for appropriate interdisciplinary courses.

**Research Seminar for Majors:** HISTORY 209S Research Seminar for Majors fulfills Writing in the Major Requirement.

HMIE tracks do not mandate the breadth or concentration requirements of the General History track. IHUM courses taught by History faculty may apply to HMIE tracks only insofar as their content is specifically appropriate to the particular methodological or geographic cluster; IHUM courses are no longer offered.

## History, Literature, and the Arts

The History, Literature, and the Arts (HLA) track is designed for the student who wishes to complement his or her work in History with study in literature, particularly in a foreign language. For the purposes of this major, literature is defined broadly, including art, drama, films and poetry, memoirs and autobiography, novels, as well as canonical works of philosophy and political science. It appeals to students who are interested in studying literature primarily in its historical context, or who want to focus on both the literature and history of a specific geographical area while also learning the language of that area.

**Gateway Course:** HISTORY 132A Enlightenment and the Arts gives students a broad introduction to the study of literary texts in history.

**Methodological Cluster:** This three-course cluster teaches students how historians, in particular, analyze literary texts as documentary sources. Students choose three courses from among the pre-approved HLA methodology curriculum. These courses need not be in the student's geographic concentration. For 2012-13, these courses are:

		Units
HISTORY 17N	Intimacy, Secrets and the Past: Biography in History and Fiction	3-4
HISTORY 30Q	English Society Through Fiction	4
HISTORY 32A	Enlightenment and the Arts	3
HISTORY 36N	Gay Autobiography	4
HISTORY 48N	African History through Literature and Film	3-4
HISTORY 50A	Colonial and Revolutionary America	3
HISTORY 54N	African American Women's Lives	3-4
HISTORY 87	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	3
HISTORY 93	Late Imperial China	3
HISTORY 98S	Forbidden Desires in China From Daoist Devotees to Dr. Sex	5
HISTORY 132A	Enlightenment and the Arts	5
HISTORY 150A	Colonial and Revolutionary America	5
HISTORY 187	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	5
HISTORY 193	Late Imperial China	5

			<b>Units</b>
HISTORY 215K	The Crusades: A Cultural History	5	
HISTORY 230C	Paris: Capital of the Modern World	4-5	
HISTORY 230E	Republic of Letters: Knowledge and Community, 1300-1800	4	
HISTORY 230K	Left, Right, and the Intellectual Life: Politics and Intellectuals in the Short Twentieth Century	5	
HISTORY 232E	Machiavelli	4-5	
HISTORY 233A	Age of Light or Times of Crisis? Euro Intellectual History fr Sci Rev to Romanticism	4-5	
HISTORY 233E	European Intellectual History: The Age of Grand Ideologies	4-5	
HISTORY 234	Enlightenment Seminar	3-5	
HISTORY 251C	The American Enlightenment	5	
HISTORY 254	Popular Culture and American Nature	5	
HISTORY 255D	Racial Identity in the American Imagination	4-5	
HISTORY 263G	History Through a Life: The Allure of American Biography	4-5	
HISTORY 267	Religion in Twentieth Century American Life	5	
HISTORY 287D	Tel Aviv: Site, Symbol, City	4-5	
HISTORY 287E	Jewish Intellectuals and the Crisis of Modernity	4-5	
HISTORY 290E	Movies and Empire in East Asia	5	
HISTORY 291K	Speaking Through Objects: Material Culture in Late Imperial China, 1550-1820	5	
HISTORY 293D	Global Intellectual History	4-5	
HISTORY 5C	Human Trafficking: Historical, Legal, and Medical Perspectives	3	
HISTORY 40	World History of Science	3	
HISTORY 40A	The Scientific Revolution	3	
HISTORY 41Q	Mad Women: Women and Mental Illness in U.S. History	3	
HISTORY 42	Darwin in the History of Life	3	
HISTORY 44	History of Women and Gender in Science, Medicine, and Engineering	3	
HISTORY 44Q	Gendered Innovations in Science, Medicine, and Engineering	4-5	
HISTORY 63S	From Hysteria to Prozac: Diagnosing Bodies, Minds, and Cultures in 20th Century America	5	
HISTORY 105C	Human Trafficking: Historical, Legal, and Medical Perspectives	5	
HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present	5	
HISTORY 140	World History of Science	5	
HISTORY 140A	The Scientific Revolution	5	
HISTORY 142	Darwin in the History of Life	5	
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering	5	
HISTORY 169	The Environmental History of North America	4-5	
HISTORY 205A	The History of Information	4-5	
HISTORY 208A	Science and Law in History	4-5	
HISTORY 242A	What is Life? The History of a Question	4-5	
HISTORY 243C	Colonial Science and Medicine	4-5	
HISTORY 243G	Tobacco and Health in World History	4-5	
HISTORY 245E	Health and Society in Africa	4-5	
HISTORY 260E	Environmental Policy and the City in U.S. History	5	
HISTORY 264G	The Social History of Mental Illness in the United States	5	

*Note:* HISTORY 187 The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan and HISTORY 193 Late Imperial China are non-Western lectures that students in the the History, Literature, and the Arts (HLA) track can use towards both an HLA methodology course and as the non-Western lecture requirement.

*Geographical Cluster:* Students select four History courses in one geographic area. These are: Europe, Britain and the countries of the former British Empire, Asia, North America, Latin America, the Middle East, or Africa. These four courses must be taken in addition to the three methodological courses required above.

*Interdisciplinary Cluster:* Four courses, taken outside the Department of History, must address the literature and arts, broadly defined, of the area chosen for the geographic concentration. The student's adviser must pre-approve all courses in this cluster; these courses may not be double-counted towards a minor or major other than History.

*Research Seminar for Majors:* HISTORY 209S Research Seminar for Majors fulfills Writing in the Major requirement.

*General Requirements:* Like all History majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or U.S., one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

## History of Science and Medicine

The History of Science and Medicine (HS&M) track is a collaborative program of the Department of History and the Program in the History and Philosophy of Science. The major is designed for students interested in both sciences and humanities, and in the interactions between the two. It is also especially useful for students contemplating medical school, since it allows them to study the history of medicine, biology, and allied sciences in conjunction with fulfilling the premed science requirements.

*Gateway Course (one course):* HISTORY 140A The Scientific Revolution

*Methodological Cluster (three courses):* These History courses focus on the history of science and medicine. For 2012-13, these courses are:

*Geographical Cluster (four courses):* Students select four History courses in one geographic area. Examples include: Europe, Britain and the countries of the former British Empire, Asia, North America, Latin America, the Middle East, or Africa. These four courses must be taken in addition to the three methodological cluster courses. Courses in the history of science, technology, and medicine that have a geographic focus may be used to fulfill this requirement, but cannot be double-counted in the methodological cluster.

*Interdisciplinary Cluster (four courses):* Students select four courses in scientific disciplines and/or in philosophy of science, anthropology of science, or sociology of science. These courses require faculty adviser pre-approval.

*Research Seminar for Majors:* HISTORY 209S Research Seminar for Majors fulfills the Writing in the Major requirement.

*General Requirements:* As with all History majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or U.S., one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

## History and Law

The History and Law (HL) interdisciplinary track is for students who want to explore the intersections between historical and legal studies. The HL curriculum focuses on the role of legal institutions, policies, and structures in various societies. HL track majors enroll in at least four History department courses that focus on issues of law in civil societies and four courses that provide a geographic concentration. In addition, students enroll in four courses outside History that provide disciplinary or

interdisciplinary perspectives on the role of law in shaping societies and a Research Seminar for Majors.

*Gateway Course:* There is no gateway course for this track. Instead, students take an extra course in the Methodological cluster.

*Methodological Cluster (four courses):* Students enroll in at least four History department courses, including courses outside History taught by faculty affiliated with the department, that focus on how law, policies, constitutions, and legal structures affect the development of various societies. *Note:* The Methodological Cluster for this HIP contains one extra course since there is no Gateway course.

For 2012-13, these courses are:

		Units
HISTORY 5C	Human Trafficking: Historical, Legal, and Medical Perspectives	3
HISTORY 16S	Inquisition: Faith and Identity in the Pre-Modern World	5
HISTORY 87	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	3
HISTORY 105C	Human Trafficking: Historical, Legal, and Medical Perspectives	5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 187	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	5
HISTORY 201A	The Global Drug Wars	4-5
HISTORY 202C	Heretics to Headscarves	5
HISTORY 208A	Science and Law in History	4-5
HISTORY 243G	Tobacco and Health in World History	4-5
HISTORY 245G	Law and Colonialism in Africa	3-5
HISTORY 258	Topics in the History of Sexuality: Sexual Violence	4-5
HISTORY 293B	Homosexuality in Historical and Comparative Perspective	4-5
HISTORY 307A	Legal History Workshop	4-5
HISTORY 352B	History of American Law	5

*Note:* HISTORY 187 The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan is a non-Western lecture that students in the History and Law track can use towards both a Law methodology course and as the non-Western lecture requirement.

*Geographical Cluster:* Students select four History courses in one geographic area. These are: Europe, Britain and the countries of the former British Empire, Asia, North America, Latin America, the Middle East, or Africa. These four courses must be taken in addition to the three methodological courses required above.

*Interdisciplinary Cluster (four courses):* Students may select from courses offered in the School of Law, School of Education, and others as appropriate. *Note:* Courses in the School of Law and School of Education require the permission of the instructor before undergraduate students can enroll, since these are graduate-level courses.

*Research Seminar for Majors:* HISTORY 209S Research Seminar for Majors fulfills the Writing in the Major requirement.

*General Requirements:* Like all history majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or U.S., one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.

## Public History/Public Service

The Public History/Public Service (PH/PS) interdisciplinary history track is designed for students who wish to include in their course of studies the application of historical study in (1) public settings such as museums and heritage sites, national and state parks, public agencies, and private

foundations, and (2) public service settings in non-profit organizations, public agencies, and educational institutions.

PH/PS majors enroll in a gateway course on public history and public service and in four History department courses that provide a geographic concentration as well as completing a two-course methodological requirement. In addition, students, in consultation with the PH/PS faculty coordinator, complete four courses from outside the History department drawn from the annual listing of service-learning courses provided by the Haas Center for Public Service; these courses provide interdisciplinary and methodological perspectives on public service. PH/PS majors must also complete an internship through a regularly offered service-learning course or through a summer internship or fellowship.

*Gateway Course (one course):* HISTORY 201 Introduction to Public History in the U.S., 19th Century to the Present, provides grounding in the theory and practice of public service and exposure to the types of public history practiced in venues such as museums, historical sites, parks, and non-profit organizations, including local historical societies.

*Geographical Cluster (four courses):* Students select four History courses in one geographic area, such as the United States, Europe, Latin America, Asia, Middle East, or Africa. The faculty coordinator must preapprove all courses in this cluster.

*Interdisciplinary Cluster (four courses):* Students select four courses from outside the History department drawn from the annual listing of service-learning and theory/practice courses provided by the Haas Center for Public Service. The faculty coordinator must preapprove all courses in this cluster.

*Methodological Cluster (two courses):* Students must enroll in one Sources and Methods seminar course and one additional 200-level History course. The Writing in the Major (WIM) requirement must be completed in a Research Seminar for Majors.

*Public Service/Service Learning Internship (one course):* Students must engage in at least a one quarter internship through a service learning course or through a full-time public service or public history summer internship or fellowship. This internship must be preapproved by the faculty coordinator.

Students who complete a paid summer internship in lieu of one for academic credit have two options: they can complete an additional history course, or they can enroll in 3 units of HISTORY 299S Undergraduate Directed Research and Writing with the faculty coordinator of the PH/PS track and write a 20-page research paper related to their internship work. This research paper is in addition to that required for the Research Seminar for Majors.)

The following History service-learning courses are offered in 2012-13:

		Units
HISTORY 5C	Human Trafficking: Historical, Legal, and Medical Perspectives	3
HISTORY 105C	Human Trafficking: Historical, Legal, and Medical Perspectives	5
HISTORY 166B	Immigration Debates in America, Past and Present	3-5
HISTORY 201	Introduction to Public History in the U.S., 19th Century to the Present	4-5
HISTORY 201A	The Global Drug Wars	4-5
HISTORY 260	California's Minority-Majority Cities	4-5

If students elect to fulfill the internship requirement through a History Department service-learning course, they must enroll in an additional course in either the geographical cluster or the Interdisciplinary cluster in order to complete the 13 courses required for the major.

*Research Seminar for Majors:* HISTORY 209S Research Seminar for Majors fulfills Writing in the Major requirement.

*General Requirements:* As with all history majors, students in History Interdisciplinary Programs must complete two lecture courses (one Europe or US, one Africa, Asia, Middle East or Latin America), two 200-level courses, a Sources and Methods seminar, and a Research Seminar for Majors.



# History Secondary Teacher's Credential

Applicants for the Single Subject Teaching Credential (Secondary) in the social studies may obtain information regarding this program from the Credential Administrator, School of Education.

## Minor in History

Students must declare the minor in History no later than Autumn Quarter of the senior year via Axess. Minor declarations are approved by the Department of History and confirmation is sent via email to the student.

Candidates for the minor in History must complete six courses, at least three of which must have a field or thematic focus. Students completing the minor may choose to concentrate in such fields as African, American, Asian, British, European (medieval, early modern, or modern), Russian and East European history, comparative empires and cultures, or such thematic topics as the history of gender, the family, religion, technology, or revolution. Students may also petition to have a concentration of their own design count toward the minor.

## Degree Requirements

All six courses must be of at least 3 units each and must be taken for a letter grade. The student must maintain a grade point average (GPA) in History courses of 2.0 (C) or higher. Two of the six courses must be small-group in format (Stanford Introductory Seminars, Sources and Methods Seminars, departmental colloquia, and research seminars). History courses taken at Stanford overseas campuses may count toward the minor, but at least three of the six courses must be taken from Stanford History faculty.

Advanced Placement credits do not fulfill any minor requirements.

## Optional Courses for the Minor

History courses taken at non-Stanford Study Abroad programs may count toward the minor (provided the History Department approves them), but at least three of the six courses must be taken from Stanford History faculty. One course from certain Introduction to the Humanities courses and Thinking Matters courses (those taught by History faculty) may count toward the six-course requirement, but not for the three-course field of concentration. One Undergraduate Directed Research and Writing (HISTORY 299S) course may count toward the minor, if taken for 3-5 units and for a letter grade. A maximum of three transfer courses may be used toward the minor.

## Coterminal B.A. and M.A. Program in History

The department each year admits a limited number of undergraduates for coterminal B.A. and M.A. degrees in History. Coterminal applications are accepted during Autumn Quarter for admission in Spring Quarter; check with the History office for the application deadline. Applicants are responsible for checking their compliance with University coterminal requirements listed in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin.

## Admission

Applicants must meet the same general standards as those seeking admission to the M.A. program; they must submit a written statement of purpose, a transcript, GRE test scores, and three letters of recommendation, at least two of which should be from members of the Department of

History faculty. To be competitive, coterminal applicants should have a 3.75 GPA in their undergraduate history major (or equivalent if they are entering without a History major.) The decision on admission rests with the department faculty upon recommendation by the Graduate Admissions Committee. Students must meet all requirements for both degrees. They must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 225 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three courses that fall within a single Ph.D. field.

The application filing deadline is December 4, 2012.

The coterminal B.A. and M.A. program is not declarable on Axess.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Master of Arts in History

University requirements for the M.A. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The department requires the completion of nine courses (totaling not less than 45 units) of graduate work; seven courses of this work must be Department of History courses. Of the seven, one must be a seminar and four must be either graduate colloquia or graduate seminars. Directed reading may be counted for a maximum of 10 units. A candidate whose undergraduate training in history is deemed inadequate must complete nine courses of graduate work in the department. The department does not recognize for credit toward the M.A. degree any work that has not received the grade of 'A' or 'B.'

## Terminal M.A. Program

Applicants who do not wish to continue beyond the M.A. degree are admitted to this program at the discretion of the faculty in individual fields (U.S., modern Europe, and so on). Students admitted may not apply to enter the Ph.D. program in History during the course of work for the M.A. degree.

## M.A. in Teaching (History)

The department cooperates with the School of Education in offering the Master of Arts in Teaching degree. For the general requirements, see the "School of Education (p. )" section of this bulletin. For certain additional requirements made by the Department of History, contact the department office. Candidates must possess a teaching credential or relevant teaching experience.

## Admission

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details, see the Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/history/http://gradadmissions.stanford.edu>) web site.

Students admitted to graduate standing do not automatically become candidates for a graduate degree. With the exception of students in the terminal M.A. program, they are admitted with the expectation that they will be working toward the Ph.D. degree and may become candidates to receive the M.A. degree after completing three quarters of work.

The application filing deadline is December 4, 2012.

# Doctor of Philosophy in History

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

Students planning to work for the doctorate in history should be familiar with the general degree requirements of the University outlined in the "Graduate Degrees (p. 38)" section of this bulletin. Those interested in applying for admission to the M.A. and Ph.D. programs should contact the graduate program coordinator in the History department. Online applications are available in September of the year prior to intended enrollment. The application filing deadline is December 4, 2012. Applicants must file a report of their general scores on the Graduate Record Examination and submit a writing sample of 10-25 pages on a historical topic. Successful applicants for the M.A. and Ph.D. programs may enter only in Autumn Quarter.

Upon enrollment in the graduate program in History, the student has a member of the department designated as an adviser with whom to plan the Ph.D. program. Much of the first two years of graduate study is spent taking courses, and, from the outset, the student should be aware that the ultimate objective is not merely the completion of courses but preparation for general examinations and for writing a dissertation.

Admission to the Department of History in the graduate division does not establish any rights respecting candidacy for an advanced degree. At the end of the first year of graduate study, students are evaluated by the faculty and given a progress report. A decision as to whether the student is admitted to candidacy for the Ph.D. is normally made by the start of the student's third year.

After the completion of certain further requirements, students must apply for acceptance for candidacy for the doctorate in the graduate division of the University.

## Admission

Applicants for admission to graduate work must take the General Test of the Graduate Record Examination. It may be taken at most American colleges and in nearly all foreign countries. For details, see the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/history/http://gradadmissions.stanford.edu>) web site.

Students admitted to graduate standing do not automatically become candidates for a graduate degree. With the exception of students in the terminal M.A. program, they are admitted with the expectation that they will be working toward the Ph.D. degree and may become candidates to receive the M.A. degree after completing three quarters of work.

The application filing deadline is December 4, 2012. The Medieval Field will not be accepting applications for autumn quarter, 2013-2014.

## Degree Requirements

### Required Courses

	Units
<b>For all first-year Ph.D. students (5-6)</b>	
HISTORY 304 Approaches to History	4-5
HISTORY 305 Graduate Workshop in Teaching	1
<b>For first-year and second-year Ph.D students in American History (24-30)</b>	
HISTORY 351A Core in American History, Part I	4-5
HISTORY 351B Core in American History, Part II	4-5
HISTORY 351C Core in American History, Part III	4-5
HISTORY 351D Core in American History, Part IV	4-5

HISTORY 351E Core in American History, Part V	4-5
HISTORY 351F Core in American History, Part VI	4-5

Other Graduate Core Colloquia required for Ph.D. students studying in fields other than the above are listed in the Department of History's Graduate Handbook.

## University Oral Examinations

The student is expected to take the University oral examination in the major concentration in the third graduate year.

## Dissertation

The student must complete and submit a dissertation which is the result of independent work and is a contribution to knowledge. It should evidence the command of approved techniques of research, ability to organize findings, and competence in expression. For details and procedural information, inquire in the department.

## Dissertation Committee

The reading committee consists of the principal dissertation adviser (first reader), and two additional members of the Department (second and third readers) agreed upon by the adviser and the student.

## Financial Support

Students who are admitted with financial support are provided multiple years of support through fellowships, teaching and research assistantships, and tuition grants. Applicants should indicate on the admissions application whether they wish to be considered for such support. No separate application for financial aid is required.

U.S. citizens and permanent resident aliens who are interested in area language studies in East Asia, Africa, and the republics of the former Soviet Union may request a Foreign Language and Area Studies (FLAS) fellowship application from the FLAS coordinator of the respective programs offering the FLAS (CEAS, CAS, CREEES). The FLAS application deadlines are in January and February (CAS).

## Resources

The degree requirements section relates to formal requirements, but the success of a student's graduate program depends in large part on the quality of the guidance received from faculty and on the library resources available. Prospective graduate applicants are advised to study the list of History faculty and the courses this faculty offers. As to library resources, no detailed statement is possible in this bulletin, but areas in which library resources are unusually strong are described following.

The University Library maintains strong general collections in almost all fields of history. It has a very large microtext collection, including, for instance, all items listed in Charles Evans' American Bibliography, and in the Short-Title Catalogues of English publications, 1474-1700, and virtually complete microfilmed documents of the Department of State to 1906. It also has a number of valuable special collections including the Borel Collection on the History of California; many rare items on early American and early modern European history; the Brasch Collection on Sir Isaac Newton and scientific thought during his time; the Gimon Collection on French political economy, and other such materials.

The rich collection of the Hoover Institution on the causes, conduct, and results of WW I and WW II are being augmented for the post-1945 period. The materials include government documents, newspaper and serial files, and organization and party publications (especially the British and German Socialist parties). There are also important manuscript collections, including unpublished records of the Paris Peace Conference of 1919 and the Herbert Hoover archives, which contain the records of the Commission for Relief in Belgium, the American Relief Administration, the various technical commissions established at the close of WW I for reconstruction in Central and Eastern Europe, the personal papers of Herbert Hoover as United States

Food Administrator, and other important personal papers. Other materials for the period since 1914 relate to revolutions and political ideologies of international importance; colonial and minority problems; propaganda and public opinion; military occupation; peace plans and movements; international relations; international organizations and administration including the publications of the United Nations, as well as principal international conferences. The Hoover Institution also possesses some of the richest collections available anywhere on the British labor movement; Eastern Europe, including the Soviet Union; East Asia (runs of important newspapers and serials and extensive documentary collections, especially for the period of WW II); and Africa since 1860, especially French-speaking Africa, the former British colonies, and South Africa.

## Requirements

1. In consultation with the adviser, students select an area of study from the list below in which to concentrate their study and later take the University oral examination. The major concentrations are:
    - Europe, 300-1500
    - Europe, 1400-1800
    - Europe since 1700
    - Jewish History
    - Russia
    - Eastern Europe
    - Middle East and Central Asia
    - South Asia
    - East Asia before 1600
    - China since 1600
    - Japan since 1600
    - Korea since 1800
    - Africa
    - Britain and the British Empire since 1460
    - Latin America
    - The United States (including colonial America)
    - The History of Science and Medicine
    - Transnational, International, and Global
  2. The department seeks to provide a core colloquium in every major concentration. Students normally enroll in this colloquium during the first year of graduate study.
  3. Students are required to take two research seminars, at least one in the major concentration. Normally, research seminars are taken in the first and second years.
  4. Each student, in consultation with the adviser, defines a secondary concentration. This concentration should represent a total of four graduate courses or their equivalents, and it may be fulfilled by working in a historical concentration or an interdisciplinary concentration. The historical concentrations include:
    - A. One of the concentrations listed above (other than the student's major concentration).
    - B. One of the concentrations listed below, which falls largely outside the student's major concentration:
      - The Ancient Greek World
      - The Roman World
      - Europe, 300-1000
      - Europe, 1000-1400
      - Europe, 1400-1600
      - Europe, 1600-1789
      - Europe, 1700-1871
- Europe since 1848
  - England, 450-1460
  - Britain and the British Empire, 1460-1714
  - Britain and the British Empire since 1714
  - Russia to 1800
  - Russia since 1800
  - Eastern Europe to 1800
  - Eastern Europe since 1800
  - Jewish History
  - Middle East and Central Asia to 1800
  - Middle East and Central Asia since 1800
  - Africa
  - South Asia
  - China before 1600
  - China since 1600
  - Japan before 1600
  - Japan since 1600
  - Latin America to 1825
  - Latin America since 1810
  - The United States (including Colonial America) to 1865
  - The United States since 1850
  - The History of Science and Medicine
  - Transnational, International, and Global
- C. Work in a national history of sufficiently long time to span chronologically two or more major concentrations. For example, a student with Europe since 1700 as a major concentration may take France from 1000 to the present as a secondary concentration.
  - D. A comparative study of a substantial subject across countries or periods. The secondary concentration requirement may also be satisfied in an interdisciplinary concentration. Students plan these concentrations in consultation with their advisers. Interconcentrations require course work outside the Department of History which is related to the student's training as a historian. Interdisciplinary course work can either add to a student's technical competence or broaden his or her approach to the problems of the research concentration.
5. Each student, before conferral of the Ph.D., is required to satisfy the department's teaching requirement.
  6. There is no University or department foreign language requirement for the Ph.D. degree. A reading knowledge of one or more foreign languages is required in concentrations where appropriate. The faculty in the major concentration prescribes the necessary languages. In no concentration is a student required to take examinations in more than two foreign languages. Certification of competence in commonly taught languages (that is, French, German, Italian, Portuguese, Russian, and Spanish) for candidates seeking to fulfill the language requirement in this fashion is done by the appropriate language department of the University. Certification of competence in other languages is determined in a manner decided on by faculty in the major concentration. In either case, certification of language competence must be accomplished before a student takes the University oral examination.
  7. The student is expected to take the University oral examination in the major concentration in the third graduate year.

- The student must complete and submit a dissertation which is the result of independent work and is a contribution to knowledge. It should evidence the command of approved techniques of research, ability to organize findings, and competence in expression. For details and procedural information, inquire in the department.

## Ph.D. in History and Humanities

The department of History participated in the Graduate Program in Humanities leading to a Ph.D. degree in History and Humanities. At this time, the option is available only to students already enrolled in the Graduate Program in Humanities; no new students are being accepted. The University remains committed to a broad-based graduate education in the humanities; the courses, colloquium, and symposium continue to be offered, and the Division of Literatures, Cultures, and Languages provides advising for students already enrolled who may contact DLCL Student Affairs at 650-724-1333 or dlcl@stanford.edu for further information. Courses are listed under the subject code HUMNTIES (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HUMNTIES&filter-catalognumber-HUMNTIES=on>) and may be viewed on the Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HUMNTIES&filter-catalognumber-HUMNTIES=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HUMNTIES&filter-catalognumber-HUMNTIES=on>).

## Ph.D. Minor in History

Students pursuing a Ph.D. other than in History may apply for the Ph.D. Minor in History. Ph.D. students cannot pursue a minor in their own program. The minimum University requirement for a Ph.D. minor is 20 units of History course work at the graduate level (courses numbered 300 and above) at Stanford. All units should be in a single field. Units taken for the minor can be counted as part of the overall requirement for the Ph.D. of 135 units taken at Stanford. Courses used for a minor may not be used to meet the requirements for a master's degree.

## Degree Requirements

20 units of History course work at the graduate level (HISTORY 300-399W and 400-499X) at Stanford. All units should be in a single field.

## Optional Courses for the Minor

A Ph.D. minor form outlining the program of study must be approved by the major and minor departments.

*Emeriti:* (Professors) Barton J. Bernstein, Carl N. Degler, Peter Duus, Terence Emmons, Harold L. Kahn, David M. Kennedy, George H. Knoles, Mark Mancall, Peter Paret, Paul A. Robinson, Paul Seaver, James J. Sheehan, Peter Stansky, David B. Tyack, Lyman P. Van Slyke; (Senior Lecturer) Joseph J. Corn

*Chair:* Kären E. Wigen

*Professors:* Keith M. Baker, Joel Beinin, Albert Camarillo, James T. Campbell, Clayborne Carson, Gordon Chang, Paula Findlen, Estelle Freedman, Stephen Haber, Tamar Herzog, David Holloway, Nancy S. Kollmann, Mark E. Lewis, Carolyn Lougee Chappell, Ian Morris, Norman M. Naimark, Robert Proctor, Jack N. Rakove, Richard L. Roberts, Aron Rodrigue, Richard P. Saller, Walter Scheidel, Londa Schiebinger, Richard White, Kären E. Wigen, Caroline Winterer, Steven J. Zipperstein

*Associate Professors:* David R. Como, Robert Crews, James P. Daughton, Zephyr Frank, Sean Hanretta, Thomas S. Mullaney, Jessica Riskin, Priya Satia, Matthew H. Sommer, Amir Weiner

*Assistant Professors:* Jennifer Burns, Allyson V. Hobbs, Aishwary Kumar, Ana Raquel Minian, Yumi Moon, Edith Sheffer, Laura Stokes, Jun Uchida, Mikael D. Wolfe, Ali Yaycioglu

*Courtesy Professors:* Giovanna Ceserani, Daniel Edelstein, Lawrence Friedman, Leah Gordon, Avner Greif, Amalia Kessler, David F. Labaree, Reviel Netz, Sam Wineburg, Gavin Wright

*Senior Lecturers:* Katherine Jolluck, Martin W. Lewis

*Acting Assistant Professor:* Arie Dubnov

*Lecturers:* Robert Fredona, Patrick Iber, Carol McKibben, Leandra Zarnow

## Overseas Studies Courses in History

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/history/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/history/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/history/http://bosp.stanford.edu>).

		Units
OSPBEJ 67	China-Africa and Middle East Relations	4
OSPBER 70	The Long Way to the West: German History from the 18th Century to the Present	4-5
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPCPTWN 38	Genocide: The African Experience	3-5
OSPFLOR 49	The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema	5
OSPFLOR 58	Space as History: Urban Change and Social Vision in Florence 1059 to the Present	4
OSPFLOR 75	Florence in the Renaissance	5
OSPKYOTO 15	Postwar Japanese Society	4-5
OSPMADR 62	Spanish California: Historical Issues	5
OSPOXFRD 15	British Architecture and the Renaissance: 1500-1850	4-5
OSPOXFRD 92	Britain and the Second World War	5
OSPOXFRD 221Y	Art and Society in Britain	4-5
OSPPARIS 29	Colonization, Decolonization and Immigration in France	5
OSPPARIS 81	France During the Second World War: Between History and Memory	5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5

# Human Biology

Courses offered by the Program in Human Biology are listed under the subject code HUMBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HUMBIO&filter-catalognumber-HUMBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HUMBIO&filter-catalognumber-HUMBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HUMBIO&filter-catalognumber-HUMBIO=on>).

The program offers a Bachelor of Arts in Human Biology (<http://www.stanford.edu/dept/registrar/bulletin/5917.htm>), as well as a minor and an honors program.

## Mission of the Undergraduate Program in Human Biology

The mission of the undergraduate program in Human Biology is to provide students with an interdisciplinary approach to understanding human beings from biological, behavioral, social, and cultural perspectives. Courses in the major allow students to see connections and parallels with other fields as they learn to formulate and evaluate health, environmental, and other public policy issues that influence human welfare. The program prepares majors to pursue advanced training in professional or graduate programs.

To achieve these goals, all students complete a 30-unit core sequence, normally in the sophomore year, which provides the foundation for the major. Also during the sophomore year, students consult with student advisers to choose a faculty adviser and complete the declaration process. Together they plan a road map of course work designed to help each student focus on an area of interest within Human Biology. Early planning and subsequent refining of an individualized course of study, in consultation with student and faculty advisers, is a strength and requirement of the program. The curriculum draws on faculty from across the University. To complete a B.A. in Human Biology, students must take courses from within the program and from other University departments. Most Human Biology majors go on to advanced training in professional schools, or graduate programs in the behavioral, natural, and social sciences, including coterminal master's degree programs in other University departments. Additional information about the major may be obtained from the program's offices or at the Program in Human Biology (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/humanbiology/> <http://humbio.stanford.edu>) web site.

## Learning Outcomes (Undergraduate)

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Human Biology. Students are expected to demonstrate:

1. ability to acquire and synthesize scientific information from a variety of sources.
2. ability to apply analytical tools to evaluate policy.

3. ability to interpret knowledge in meaningful and appropriate ways as they draw conclusions about the significance of their findings.
4. ability to communicate their scientific ideas clearly and persuasively.

## Student Advisers

Human Biology has an advising program comprising faculty and student advisers. Before declaring Human Biology as the undergraduate major, each student must meet with one of six student advisers who assist in developing a coherent study plan based on an individualized area of concentration, and the selection of foundation, concentration, and upper-division courses. The student advisers also assist students in selecting an appropriate faculty adviser and a suitable internship for their area of concentration and career goals. Student advisers offer drop-in services during scheduled office hours every weekday and some evenings. The student advisers also sponsor events including the Internship Faire, Beyond HumBio, and declaration workshops. To maintain high standards of advising that respond to the needs of individual students, student advisers meet weekly with the program's faculty advising chairs and the student services coordinator to review the program's policies and specific student inquiries and petitions concerning the program.

## Storey House

Storey House, 544 Lasuen Mall, is an undergraduate resident theme house for Human Biology, devoted to developing an intellectual community among Human Biology majors at Stanford, and allowing faculty and students to become acquainted and share their Human Biology interests and research. Its goals are to foster intellectual discussion in the residential lives of the students living in Storey House, mentoring relationships between upperclassmen and core students in the house, and stimulating events for all Human Biology majors facilitated by academic theme associates. Assignment is made through the regular undergraduate housing draw.

## Bachelor of Arts in Human Biology

### Declaring the Major

A prospective major must consult with the student and faculty advisers to obtain detailed information about the program and guidance in the development of an individual course of study.

At the time the major is declared, the student must submit a written statement (3-5 pages) of academic and long-term goals and the proposed list of courses satisfying the requirements for the major. The proposal is then reviewed by the student advisers who help identify an appropriate faculty adviser. Final approval of the proposed course of study rests with the faculty adviser.

It is important to declare early, preferably in early spring as soon as students have passed both Autumn and Winter Quarter core courses (HUMBIO 2A Genetics, Evolution, and Ecology, HUMBIO 2B Culture, Evolution, and Society, HUMBIO 3A Cell and Developmental Biology, HUMBIO 3B Behavior, Health, and Development). The University requires students to declare a major by the end of Spring Quarter of the sophomore year. Under special circumstances students may declare as late as Autumn Quarter of the junior year. Petitions to declare late require additional documentation and are less likely to be approved.

Students who plan to pursue graduate work should be aware of the admission requirements of the schools to which they intend to apply. Early planning is advisable to guarantee completion of major and graduate school requirements.

## Degree Requirements

The B.A. in Human Biology (HUMBIO) requires a minimum of 87 units in the major divided among four levels of courses:

1. Fundamental Program: at least 38 units, to include
  - A. Human Biology Core (30 units); see "Human Biology Core" below for more information. The Human Biology Core refers to:
 

		Units
HUMBIO 2A	Genetics, Evolution, and Ecology	5
HUMBIO 2B	Culture, Evolution, and Society	5
HUMBIO 3A	Cell and Developmental Biology	5
HUMBIO 3B	Behavior, Health, and Development	5
HUMBIO 4A	The Human Organism	5
HUMBIO 4B	Environmental and Health Policy Analysis	5
  - B. Statistics (4-5 units). The core and statistics courses must be taken for a letter grade by majors. Statistics may be chosen from courses such as:
 

		Units
STATS 60	Introduction to Statistical Methods: Precalculus	3-5
or STATS 141 Biostatistics		
PSYCH 10	Introduction to Statistical Methods: Precalculus	5
SOC 181B	Sociological Methods: Statistics	5
BIO 141	Biostatistics	3-5
  - C. Internship: HUMBIO 197 Human Biology Internship, 4 units.
  - F. The internship requirement, a mentored non-classroom project, is graded satisfactory/no credit only.

2. Foundation Courses: 20-unit minimum. Total units vary, depending on the focus of study chosen by the student for the area of concentration. They may include introductory-level courses from across the University and lab courses. The minimum grade requirement for foundation courses is 'C-.'
3. Area of Concentration: a minimum of five courses totaling at least 20 units. This in-depth area of study enables the student to focus on educational and post-baccalaureate goals. Courses are non-introductory, theory-based, and are usually numbered over 100. Three or more departments must be represented in the concentration. Each course must be taken for a minimum of 3 units. Minimum grade requirement for Upper Division courses is C-. The area of concentration is individually designed by the student in consultation with the student advisers and faculty adviser. Final approval of the concentration rests with the student advisers and faculty adviser. All area of concentration courses must be taken for a letter grade. The minimum grade requirement for area of concentration courses is 'C-'. The area of concentration generally has an emphasis in one, and sometimes more than one, of the following eight areas:

Area 1: Environment and Environmental Policy

- Environment
- Environmental Policy
- Culture/Demography/Human Ecology

Area 2: Health and Health Policy

- Health Policy
- Public Health
- International Health

Area 3: Human Performance

Area 4: Human Development

- Biological Development
- Psychological Development
- Education

Area 5: Biomedical Science

- Genetics
- Molecular Biology
- Human Physiology
- Infectious Diseases

Area 6: Brain and Behavior

Area 7: Ethics and Medical Humanities

Area 8: Evolution

A non-exclusive list of possible courses for each emphasis is available at the student advisers' office or at the Area of Concentration Course List (<https://humbio.stanford.edu/courses/aoc>) web site.

4. Upper-Division Courses: students must take three Human Biology upper-division courses numbered 100 to 189. These courses should be used to explore subjects outside the area of concentration. One upper-division course may be taken satisfactory/no credit. Each course must be taken for a minimum of 3 units. Minimum grade requirement for Upper Division courses is "C-". All non-laboratory advanced HUMBIO courses (those numbered 100 to 189) fulfill the Human Biology upper-division requirement. A list of Human Biology related/cognate courses can be found at the Related Courses (<http://www.stanford.edu/dept/humbio/cgi-bin/?q=node/1382>) web site.

## Human Biology Core

Required core sequences (HUMBIO 2A Genetics, Evolution, and Ecology, HUMBIO 2B Culture, Evolution, and Society, HUMBIO 3A Cell and Developmental Biology, HUMBIO 3B Behavior, Health, and Development, and HUMBIO 4A The Human Organism, HUMBIO 4B Environmental and Health Policy Analysis) introduce the biological and social sciences, and most importantly, relationships between the two. Classes meet throughout the academic year. Students must register concurrently for the A and B series. Students should initiate the core in Autumn Quarter of the sophomore year. Freshmen are not permitted to enroll. Majors must earn a minimum letter grade of 'C-' in core courses. The Human Biology core consists of the following courses:

		Units
HUMBIO 2A	Genetics, Evolution, and Ecology	5
HUMBIO 2B	Culture, Evolution, and Society	5
HUMBIO 3A	Cell and Developmental Biology	5
HUMBIO 3B	Behavior, Health, and Development	5
HUMBIO 4A	The Human Organism	5
HUMBIO 4B	Environmental and Health Policy Analysis	5

## Honors Program

The honors program in Human Biology provides qualified majors the opportunity to work closely with faculty on an individual research project, culminating in an honors thesis. Students may begin honors research from a number of starting points including topics introduced in the core or upper-division courses; independent interests stemming from an internship experience; or collaborating with faculty from the natural, social, or behavioral sciences.

Students may apply to the honors program if they have completed the Human Biology core with a minimum GPA of 3.0, have an overall Stanford grade point average (GPA) of 3.2, and meet other requirements detailed in

the honors handbook. Interested students should consult the Human Biology Honors Handbook (<https://humbio.stanford.edu/node/152>) and meet with the Human Biology Associate Director or student services officer.

Most honors projects involve a total of 10-15 units of course work in:

		<b>Units</b>
HUMBIO 193	Research in Human Biology	1-5
HUMBIO 194	Honors	1-10

Admission to the honors program is by submission of an intention to undertake honors research in early February, followed by the application in early March of the junior year. Students planning to undertake honors begin research or preparation as early as completion of the sophomore year.

The honors thesis is normally completed by the middle of Spring Quarter of the senior year. Honors students then present summaries of their research at the Human Biology Honors Poster Symposium in May.

Human Biology also holds a Summer Honors College just prior to Autumn Quarter each year for students who have applied to the honors program. Students apply to Summer Honors College in April of the junior year. For applications, contact the program office.

## Minor in Human Biology

A minor in Human Biology provides an introductory background to the relationship between the biological and social aspects of humanity's origin, development, and prospects. Many of the major problems facing human civilization today involve both biological and social aspects. Scientific approaches to these problems are essential, but they must be broadly conceived, integrating what is known of the biological with an understanding of the social and cultural setting in which they exist. Students with a minor in Human Biology are expected to develop a strong background in the integration between the biological and social aspects of human beings.

Students declaring a minor in Human Biology must do so no later than two quarters prior to their intended quarter of degree conferral (for example, a student must declare a minor before the end of Autumn Quarter to graduate the following Spring Quarter).

To minor in Human Biology, students must take the Human Biology Core (HUMBIO 2A Genetics, Evolution, and Ecology, HUMBIO 2B Culture, Evolution, and Society, HUMBIO 3A Cell and Developmental Biology, HUMBIO 3B Behavior, Health, and Development, HUMBIO 4A The Human Organism, and HUMBIO 4B Environmental and Health Policy Analysis) and one additional upper-division course (for example, any HUMBIO course numbered 100-189). The student must earn a minimum letter grade of 'C-'. Courses that count towards the fulfillment of major requirements may not be counted towards the minor.

*Emeriti:* (Professors) Clifford Barnett (Anthropological Sciences), Doug Brutlag (Biochemistry), Luigi Cavalli-Sforza (Genetics), Christos Constantinou (Urology), Carl Djerassi (Chemistry), Sanford Dornbusch (Sociology), Stanley Falkow (Microbiology/Immunology), Shirley Feldman (Associate Director), Ute Francke (Genetics), A. Dale Kaiser (Biochemistry), Herant Katchadourian (Human Biology), Donald Kennedy (Biology), Carol Winograd (Medicine)

*Director:* Carol Boggs (Biology; on leave)

*Interim Director:* Paul Fisher (Neurology)

*Associate Director:* Katherine Preston

*Professors:* Russ Altman (Bioengineering), Laurence Baker (Health Research and Policy), Ben Barres (Neurobiology), Donna Bouley (Comparative Medicine), Laura Carstensen (Psychology), Lisa Curran (Anthropology), Martha Cyert (Biology), William H. Durham (Anthropology), Heidi Feldman (Pediatrics: Neonatology), Russell D. Fernald (Biology), Paul Fisher (Neurology), Margaret Fuller (Developmental Biology), Rona Giffard (Anesthesia), Garry Gold

(Diagnostic Radiology), Lawrence H. Goulder (Economics), James J. Gross (Psychology), H. Craig Heller (Biology), Paula Hillard (Obstetrics and Gynecology), Patricia P. Jones (Biology), Terence Ketter (Psychiatry and Behavioral Sciences), Richard Klein (Anthropology), Amy Ladd (Orthopaedic Surgery), Joseph S. Lipsick (Pathology), Helen Longino (Philosophy), Tanya Luhmann (Anthropology), Yvonne Maldonado (Pediatrics: Infectious Diseases), Michael Marmor (Ophthalmology), Gordon Matheson (Orthopaedic Surgery), Clifford Nass (Communication), Rosamond Naylor (Environmental Earth System Science and Woods Institute), Robert Negrin (Medicine: Blood and Marrow Transplantation), Roeland Nusse (Developmental Biology), Amado Padilla (Education), Julie Parsonnet (Medicine: Infectious Diseases), Thomas Rando (Neurology), Thomas Robinson (Pediatrics), Lee Ross (Psychology), Robert Sapolsky (Biology), Walter Scheidel (Classics), Kenneth Schultz (Political Science), Matthew Scott (Developmental Biology), Randall Stafford (Stanford Prevention Research Center), William Talbot (Developmental Biology), Lucy Tompkins (Infectious Diseases), Shripad Tuljapurkar (Biology), Anthony Wagner (Psychology), Jeffrey Wine (Psychology), Paul Wise (Pediatrics), Arthur P. Wolf (Anthropological Sciences)

*Associate Professors:* Jayanta Bhattacharya (Medicine/PCOR), Rebecca Bird (Anthropology), Firdaus Dhabhar (Psychiatry and Behavioral Sciences), Dean Felsher (Medicine: Oncology), Anne Fernald (Psychology), James Fox (Anthropology), Brenda Golianu (Anesthesia), Joachim Hallmayer (Psychiatry and Behavioral Sciences - Child and Adolescent Psychiatry and Child Development), James Jones (Anthropology), Brian Knutson (Psychology), Sean Mackey (Anesthesia), Norman G. Miller (Medicine/PCOR), Jose Montoya (Infectious Diseases), John Rick (Anthropology), Nancy Wang (Surgery: Emergency Medicine)

*Assistant Professors:* Eran Bendavid (General Internal Medicine), Daniel Garza (Orthopaedic Surgery), Jeremy Goldhaber-Fiebert (Medicine/PCOR), Samuel McClure (Psychology), Denise Monack (Microbiology and Immunology), Michelle Monje-Deisseroth (Neurology), Jelena Obradovic (Education), Anna Penn (Pediatrics: Neonatology), Jamie Zeitzer (Psychiatry and Behavioral Sciences)

*Professor (Research):* David Lyons (Psychiatry and Behavioral Sciences), Marcia Stefanick (Stanford Prevention Research Center)

*Associate Professors (Research):* Christopher Gardner (Stanford Prevention Research Center), David Katzenstein (Medicine: Infectious Diseases),

*Assistant Professor (Research):* Scott Hall (Interdisciplinary Brain Science Research)

*Professors (Teaching):* Carol Boggs (Biology), David Magnus (Pediatrics/SCBE), Ellen Porzig (Developmental Biology)

*Associate Professors (Teaching):* Donald Barr (Pediatrics), Catherine Heaney (Psychology), Eunice Rodriguez (Pediatrics), Robert Siegel (Microbiology and Immunology)

*Clinical Professors:* Nancy Morioka-Douglas (General Internal Medicine)

*Clinical Associate Professors:* Mary Therese Jacobson (Obstetrics and Gynecology), Daryn Reicherter (Psychiatry and Behavioral Sciences), Katherine Williams (Psychiatry and Behavioral Sciences)

*Clinical Assistant Professors:* Christopher Gonzalez (Pathology/Blood Center), Cynthia Nguyen (Psychiatry and Behavioral Sciences), Rita Popat (Health Research and Policy, Epidemiology)

*Senior Research Associates:* Wesley F. Alles (Medicine: Stanford Prevention Research Center), Douglas Bird (Anthropology)

*Other Teaching Faculty and Staff:* William Abrams, Maya Adam-Seef, Judy Chu, Sophia Colamarino (Psychiatry and Behavioral Sciences), Anne Firth-Murray, Anne Friedlander, Ronald Garcia (Center for Excellence), Renu Heller (Biology), John Lynham, Michael Mastrandrea (Woods Institute), Lisa Medoff (School of Education), Stephen Murphy-Shigematsu (Anesthesia), Katherine Preston, Lisa Goldman Rosas (Medicine: Stanford Prevention Research Center), Matthew Rothe (Stanford Dining Services), Lynn Rothschild, Merritt Ruhlen, Michael James Salinger, Annette Salmeen, Darwin Scott Smith (Microbiology and

Immunology), Jennifer Wolf (School of Education), Nathan Wolfe, Larry Zaroff

*Course Associates:* Autumn Albers, Adrian Castillo, Steven Michael Crane, Molly Fausone, Rahael Gupta, Grace Huh, Sonja Swenson, Jill Watt

*Honors Chair:* Katherine Preston

## Overseas Studies Courses in Human Biology

Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/humanbiology/> <http://explorecourses.stanford.edu>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/humanbiology/http://bosp.stanford.edu>) web site.

		Units
OSPAUSTL 10	Coral Reef Ecosystems	3
OSPAUSTL 30	Coastal Forest Ecosystems	3
OSPBER 47	Ethics in Medicine and Everyday Life	4
OSPCPTWN 43	Public and Community Health in Sub-Saharan Africa	4
OSPFLOR 57	Global Change and Italian Ecosystems: Management and Conservation for Mitigation	4
OSPFLOR 83	The Art of Vision	3
OSPFLOR 85	Bioethics: Between Human Rights, Responsibility, and Care Ethics	4
OSPFLOR 87	International Comparison of Health Care Systems: The Italian Profile	4
OSPMADRD 57	Health Care: A Contrastive Analysis between Spain and the U.S.	5
OSPMADRD 72	Issues in Bioethics Across Cultures	5
OSPPARIS 153X	Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time	5

## Iberian and Latin American Cultures

Courses offered by the Department of Iberian and Latin American Cultures, formerly the Department of Spanish and Portuguese, are listed under the subject code ILAC on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ILAC&filter-catalognumber-ILAC=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ILAC&filter-catalognumber-ILAC=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ILAC&filter-catalognumber-ILAC=on>). For courses in Catalan, Portuguese, and Spanish language instruction with the subject codes CATLANG, PORTLANG and SPANLANG, see the "Language Center (<http://www.stanford.edu/dept/registrar/bulletin/5966.htm>)" section of this bulletin.

The Department of Iberian and Latin American Cultures offers courses focused on the languages, literatures, and cultures of the Iberian Peninsula, Latin America, and Latina/o populations in the United States. To achieve its goal of training students as experts in the cultures of the Iberian Peninsula and Latin America, the department balances an emphasis on literary studies with philosophical, historical, and social approaches to cultural issues.

The department's faculty includes scholars of modern and contemporary Spanish literature and cinema, contemporary Latin American literature and cinema, medieval and contemporary Catalan literature and culture, Aljamiado and medieval Spanish literature, early modern Portuguese literature, modern and contemporary Brazilian literature, and Chicana/o culture and literature. The department's courses are characterized by an intercultural and interdisciplinary focus that combines the study of literature with wide ranging intellectual concerns.

The department is committed to three main educational goals:

1. to provide students with a contextualized knowledge of the literatures and cultures of the Iberian Peninsula from the medieval period to the present, of the Spanish and Portuguese speaking countries of Latin America, and of the Spanish-speaking communities of the United States.
2. to prepare undergraduates for advanced study in those areas and/or in a range of professional fields.
3. to provide doctoral students with advanced training as research scholars and teachers in preparation for careers as university professors or in related roles.

In addition, the department regularly hosts visiting faculty including the Ginebre Serra Visiting Chair in Catalan Studies through the Iberian Studies Program.

The department awards B.A., M.A., and Ph.D. degrees in Iberian and Latin American Cultures, and a B.A. in degree in Spanish. It also offers undergraduate minors in Spanish and Portuguese, and a Ph.D. minor in Iberian and Latin American Cultures.

Courses for Heritage Language Speakers—The Language Center offers a series of second- and third-year courses designed for students who grew up in homes where Spanish is spoken and who wish to develop their existing linguistic strengths. See the "Language Center (<http://www.stanford.edu/dept/registrar/bulletin/5966.htm>)" section of this bulletin for these courses.

## Mission of the Undergraduate Program in Iberian and Latin American Cultures

The mission of the undergraduate program in Iberian and Latin American Cultures is to expose students to a variety of perspectives in languages, literatures, and cultures of the Iberian Peninsula, Latin America, and Latina/o populations in the United States. The program balances an emphasis on literary studies with a diverse set of approaches to cultural and social issues. Courses in the program provide students with a contextualized knowledge of the literatures and cultures of the Iberian Peninsula from the medieval period to the present; the Spanish and Portuguese speaking countries of Latin America; and the Spanish-speaking communities of the United States. Students in the major are prepared for advanced study in these areas and for a range of professional fields.

## Learning Outcomes (Undergraduate)

The department prepares undergraduate majors in the program to be able to demonstrate the following learning outcomes. These outcomes are used in



evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to develop effective and nuanced lines of interpretation.
2. critical thinking skills using their courses' primary source materials.
3. facility with the methodologies and presuppositions underlying interpretive positions in secondary literature and in their own work.
4. analytical writing skills and close reading skills.
5. expository oral skills.
6. proficiency in Catalan, Portuguese, or Spanish

## Graduate Programs in Iberian and Latin American Cultures

University requirements for the M.A. and Ph.D. degrees are discussed in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Iberian and Latin American Cultures and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Iberian and Latin American Cultures. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Iberian and Latin American Cultures and to interpret and present the results of such research.

## Coterminal B.A. and M.A.

The requirements for the coterminal M.A. are the same as those outlined for the M.A. No course can count for both the B.A. and M.A. degrees. University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4874.htm>)" section of this bulletin.

## Study Abroad Programs in Iberian and Latin American Cultures

All majors are encouraged to study abroad. To transfer credits from non-Stanford programs abroad, consult the Bing Overseas Studies Office. Course work taken abroad may be applied toward the major in ILAC and Spanish as well as the minor in Spanish or Portuguese. Students planning to study abroad must consult with the Chair of Undergraduate Studies to coordinate the course work from abroad with their degree program. The maximum number of units is identified in the elective section for each major.

The department and Bechtel International Center (<http://icenter.stanford.edu>) maintain information on study abroad programs. Stanford supports the options listed below and credits course work taken in academically sound programs. Students considering different options are encouraged to speak with the Director of the department or the Chair of Undergraduate Studies.

## Stanford in Santiago, Chile and Madrid or Barcelona, Spain

The Bing Overseas Studies Programs in Santiago, Chile and Madrid, Spain require a certain level of proficiency in Spanish. Students should consult the program summary of their interested campus. Course work is primarily in Spanish. Information is available in the "Overseas Studies (<http://www.stanford.edu/dept/registrar/bulletin/5090.htm>)" section of this bulletin or at the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/iberianandlatinamericancultures/http://bosp.stanford.edu>) web site. Internships and research opportunities may be arranged for students staying for two quarters.

For ILAC majors with an interest in Iberian Studies, the department recommends study in Barcelona through CASB, a consortium of U.S. universities of which Stanford is a participating member. This program combines courses at the program's center with open access to courses at three Barcelona universities: Universitat Popeu Fabra, University of Barcelona, and Autonomous University of Barcelona. Visiting faculty from Brown, Chicago, Stanford, and Northwestern complement the offerings of these three major universities. Admission is highly competitive. Other programs are also recognized by the department, and students are encouraged to discuss their interests with the Director of the department or with the Chair of Undergraduate Studies.

## Brazil and Portugal

The University maintains a relationship with the Universidade Estadual do Rio de Janeiro in Brazil at the graduate level. Students interested in study in Brazil should contact Professor Marflia Librandi Rocha. Students interested in study in Portugal should contact Professor Vincent Barletta.

## Bachelor of Arts in Iberian and Latin American Cultures

The major in Iberian and Latin American Cultures (ILAC) requires 60 units of course work. Courses must be taken for a letter grade, and a maximum of 15 units of course work from abroad may be applied towards the major. At the discretion of the Chair of Undergraduate Studies, up to 5 units of course work from outside the department, clearly related to the study of literature and culture in the areas and traditions taught by the department, may be counted towards the degree. The core courses (requirements 1, 2, 3 and 4 below) may not be taken abroad. Exceptional cases for any of these requirements must be referred to the Chair of Undergraduate Studies who, in consultation with the department Director, makes a final decision.

## Prerequisites

For all ILAC courses taught in Spanish, students must have successfully completed SPANLANG 102 or successfully tested above this level through the Language Center. One course above 100 and one core course, or consent of the instructor, are prerequisites for 200-level courses.

## Declaring the Major

Students declare the major in Iberian and Latin American Cultures through Axess. Students should meet with the Chair of Undergraduate Studies to discuss appropriate courses and options within the major, and to plan the course of study. Majors are also urged to attend department events such as public talks and conferences.

## Double Majors

The major in ILAC is designed to combine with a second major in another field and with study abroad. Students may not count the same courses to fulfill requirements in both majors.

## General Course Requirements

Core Courses. Students must complete a total of 60 units for the major. The following 4 requirements must be taken at Stanford University.

1. ILAC 120 Advanced Critical Reading in Spanish - Writing in the Major (WIM): 5 units are required, and this is a prerequisite for every course in the major; however, concurrent enrollment is allowed.
2. Core courses in literature. All three courses must be completed

		Units
ILAC 136	Modern Iberian Literatures	3-5
ILAC 157	Medieval and Early Modern Iberian Literatures	3-5
ILAC 161	Modern Latin American Literature	3-5

3. Core courses in culture, history, and civilization. Choose at least one.

		Units
ILAC 130	Introduction to Iberia: Cultural Perspectives	3-5
ILAC 131	Introduction to Latin America: Cultural Perspectives	3-5

4. Senior Seminar.

		Units
ILAC 278A	Senior Seminar: Latin American Fiction and Theory	3-5

Elective Courses. Students must complete a total of 60 units for the major. Elective courses can be taken within the following parameters:

- Up to 15 units of language courses (not including conversational courses) in Spanish, Portuguese, or Catalan.
- Additional 100- or 200- level ILAC literature courses.
- Bing Overseas Program. Up to 15 units of pre-approved coursework from Barcelona, Madrid, or Santiago.
- Coursework from outside ILAC. A maximum of 5 units of relevant coursework from outside ILAC may be counted towards the electives. Prior approval from the Chair of Undergraduate Studies is required.
- IHUM or Thinking Matters courses taught at least partially by a faculty member of the ILAC department. Maximum of 10 units. IHUM courses are no longer offered.
- Structured Liberal Education (SLE). Maximum of 10 units.

## Bachelor of Arts in Spanish

The Spanish major is declared in Axess. "B.A. Spanish" appears on the official transcript and on the diploma. This program is designed for students who want to move towards fluency in reading, listening, speaking, and writing Spanish while developing a contextualized understanding of the language through linguistic and cultural study. This degree emphasizes critical use of the language in a global perspective. The major in Spanish requires 60 units of coursework. All coursework must be done in Spanish. If a class is taught in a language other than Spanish, then written work (e.g. final papers) must be completed in Spanish. Courses cannot be duplicated for two degrees. All courses must be taken for a letter grade.

## Prerequisites

Students must be at or above the level of SPANLANG 13 or successfully tested above this level through the Language Center.

## Declaring the Major

Students declare the major in Spanish through Axess. Students should meet with the Chair of Undergraduate Studies to discuss appropriate courses and options within the major, and to plan the course of study. Majors are also urged to attend department events such as public talks and conferences.

## General Course Requirements

Core Courses. Students must complete a minimum of 60 units for the major. The following requirements must be taken at Stanford University.

1. SPANLANG 101 The Structure of Spanish.
2. ILAC 120 Advanced Critical Reading in Spanish, Writing in the Major (WIM). 5 units are required. This is a prerequisite for every course in the major; however, concurrent enrollment is allowed.
3. Core courses in culture, history, and civilization. Choose at least one.

		Units
ILAC 130	Introduction to Iberia: Cultural Perspectives	3-5
ILAC 131	Introduction to Latin America: Cultural Perspectives	3-5

4. Senior Seminar. ILAC 277 Spanish in Society
5. Two 200-level ILAC courses.
6. Spanish Proficiency Notation. All majors must test for Proficiency in Spanish through the Language Center by winter quarter of their Senior year. Students must receive a notation of at least "Advanced Mid" to be deemed proficient. Those needing outside tutoring will be advised to do so (resources are available through the CTL and ILAC). The proficiency examination will comprise an oral interview and a writing proficiency test.

Elective Courses. Students must complete a total of 60 units for the major. Elective courses can be taken within the following parameters:

- Course work within ILAC. Additional ILAC courses at the 100- or 200-level to meet the required 60 units.
- Bing Overseas program. A maximum of 15 units of related course work from Madrid or Santiago may count towards the electives. Prior approval from the Chair of Undergraduate Studies is required.
- Course work from outside ILAC. A maximum of 5 units of relevant coursework from outside ILAC may be counted towards the electives. Prior approval from the Chair of Undergraduate Studies is required.

## Honors Program

ILAC majors and Spanish majors with an overall grade point average (GPA) of 3.3 or above, and who maintain a 3.5 (GPA) in major courses, are eligible to participate in the DLCL's honors program. Prospective honors students must choose a senior thesis adviser from among their home department's regular faculty, in their junior year, preferably by March 1, but no later than May 1.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Honors theses range from 40-90 pages not including bibliography and notes.

During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies of their home department to submit a thesis proposal (2-5 pages), DLCL Honors application and an outline of planned course work for their senior year. During this quarter, students may enroll for 2 units in DLCL 189C Honors Thesis Seminar for the drafting or revision of the thesis proposal. The proposal is reviewed by the Chair of Undergraduate Studies and the Director of the department and will be approved or returned for submission.

Honors students are encouraged to participate in the honors college hosted by Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) and coordinated by the Division of Literatures, Cultures, and Languages. The honors college is offered at the end of the summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted through the Bing program. For more information, view the Bing Honors website.

In Autumn Quarter of the senior year, the students must enroll in DLCL 189A Honors Thesis Seminar, a 5 unit seminar that focuses on researching and writing the honors thesis. During Winter Quarter students then enroll for 5 units in DLCL 189B Honors Thesis Seminar while composing their thesis. Students who did not enroll in DLCL 189C Honors Thesis Seminar during their Spring Quarter junior year may do so in the Spring Quarter of their senior year while revising the thesis, if approved by the thesis supervisor. A total of 10-12 units will be awarded for completion of honors course work, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15th of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

## Minors in Spanish and Portuguese

The minors in Spanish and Portuguese are for students who want to combine acquisition of linguistic competence with the study of the literature, thought, culture, or language systems of the Spanish- or Portuguese-speaking worlds. The minors in Spanish and Portuguese require 30 units of course work taken for a letter grade. Up to 5 units of course work outside the department, up to 10 units of relevant course work taken abroad, and up to 15 units of second-year and above Spanish or Portuguese language courses (not including conversational courses) may count toward these minors with the approval of the Chair of Undergraduate Studies.

### Minor in Portuguese

#### Required Courses: (30)

1. A 100- or 200-level course in Iberian literature with a Lusophone component
2. A 100- or 200-level course in Latin American literature with a Lusophone component.
3. Any additional 100- or 200-level courses in literature and culture to complete the required 30 units. IHUM courses with a Lusophone component taught at least partially by ILAC faculty may count toward these electives as may 5 units of SLE.

Units

30

### Minor in Spanish

#### Required Courses: (30)

1. A 100- or 200-level course in Iberian literature
2. A 100- or 200-level course in Latin American literature
3. Any additional 100- or 200-level courses in literature and culture to complete the required 30 units. IHUM courses with a Hispanophone component taught at least partially by ILAC faculty may count towards these electives, as may 5 units of SLE.

Units

30

## Master of Arts in Iberian and Latin American Cultures

This terminal M.A. degree program is for students who do not intend to continue their studies through the Ph.D. degree. Students in this program may not apply concurrently for entrance to the Ph.D. program. Students must complete a minimum of 45 graduate-level units, 36 of which must be taken at Stanford. All 45 units must have a letter grade of 'B' or above. Students enrolled in the terminal M.A. program must file a Program Proposal for a Master's Degree during their first quarter of enrollment. Any changes to the proposal should be reviewed and approved by the Chair of Graduate Studies.

The requirements for the terminal M.A. and coterminial M.A. are:

1. A 200-level or above course in literary or cultural theory
2. Two 200-level or above courses in Latin American (including Brazilian) or Latino/Chicano literature and culture
3. Two 200-level or above courses in Iberian literature and culture
4. One 300-level course in Latin American (including Brazilian) or Latino/Chicano literature and culture
5. One 300-level course in Iberian literature and culture
6. Enrollment in at least one 300-level graduate seminar offered in the department each quarter
7. Intermediate-high proficiency in Portuguese or Catalan (equivalent to one year of university study).

Independent study courses (ILAC 299 Individual Work, ILAC 399 Individual Work) and crosslisted courses originating outside the department may not be used to fulfill requirements except by consent of the Chair of Graduate Studies.

In addition, students may take approved courses in related fields such as classics, comparative literature, education, history of art, linguistics, modern thought, and philosophy.

## Doctor of Philosophy in Iberian and Latin American Cultures

University requirements for the Ph.D. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. The requirements of the Ph.D. in Iberian and Latin American Cultures (ILAC) are:

### 1. Course work

135 units of graduate-level course work with a grade point average (GPA) of 3.0 (B) or above. All candidates for the Ph.D. degree are expected to fulfill all requirements for the M.A. during their first year in the program. Units completed for the M.A. degree at another institution (up to 45 units) can be counted toward the Ph.D., pending university and department approval. Graduate students may not take independent study courses (ILAC 299, 399) during the regular academic year (Autumn, Winter, Spring), except during the Summer, until they are ready to write their dissertation (on achieving TGR status), with the understanding that students need more focused mentorship at this time. Any exception to this policy must be made in consultation with the Graduate Program Adviser and with the relevant faculty member and/or the student's faculty adviser. Students must be enrolled in at least one 200- or 300-level course offered by a core member of the ILAC faculty each quarter before advancing to TGR. This policy is

designed to ensure that all the graduate students and all the core faculty of ILAC have the opportunity of doing some significant coursework together. This principle is in the best interests of the student since the entire faculty is involved in the periodic review and evaluation of every graduate student. In consultation with their adviser, students choose one major field and two minor fields of study from the following:

- A1. Medieval and Early Modern Iberian Literature and Culture
- A2. Eighteenth- and Nineteenth-Century Iberian Literature and Culture
- A3. Twentieth- and Twenty-First-Century Iberian Literature and Culture
- B1. Colonial to Nineteenth-Century Latin American Literature and Culture
- B2. Twentieth- and Twenty-First-Century Latin American Literature and Culture
- B3. Luso-Brazilian Literature and Culture
- C. US Latin/Chicano Literature and Culture

Students must select one minor area from a group (A, B, C) other than that in which their major area falls. At least four graduate-level courses must be taken in the major area of study. At least two graduate-level courses must be taken in each minor area.

## 2. Language

All students are required to have advanced-high proficiency in English and Spanish by the time they take the comprehensive examination. In addition, students specializing in Iberian literature and culture must attain intermediate-mid proficiency in Catalan and Portuguese (equivalent to two quarters of university study for each language); for students specializing in Latin American and/or US Latino/Chicano literature and culture, the level of advanced-low proficiency in Portuguese (equivalent to four quarters of university study) must be attained. This requirement must be fulfilled before students take the comprehensive examination. Students wishing to satisfy the language requirements in Catalan and/or Portuguese may do so by passing a proficiency exam administered by the Language Center.

## 3. Examinations

All students must pass the following: a Qualifying Paper; a written and oral Comprehensive examination; and a University Oral examination.

### 3a. Qualifying Paper

The qualifying paper is a research paper, written in either English or Spanish, consisting of no more than 6,000 words. The student chooses as its source a term paper written for a course taught by a core member of the ILAC faculty. This instructor will serve as adviser to the student in preparing the qualifying paper for submission. The paper must be submitted to the Graduate Student Services Coordinator by the first day of instruction in Autumn Quarter of the student's second year of study. Students who do not pass the initial submission will have the opportunity to revise and resubmit it by November 15. Should the second qualifying paper not satisfy the minimum requirements, the student will be released from the Ph.D. program at the end of that same quarter. A terminal M.A. degree may be awarded if all requirements for that degree have been completed satisfactorily.

### 3b. Comprehensive examination

This exam consists of two parts, a written submission and an oral presentation, and is designed for students to demonstrate intellectual competence in multiple areas of study. This exam occurs during Winter Quarter of the third year of graduate study, and it must be completed prior to the last day of instruction in that same quarter. Students must select three examination areas from the following options:

- A1. Medieval and Early Modern Iberian Literature and Culture
- A2. Eighteenth- and Nineteenth-Century Iberian Literature and Culture

- A3. Twentieth- and Twenty-First-Century Iberian Literature and Culture
- B1. Colonial to Nineteenth-Century Latin American Literature and Culture
- B2. Twentieth- and Twenty-First-Century Latin American Literature and Culture
- B3. Luso-Brazilian Literature and Culture
- C. US Latin/Chicano Literature and Culture

Students may not select all three areas from the same group (A, B, C).

The committee for the Comprehensive Exam is formed by asking three ILAC professors to serve on the committee, one for each of the three examination areas chosen by the student. In consultation with each member of the committee, the student must develop a list of twenty-one themes (seven for each area of study) plus a reading list of 130-150 texts and critical works. In addition, the student will submit a 6,000-word research paper (different from the Qualifying Paper) on a topic preferably related to the dissertation. This paper must be written in English. This list and research paper must be presented to committee members and to the Graduate Student Services Coordinator at least two weeks prior to the Oral portion of the Comprehensive Exam. The Oral exam will be based upon the submitted list and research paper and will last no more than two hours. Students must demonstrate their proficiency in Spanish and English during the course of this exam.

### 3c. University Oral examination

All Ph.D. candidates in ILAC are required to take a University Oral examination no later than one quarter after successfully completing the Comprehensive Examination. This examination is a defense of the dissertation prospectus. During the examination, the candidate speaks for approximately 20 minutes on the proposed dissertation, the methods to be used in research and the conclusions the candidate expects to reach. Afterward, there will be questions by the members of the committee, in an order established by the Chair of the committee. The examination may be taken in English or Spanish, as mutually agreed by the student and the committee. The examination will last no more than two hours.

The University Oral examination committee must be finalized no later than the last week of the quarter during which the student successfully completes the comprehensive examination. The examination committee should include the dissertation adviser and three other members, usually from the Reading Committee, and a Chair from outside the department, for a total of five members. All members must belong to the Academic Council. The adviser and two other members must be ILAC faculty. Once a committee and date are finalized the student must submit the University Oral Examination form to the Graduate Student Services Coordinator. The members of the Oral Examination committee must receive copies of the dissertation prospectus no later than three weeks prior to the examination.

The dissertation prospectus should consist of 20-25 pages (approximately 7,500 words) and follow the most recent MLA Style guidelines. The student must prepare the dissertation prospectus with the help of the principal adviser, and other advisers. The dissertation prospectus must contain a title along with the following elements:

1. Statement of Thesis
2. Statement of Significance and Impact
3. Brief Literature Review
4. Outline of Theoretical Framework
5. Chapter Outline
6. Preliminary Biography
7. Timetable for Completion

## 4. Teaching

Each Ph.D candidate must teach a minimum of five quarters of undergraduate courses (three are taught during the second year and

the remaining two after advancing to TGR status). Language course assignments are arranged through the Language Center. In preparation for teaching, Ph.D. candidates are required to take DLCL 301 The Learning and Teaching of Second Languages in the first year.

## 5. Ph.D. Dissertation

The doctoral dissertation should demonstrate the student's ability to carry out original research and to organize and present the results in publishable form. The scope of the dissertation should be such that it is completed in twelve to eighteen months of full-time work. A copy of the completed dissertation must be submitted to each member of the reading committee at least eight weeks before the University filing deadline in the quarter during which the candidate expects to receive the Ph.D. degree. Committee members will have three weeks to read the dissertation before determining whether to approve or require changes. Ph.D. dissertations must be completed and approved within five years from the date of admission to candidacy. Students taking more than five years must apply for reinstatement of candidacy which is reviewed on a case by case basis.

## Yearly review

In order to evaluate student progress and to identify potential problem areas, the department's faculty reviews the academic progress of each first-year student at the beginning of Winter and Spring quarters and again at the end of the academic year. The first two reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may be placed on probation with specific guidelines for addressing the problems detected. The review at the end of Spring Quarter is more thorough; each student's performance during the first year is reviewed and discussed. Possible outcomes of the spring review include: (1) continuation of the student in good standing, or (2) placing the student on probation, with specific guidelines for the period of probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: (1) restoration to good standing; (2) continued probation, again with guidelines for necessary remedial steps; or (3) termination from the program. All students are given feedback from their advisers at the end of their first year of graduate work, helping them to identify areas of strength and potential weakness.

At the end of the second year of residency, students who are performing well, as indicated by their adviser, performance on the Comprehensive Exam, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded a terminal M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for Autumn Quarter of the student's third year.

At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student.

## Grading

Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course instructed in the DLCL. Any grade of 'B' or below is considered to be less than satisfactory. Grades of 'B' or below are reviewed by faculty and the following actions may be taken: (1) the grade stands and the student's academic performance is monitored to ensure that satisfactory

progress is being made; (2) the grade stands and the student is required to revise and resubmit the work associated with that course; or (3) the student may be required to retake the course.

## Ph.D. Minor in Iberian and Latin American Cultures

For a minor in Spanish, the student must complete 25 units, with a grade point average (GPA) of 3.0 or above, selected from courses numbered 200 or higher.

Students in the Ph.D. program in ILAC who choose a minor in another department should consult with advisers in that department.

*Emeriti:* (Professors) Bernard Gicovate, Mary Pratt, Sylvia Wynter; (Professor, Teaching) María-Paz Haro

*Director:* Jorge Ruffinelli

*Chair of Graduate Studies:* Michael P. Predmore

*Chair of Undergraduate Studies:* Lisa Surwillo

*Professors:* Michael P. Predmore, Joan Ramon Resina (Iberian and Latin American Cultures, Comparative Literature)(on leave, Autumn), Jorge Ruffinelli, Yvonne Yarbrow-Bejarano

*Associate Professor:* Vincent Barletta

*Assistant Professors:* Héctor M. Hoyos (on leave), Marília Librandi Rocha, Lisa Surwillo

*Courtesy Professors:* John Felstiner, Roland Greene, Hans U. Gumbrecht, Ramón Saldívar

*Courtesy Associate Professors:* James A. Fox, Paula Moya

*Visiting Professor:* Margalida Jammé Pons (Autumn)

*Visiting Lecturers:* Ximena Briceño, Caridad Kenna

*Director of Iberian Studies Program:* Joan Ramon Resina

*Spanish Language Program Coordinator:* Alice Miano

*Portuguese Language Program Coordinator:* Lyrís Wiedemann

*Catalan Language Program Coordinator:* Joan Molitoris

## Overseas Studies Courses in Iberian and Latin American Cultures

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/iberianandlatinamericancultures/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/iberianandlatinamericancultures/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/iberianandlatinamericancultures/http://bosp.stanford.edu>).

### Units

OSPMADRD 40 Introduction to Literary and Cultural Analysis in the 4-5 Spanish World

OSPMADRD 41	Dissidence and Continuity: Spanish Theater, 1907 to the Present	4-5
OSPMADRD 43	The Jacobean Star Way and Europe: Society, Politics and Culture	5
OSPMADRD 45	Women in Art: Case Study in the Madrid Museums	4
OSPMADRD 46	Drawing with Four Spanish Masters: Goya, Velazquez, Picasso and Dali	3
OSPMADRD 50	Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Almodóvar	4-5
OSPMADRD 61	Society and Cultural Change: The Case of Spain	5
OSPMADRD 62	Spanish California: Historical Issues	5
OSPSANTG 10	Borges and Argentina	4-5
OSPSANTG 14	Women Writers of Latin America in the 20th Century	4-5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 118X	Artistic Expression in Latin America	5

# Individually Designed Majors and Individually Designed Honors Program in Humanities

New students are not being accepted into the Individually Designed Major or the Individually Designed Honors Program in Humanities. Students who have already been accepted into these programs will be allowed to complete their course of study.

The Individually Designed Major (IDM) is overseen by the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences. (See the "Individually Designed Majors in Engineering (<http://www.stanford.edu/dept/registrar/bulletin/5152.htm>)" section of this bulletin for information about the IDM in Engineering.)

The IDM is intended for exceptional undergraduates interested in pursuing an area of study that, by virtue of its focus and intellectual content, cannot be accommodated by existing departmental or programmatic majors. Students must have a minimum GPA of 3.5 and the IDM cannot be a student's secondary major. IDM curricula are designed by students with the assistance of three faculty members of their choice; all advisers must be members of the Academic Council.

IDM programs must meet the following requirements:

1. A minimum of 75 units, with all courses at or above the 100 level.
2. A maximum of 5 units on a credit/no credit basis.
3. A maximum of 8 units in directed reading or independent study, prior approval required.
4. A core sequence in the department of one of the advisers.
5. A WIM course in the department of one of the advisers.

6. None of the units may count towards another major, minor, or other special program.

The proposed major must not be achievable through a major or combination of majors and/or minors already offered by degree-granting departments or programs. IDM students are required to complete a capstone requirement in the form of an honors thesis.

Any changes to a previously approved IDM must be endorsed by the primary adviser and approved by the Office of Graduate and Undergraduate Studies. A request by a student to make changes in his or her approved curriculum must be made sufficiently far in advance so that, should the request be denied, adequate time remains to complete the original, approved curriculum.

## Individually Designed Honors Program in Humanities

The Individually Designed Honors Program (IDHP) in Humanities is overseen by the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences. This program is available to exceptional students who wish to complete an honors thesis in the Humanities and to have the notation "Honors in Humanities" recorded on their diplomas and transcripts in addition to their primary degree. This program is also available to students completing an Individually Designed Major. The requirements for the IDHP are as follows:

1. A minimum GPA of 3.5. Students must maintain a 3.5 GPA throughout the course of their Stanford undergraduate career.
2. Students must select two advisers for the honors thesis who are members of the Academic Council, at least one of whom is not from the student's major department. Both faculty members must be from humanities and arts departments.
3. Students majoring in a humanities or arts department must complete 25 additional units in the humanities and arts, chosen from areas outside of the major department. Areas of concentration include arts, literature, history, and philosophy. Courses must be chosen in consultation with the student's advisers, and a potential list of such courses submitted with the proposal.
4. Students majoring in a non-humanities and arts department must complete the equivalent of a minor in one humanities and arts department, and an additional 10 units in another. Winter-Spring IHUM courses may be used to satisfy part of this requirement. Courses must be chosen in consultation with the student's advisers, and a potential list of such courses submitted with the proposal.
5. Students must complete a capstone, majors seminar, or honors seminar in a humanities and arts department.
6. The honors thesis may be taken for a minimum of 5 units up to a maximum of 10 units. These units must be in addition to the requirements above. The student should determine the size and scope of the thesis in consultation with his or her advisers.
7. Students should consult with the Office of Graduate and Undergraduate Studies in the School of Humanities and Sciences before submitting a proposal.
8. All proposals must be submitted no later than the third week of Autumn Quarter in the student's junior year, and preferably by Spring Quarter of the sophomore year. The H&S Curriculum Committee in the Humanities and Arts reviews and approves all proposals.

# International Policy Studies

Courses offered by the Ford Dorsey Program in International Policy Studies are listed under the subject code IPS on the Stanford Bulletin's ExploreCourses web site (<http://explorecourses.stanford.edu/search.jsessionid=CD85410D8306285785D60502AD7D575F?page=0&q=ips&filter-coursestatus-Active=on&view=timeschedule&collapse=&catalog=71>).

The Ford Dorsey Program in International Policy Studies (IPS) is an interdisciplinary program devoted to rigorous analysis of international policy issues. Its goal is to provide students with exposure to issues they will face in international business and public policy, and to develop the skills and knowledge to address those issues. The program allows students to specialize in democracy, development, and the rule of law; energy, environment, and natural resources; global health; international political economy; or international security and cooperation.

University requirements for the M.A. degree are described in the "Graduate Degrees (p. 38)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in International Policy Studies and to prepare students for a professional career. This is achieved through completion of required courses in the global, quantitative, and skills core, as well as courses in an area of concentration and the capstone course. Students are also encouraged to gain experience through a summer internship and research skills through assistantships with Stanford faculty.

## Admission

IPS is designed for students who have undergraduate backgrounds in economics, political science, and international relations. To enroll in the program, students must have completed prerequisite courses in microeconomics, macroeconomics, introductory statistics, international trade and international finance. Stanford courses satisfying these requirements are:

		Units
ECON 51	Economic Analysis II	5
ECON 52	Economic Analysis III	5
ECON 165	International Finance	5
ECON 166	International Trade	5

To apply or for information on graduate admission, see the Office of Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>) website.

Applicants from schools other than Stanford or applicants from Stanford who did not apply in their senior year should submit a graduate admission application including:

- a statement on relevant personal, academic, and career plans and goals
- official transcripts (two copies)
- three letters of recommendation
- Graduate Record Examination (GRE) scores
- a writing sample of at least eight double-spaced pages
- resume or curriculum vitae

- TOEFL scores (only required of applicants who are non-native English speakers or who did not attend undergraduate institutions where English is the language of instruction)

Applicants are expected to have a B.A. or B.S. degree from an accredited school.

Applications for admission in Autumn Quarter must be filed with supporting credentials by January 8, 2013.

## Coterminal Program

Undergraduates at Stanford may apply for admission to the coterminal master's program in IPS when they have earned a minimum of 120 units toward graduation, including Advanced Placement and transfer credit, and no later than the quarter prior to the expected completion of their undergraduate degree. The co-terminal application requires the following supporting materials:

- two letters of recommendation from University faculty
- a writing sample of at least eight double-spaced pages
- a statement of relevant personal, academic, and career plans and goals.

Applications must be filed together with supporting materials by January 8, 2013.

University requirements for the coterminal M.A. are described in the "Coterminal (p. 36)" and "Master's (p. 39)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) website.

## Joint Degree Program

Students may also choose to pursue a joint J.D./M.A. in IPS degree. The joint degree program supplements the strengths of the Law School with training through IPS. Prospective students interested in the joint J.D./M.A. in IPS program may apply concurrently to both the Stanford Law School and the IPS program. Two separate application forms are required and applicants must submit LSAT scores to the Law School and GRE scores to the IPS program.

Students already enrolled at Stanford Law School may apply to the joint J.D./M.A. in IPS program no later than the end of the second year of Law School. The IPS program will make rolling admissions decisions based on the student's original application materials (GRE scores are not required in addition to LSAT scores in this case). Submission of the following is required for consideration:

- IPS Joint Degree Application Form (available from the IPS web site ([http://ips.stanford.edu/joint\\_program](http://ips.stanford.edu/joint_program)))
- Law School Joint Degree Petition (available from the Law School Registrar's Office (<http://www.law.stanford.edu/program/degrees/joint>))
- Graduate Program Authorization Petition (submitted via Axxess (<http://axess.stanford.edu>))
- Enrollment Agreement for Students with Multiple Programs (available for download on the University Registrar's forms page (<http://studentaffairs.stanford.edu/registrar/forms/grad/#enrollment>))

For further information, see the "Joint Degree Programs (p. 43)" section of this bulletin and the University Registrar's site (<http://studentaffairs.stanford.edu/registrar/students/jdp-information>).

## Language Requirement

Proficiency in a foreign language is required and may be demonstrated by completion of three years of university-level course work in a foreign language or by passing an oral and written proficiency examination prior to graduation. International students who speak English as a second language already meet this requirement.

## Grade Requirement

All courses taken to fulfill degree requirements, except IPS 300 Issues in International Policy Studies or IPS 200 Global Affairs: Social Media and Blog Writing Workshop, must be taken for a letter grade. An overall GPA of 3.0 must be maintained.

## Additional Academic Requirements

1. Students are not required to repeat a course that covers material they have already mastered. In such cases, students may petition to substitute a different course for a core required course. This flexibility does not reduce the unit requirements for the M.A. degree.
2. All graduate degree candidates must submit a Master's Degree Program Proposal to the International Policy Studies office by the end of Winter Quarter. This document must be on file in order for the student to apply to graduate.

## Master of Arts in International Policy Studies (IPS)

University requirements for the master's degree are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

### Degree Requirements

To receive the M.A. degree in International Policy Studies, students must complete the courses listed in the curriculum below. These requirements include:

- Two courses in the global core
- Four courses in the quantitative core
- Four courses in the skills core
- Six courses in the area of concentration, including the gateway course
- The practicum or master's thesis

The minimum number of units required to graduate is 73.

During the first year of the program, students must complete required coursework in statistics, econometrics, international economics, advanced economics, international relations theory, policy writing, and an introductory (gateway) course in the area of concentration. During the second year of the program, students are required to complete either the practicum or master's thesis during autumn and winter quarters. Only students with two or more years of relevant policy work may petition to write a master's thesis.

### Language Requirement

In order to receive the M.A. degree in International Policy Studies, students must be proficient in a foreign language. Foreign language proficiency can be demonstrated by:

- Completion of three years of university-level coursework in a foreign language (verified by a transcript)
- Passing an oral and written proficiency exam at Stanford prior to graduation
- Status as a non-native English speaker

## Prerequisite Course Work

The IPS program has five prerequisites courses that must be completed prior to matriculation. These are microeconomics, macroeconomics, introductory statistics, international trade and international finance. International trade and international finance are often covered in a single international economics course. Prerequisite courses may be taken at community colleges, at four-year institutions, or through online courses. Proof of completion, which is usually verified by a transcript, is required. The Stanford equivalents of our prerequisite courses are listed below:

		Units
ECON 51	Economic Analysis II	
ECON 52	Economic Analysis III	
ECON 165	International Finance	
ECON 166	International Trade	

## Curriculum

		Units
<b>Global Core (4)</b>		
Colloquium (*):		1
IPS 300	Issues in International Policy Studies	
International Relations Theory (*):		3
IPS 201	Managing Global Complexity	
<b>Quantitative Core (19-20)</b>		
Statistics Course (*):		5
IPS 205	Introductory Statistics for Policy	
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	
Econometrics Course - Select one of the following (*):		5
IPS 206	Applied Statistics for Policy	
ECON 102B	Introduction to Econometrics	
POLISCI 350B	Political Methodology II	
International Economics Course - Select one of the following (*):		5
IPS 202	Topics in International Macroeconomics	
IPS 203	Issues in International Economics	
Advanced Economics Course - Select one of the following (*):		4-5
IPS 202	Topics in International Macroeconomics	
IPS 203	Issues in International Economics	
IPS 204A	Microeconomics	
IPS 204B	Cost-Benefit Analysis and Evaluation	
<b>Skills Core (13-14)</b>		
Policy Writing: Select one of the following (*):		5
IPS 210	The Politics of International Humanitarian Action	
IPS 211	The Transition from War to Peace: Peacebuilding Strategies	
IPS 213	International Mediation and Civil Wars	
IPS 235	From Innovation to Implementation: How Government Can Develop and Apply New Ideas	
IPS 244	U.S. Policy toward Northeast Asia	
IPS 264	Behind the Headlines: An Introduction to Contemporary South Asia	
IPS 314S	Decision Making in U.S. Foreign Policy	
Justice: Select one of the following:		4-5
IPS 208	Justice	
POLISCI 336	Introduction to Global Justice	
Decisionmaking: Select one of the following:		4
IPS 207A	Judgment and Decision Making	



IPS 207B	Public Policy and Social Psychology: Implications and Applications	
<b>Skills Elective (3-5)</b>		
Select one of the following six courses, or any IPS or approved area of concentration course		
CEE 251	Negotiation	
ENGR 103	Public Speaking	
FINANCE 221	Finance for Non-MBAs	
GSBGEN 315	Strategic Communication	
LAW 615	Negotiation	
ME 377	Design Thinking Bootcamp: Experiences in Innovation and Design	
<b>Area of Concentration: Gateway and elective courses: (24)</b>		24
<b>Capstone (10)</b>		
Select one to be completed during Autumn and Winter quarters of the second year		
IPS 209	Practicum	
IPS 209A	IPS Master's Thesis	
* indicates courses which must be completed during the first year of the program		
Total Units		73-77

## Area of Concentration Curriculum

Students are required to choose one area of concentration from the list below and complete a total of six courses within the concentration for a minimum of 24 total units. Each area of concentration has a gateway course, which must be taken during the first year and prior to enrolling in subsequent courses. Additionally, each area of concentration has a list of approved elective courses, which can be found under the 'Related Courses' tab at the top of this page. Courses not listed under the 'Related Courses' tab have not been approved and will need to be petitioned. Petitions are reviewed by the IPS Faculty Director. The petition form (<http://ips.stanford.edu/resources>) can be found on the IPS website.

## Area of Concentration Requirements:

1. Students must select an area of concentration during the first year of the program.
2. Students must complete a minimum of six courses within the area of concentration, including the gateway course, for a minimum total of 24 units.
3. Each course must be taken for a minimum of three units.
4. Students may petition to count two two-unit courses as one elective course within the area of concentration.
5. All coursework must be taken for a letter grade.
6. Students concentrating in International Political Economy are required to take IPS 202 Topics in International Macroeconomics for the international economics requirement and for the area of concentration gateway. They can select between IPS 204A Microeconomics and IPS 204B Cost-Benefit Analysis and Evaluation for the advanced economics requirement.
7. Students from any other area of concentration may fulfill the advanced economics requirement by taking IPS 204B Cost-Benefit Analysis and Evaluation only if they have a strong background in microeconomics.

<b>Democracy, Development, and Rule of Law Gateway Course: (5)</b>		5
IPS 230	Democracy, Development, and the Rule of Law	

## Energy, Environment, and Natural Resources Gateway Course: (3-5)

CEE 207A	Energy Resources	
<b>Global Health Gateway Course: (4)</b>		
HUMBIO 129S	Global Public Health	
<b>International Political Economy Gateway Course: (5)</b>		
IPE concentrators take IPS 202 as the international economics requirements and IPS 203 as the area of concentration gateway		
IPS 202	Topics in International Macroeconomics	
IPS 203	Issues in International Economics	
<b>International Security and Cooperation Gateway Course: (5)</b>		
IPS 241	International Security in a Changing World	

## Academic Policies

- All courses taken to fulfill requirements for the M.A. degree in International Policy Studies must be taken for a letter grade. The only exceptions are IPS 300 and IPS 200, which are only offered as "S/NC", or courses taken in the Law School, the School of Medicine, or the Graduate School of Business where a letter grade may not be offered. Pre-approval is required from the IPS student services officer in order to apply a non-letter grade course in Law, Medicine, or the Graduate School of Business toward the IPS degree.
- A maximum of 10 undergraduate units can be applied towards the IPS degree (not including ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists or ECON 102B Introduction to Econometrics). Courses listed at the 100-level or below are considered to be at the undergraduate level. The exceptions are History, Political Science, and Public Policy, which list undergraduate courses at the 200-level and below.
- Units from language courses do not count towards the IPS degree requirements, except in cases in which they are used to substitute for units that were made available through an exemption from a core course.
- Only students with two or more years of relevant policy work may petition to write a master's thesis (IPS 209A IPS Master's Thesis)
- Students are not required to repeat a course that covers material they have already mastered. In such cases, students may petition to substitute a different course for a core required course. This flexibility does not reduce the unit requirements for the M.A. degree.
- All graduate degree candidates must submit a Master's Degree Program Proposal to the International Policy Studies office by the end of Winter Quarter. This document must be on file in order for the student to apply to graduate.

## Course Petitions

Students may petition for units from a course that is not currently listed in the Related Course (p. 449)s tab to fulfill area of concentration requirements. A course petition may also be used to apply for an exemption from a core course that covers coursework previously completed at the graduate level. The course petition (<http://ips.stanford.edu/resources>) must be submitted no later than the end of the second week of the quarter in which the course is offered. The IPS Faculty Director reviews the petition and renders a decision within one week of the petition submission.

## Directed Readings

Students may arrange directed reading courses if the current course offerings do not meet particular research or study needs. Directed reading courses are independent study projects students may undertake with Stanford faculty members. Once the student has found a faculty member to support his or her studies, the student must submit the directed reading petition (<http://ips.stanford.edu/resources>) to the IPS office for review by the IPS Faculty Director. Directed reading petitions must be submitted no

later than the end of the second week of the quarter to allow sufficient time to for review. If approved, the IPS staff creates a section for the specific instructor so that the student can enroll in the course. The course is listed as IPS 299 Directed Reading and the section number is based on the particular instructor. The limitations for directed reading units are:

1. A maximum of five units per directed reading course
2. The course must be taken for a letter grade

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*Executive Committee Co-chairs:*

Gerhard Casper (Law, emeritus)

Norman Naimark (History)

*Executive Committee:*

Larry Diamond (Hoover Institution)

Nicholas C. Hope (Stanford Institute for Economic Policy Research)

Jenny Martinez (Law)

Norman Naimark (History)

Rosamond Naylor (Freeman Spogli Institute for International Studies)

Bruce Owen (Public Policy)

Julie Parsonnet (Medicine)

Frank Wolak (Economics)

*Affiliated Faculty:*

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Coit D. Blacker (Freeman Spogli Institute for International Studies, on leave)

Paul Brest (Law)

Jeremy Bulow (Economics)

Mary Kate Bundorf (Health Research and Policy)

Joshua Cohen (Political Science)

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Byron Bland (Law)

Steve Hilton (International Policy Studies)

Christine Jojarth (International Policy Studies)

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Anja Manuel (International Policy Studies)

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David Straub (Freeman Spogli Institute for International Studies)

Mark Thurber (Freeman Spogli Institute for International Studies)

Jane Woodward (Civil and Environmental Engineering)

*Visiting Faculty:*

David Cohen

Michael Karayanni

Lucan Way

## Area of Concentration Curriculum

The Ford Dorsey Program in International Policy Studies (IPS) offers five areas of concentration:

- [Democracy, Development and Rule of Law](#) (DDRL)
- [Energy, Environment, and Natural Resources](#) (EENR)
- [Global Health](#) (GH)
- [International Political Economy](#) (IPE)
- [International Security and Cooperation](#) (ISC)

Each concentration is guided by one or more of the major international research centers at Stanford. This collaboration provides IPS students with unparalleled exposure to cutting edge research on some of the most pressing policy issues of our time. Students are required to choose one area of concentration and complete a total of six courses within the concentration at a minimum of 24 total units. Each area of concentration requires the the completion of a gateway course (indicated on the Master’s tab), which must be taken during the first year and prior to enrolling in subsequent courses. Additionally, each area of concentration has a list of approved elective courses, as shown below. See the Master’s tab for information on how to petition to apply a course toward the area of concentration that is not included in the lists below.

### Democracy, Development and Rule of Law

		Units
AFRICAST 212	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AFRICAST 301A	The Dynamics of Change in Africa	4-5
BIOE 372	Design for Service Innovation	4
CEE 207A	Energy Resources	4-5
CEE 241A	Infrastructure Project Development	3
CEE 265D	Water and Sanitation in Developing Countries	1-3
CLASSGEN 354	Social Power: The Law and the State, a Comparative Study of Ancient Legal Systems	3-5
COMM 312	Models of Democracy	3-5
EARTHSYS 242	Remote Sensing of Land	4
EARTHSYS 281	Concepts of Urban Agriculture	3
ECON 216	Development Economics III	2-5
EDUC 224A	Social Entrepreneurship and Social Innovation	4
EDUC 306A	Economics of Education in the Global Economy	5
EDUC 377B	Strategic Management of Nonprofits	4

EESS 262	Remote Sensing of Land	4
EESS 281	Concepts of Urban Agriculture	3
EESS 318	Global Land Use Change to 2050	2-3
ETHICSOC 232T	Theories of Civil Society, Philanthropy, and the Nonprofit Sector	5
ETHICSOC 280	Transitional Justice, International Criminal Tribunals, and the International Criminal Court	3-5
HISTORY 378A	The Logic of Authoritarian Government, Ancient and Modern	5
HISTORY 379	Latin American Development: Economy and Society, 1800-2000	4-5
HRP 274	Design for Service Innovation	4
INTNLREL 142	Challenging the Status Quo: Social Entrepreneurs Advancing Democracy, Development and Justice	5
IPS 230	Democracy, Development, and the Rule of Law	5
IPS 234	Religion and Multiculturalism	3
IPS 235	From Innovation to Implementation: How Government Can Develop and Apply New Ideas	3-5
IPS 245	An Introduction to Theories of Authoritarian Resilience and Vulnerability	3-5
IPS 280	Transitional Justice, International Criminal Tribunals, and the International Criminal Court	3-5
ME 206A	Entrepreneurial Design for Extreme Affordability	4
ME 377	Design Thinking Bootcamp: Experiences in Innovation and Design	3-4
MED 262	Economics of Health Improvement in Developing Countries	5
MS&E 249	Economic Growth and Development	3
OIT 333	Entrepreneurial Design for Extreme Affordability	4
OIT 334	Entrepreneurial Design for Extreme Affordability	4
PHIL 271	Justice	4-5
PHIL 276	Political Philosophy: The Social Contract Tradition	4
POLISCI 136S	Justice	4-5
POLISCI 214G	International Political Economy and International Organizations: Theory and Practice	3-5
POLISCI 314D	Democracy, Development, and the Rule of Law	5
POLISCI 314R	Challenges and Dilemmas in American Foreign Policy	5
POLISCI 337T	Designing Liberation Technology	3-4
POLISCI 346P	The Dynamics of Change in Africa	4-5
POLISCI 348	Chinese Politics: The Transformation and the Era of Reform	5
POLISCI 440B	Political Economy of Development	5
PUBLPOL 302A	Introduction to American Law	3-5
PUBLPOL 307	Justice	4-5
REES 205	Central and East European Politics	5
REES 320	State and Nation Building in Central Asia	5
SOC 218	Social Movements and Collective Action	5
SOC 230	Education and Society	4-5
SOC 231	World, Societal, and Educational Change: Comparative Perspectives	4-5
SOC 240	Introduction to Social Stratification	5
SOC 314	Economic Sociology	4-5
SOC 370A	Sociological Theory: Social Structure, Inequality, and Conflict	5
STRAMGT 367	Social Entrepreneurship and Social Innovation	3
STRAMGT 368	Strategic Management of Nonprofit Organizations and Social Ventures	4
URBANST 137	Innovations in Microcredit and Development Finance	4

  

## Energy, Environment, and Natural Resources

		Units
BIO 247	Controlling Climate Change in the 21st Century	3
CEE 176A	Energy Efficient Buildings	3-4
CEE 207A	Energy Resources	4-5
CEE 224A	Sustainable Development Studio	1-5
CEE 241A	Infrastructure Project Development	3
CEE 263D	Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 265A	Sustainable Water Resources Development	3
CEE 265D	Water and Sanitation in Developing Countries	1-3
CEE 266D	Water Resources and Water Hazards Field Trips	2
CEE 272S	Green House Gas Mitigation	1-3
CEE 297M	Managing Critical Infrastructure Seminar	1-2
CLASSGEN 223	Urban Sustainability: Long-Term Archaeological Perspectives	3-5
EARTHSYS 106	World Food Economy	5
EARTHSYS 180B	Principles and Practices of Sustainable Agriculture	3-4
EARTHSYS 232	Energy and Climate Cooperation in the Western Hemisphere	4
EARTHSYS 242A	Negotiating Sustainable Development	3
EARTHSYS 247	Controlling Climate Change in the 21st Century	3
EARTHSYS 275	California Coast: Science, Policy, and Law	3-4
EARTHSYS 281	Concepts of Urban Agriculture	3
EARTHSYS 284	Climate and Agriculture	3-4
ECON 106	World Food Economy	5
ECON 216	Development Economics III	2-5
EESS 106	World Food Economy	5
EESS 180B	Principles and Practices of Sustainable Agriculture	3-4
EESS 281	Concepts of Urban Agriculture	3
EESS 284	Climate and Agriculture	3-4
ENERGY 291	Optimization of Energy Systems	3
ENVRES 380	Collaborating with the Future: Launching Large Scale Sustainable Transformations	3-4
FINANCE 335	Corporate Valuation, Governance and Behavior	4
GES 253	Petroleum Geology and Exploration	3
GSBGEN 532	Cleantech: Business Fundamentals and Public Policy	2
IPS 263	Energy and Climate Cooperation in the Western Hemisphere	4
ME 206A	Entrepreneurial Design for Extreme Affordability	4
ME 368	d.Leadership: Design Process Leadership	1-3
ME 380	Collaborating with the Future: Launching Large Scale Sustainable Transformations	3-4
MED 262	Economics of Health Improvement in Developing Countries	5
MS&E 248	Economics of Natural Resources	3-4
MS&E 295	Energy Policy Analysis	3
MS&E 491	Clean Energy Development	3

OIT 333	Entrepreneurial Design for Extreme Affordability	4
OIT 334	Entrepreneurial Design for Extreme Affordability	4
OIT 343	D-Lab: Design for Service Innovation	4
POLISCI 337T	Designing Liberation Technology	3-4
PSYCH 380	Collaborating with the Future: Launching Large Scale Sustainable Transformations	3-4
URBANST 114	Urban Culture in Global Perspective	5
URBANST 115	Urban Sustainability: Long-Term Archaeological Perspectives	3-5

## Global Health Electives

		Units
AFRICAST 151	AIDS in Africa	3
AFRICAST 212	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
BIO 102	Demography: Health, Development, Environment	3
BIO 146	Population Studies	1
BIOE 371	Global Biodesign: Medical Technology in an International Context	1-2
BIOMEDIN 256	Economics of Health and Medical Care	5
CEE 265D	Water and Sanitation in Developing Countries	1-3
EASTASN 217	Health and Healthcare Systems in East Asia	3-5
ECON 118	Development Economics	5
FEMST 129	Critical Issues in International Women's Health	4
GSBGEN 569	Online Financial Training for Managers and Entrepreneurs in Developing Economies	2
HISTORY 347E	Health and Society in Africa	4-5
HRP 207	Introduction to Concepts and Methods in Health Services and Policy Research I	2
HRP 208	Introduction to Concepts and Methods in Health Services and Policy Research II	2
HRP 212	Cross Cultural Medicine	3
HRP 231	Epidemiology of Infectious Diseases	3
HRP 256	Economics of Health and Medical Care	5
HUMBIO 119	Demography: Health, Development, Environment	3
HUMBIO 129S	Global Public Health	4
HUMBIO 153	Parasites and Pestilence: Infectious Public Health Challenges	4
IPS 235	From Innovation to Implementation: How Government Can Develop and Apply New Ideas	3-5
ME 206A	Entrepreneurial Design for Extreme Affordability	4
MS&E 256	Technology Assessment and Regulation of Medical Devices	1-3
MS&E 292	Health Policy Modeling	3
OIT 333	Entrepreneurial Design for Extreme Affordability	4
OIT 334	Entrepreneurial Design for Extreme Affordability	4
PEDS 222	Beyond Health Care: Seeking Health in Society	3
PUBLPOL 231	Health Care Regulation, Finance and Policy	3
SURG 231	Haiti and Healthcare	1

## International Political Economy

IPE concentrators will take IPS 202 as the international economics requirements and IPS 203 as the area of concentration gateway

		Units
IPS 202	Topics in International Macroeconomics (International Economics Requirement)	5
IPS 203	Issues in International Economics (IPE Gateway)	5

EARTHSYS 106	World Food Economy	5
EARTHSYS 232	Energy and Climate Cooperation in the Western Hemisphere	4
ECON 102C	Advanced Topics in Econometrics	5
ECON 106	World Food Economy	5
ECON 215	Economic Development	2-5
ECON 216	Development Economics III	2-5
ECON 242	Public Finance and Taxation II	2-5
ECON 246	Labor Economics I	2-5
ECON 251	Natural Resource and Energy Economics	2-5
ECON 252	Policy & Strategy Issues in Financial Engineering	2
ECON 265	International Economics I	2-5
ECON 266	International Economics II	2-5
ECON 267	Topics in International Trade	2-5
EDUC 224A	Social Entrepreneurship and Social Innovation	4
EESS 106	World Food Economy	5
FINANCE 221	Finance for Non-MBAs	3
FINANCE 324	Practical Corporate Finance	4
FINANCE 335	Corporate Valuation, Governance and Behavior	4
HISTORY 339D	Capital and Empire	4-5
HISTORY 379	Latin American Development: Economy and Society, 1800-2000	4-5
IPS 221A	Globalization and Its Discontents: An Introduction to International Political Economy	3-5
IPS 263	Energy and Climate Cooperation in the Western Hemisphere	4
LAW 285	International Trade Law	3
MED 262	Economics of Health Improvement in Developing Countries	5
MGTECON 591	Management Practices in Europe, the US and Emerging Markets	1
MS&E 242	Investment Science	3
MS&E 249	Economic Growth and Development	3
POLISCI 348	Chinese Politics: The Transformation and the Era of Reform	5
POLISCI 350A	Political Methodology I	5
POLISCI 351A	Foundations of Political Economy	4
POLISCI 352	Introduction to Game Theoretic Methods in Political Science	3-5
POLISCI 440B	Political Economy of Development	5
POLISCI 444	Comparative Political Economy: Advanced Industrial Societies	3-5
PUBLPOL 204	Economic Policy Analysis	4-5
PUBLPOL 303A	Political Methodology I	5
PUBLPOL 303B	Political Methodology II	5
PUBLPOL 364	Policy & Strategy Issues in Financial Engineering	2
SOC 214	Economic Sociology	5
SOC 231	World, Societal, and Educational Change: Comparative Perspectives	4-5
STRAMGT 353	Entrepreneurship: Formation of New Ventures	4
STRAMGT 367	Social Entrepreneurship and Social Innovation	3
STRAMGT 369	Social Entrepreneurship	4

## International Security and Cooperation

		Units
AFRICAST 301A	The Dynamics of Change in Africa	4-5
COMM 312	Models of Democracy	3-5
EARTHSYS 232	Energy and Climate Cooperation in the Western Hemisphere	4
EARTHSYS 251	Biological Oceanography	3-4
ECON 252	Policy & Strategy Issues in Financial Engineering	2
ENGLISH 172D	Introduction to Comparative Studies in Race and Ethnicity	5
ETHICSOC 280	Transitional Justice, International Criminal Tribunals, and the International Criminal Court	3-5
HISTORY 103E	History of Nuclear Weapons	5
HISTORY 106C	Global Historical Geography	5
HISTORY 304G	War and Society	5
HISTORY 306E	International History and International Relations Theory	5
HISTORY 327	East European Women and War in the 20th Century	4-5
HISTORY 330F	Self-Policing, Denunciation, and Surveillance in Modern Europe	4-5
HISTORY 339D	Capital and Empire	4-5
HISTORY 355	Decision Making in International Crises: The A-Bomb, the Korean War, and the Cuban Missile Crisis	4-5
HISTORY 391E	Maps, Borders, and Conflict in East Asia	4-5
HISTORY 481	Research Seminar in Middle East History	4-5
INTNLREL 110D	War and Peace in American Foreign Policy	5
INTNLREL 140C	The U.S., U.N. Peacekeeping, and Humanitarian War	5
IPS 219	Intelligence and National Security	3-4
IPS 230	Democracy, Development, and the Rule of Law	5
IPS 234	Religion and Multiculturalism	3
IPS 235	From Innovation to Implementation: How Government Can Develop and Apply New Ideas	3-5
IPS 244	U.S. Policy toward Northeast Asia	5
IPS 245	An Introduction to Theories of Authoritarian Resilience and Vulnerability	3-5
IPS 263	Energy and Climate Cooperation in the Western Hemisphere	4
IPS 280	Transitional Justice, International Criminal Tribunals, and the International Criminal Court	3-5
IPS 314S	Decision Making in U.S. Foreign Policy	5
JEWISHST 287S	Research Seminar in Middle East History	4-5
JEWISHST 481	Research Seminar in Middle East History	4-5
MS&E 293	Technology and National Security	3
PHIL 271	Justice	4-5
PHIL 287	Philosophy of Action	4
POLISCI 110Y	War and Peace in American Foreign Policy	5
POLISCI 136S	Justice	4-5
POLISCI 149S	Islam, Iran, and the West	5
POLISCI 215	Explaining Ethnic Violence	5
POLISCI 314D	Democracy, Development, and the Rule of Law	5
POLISCI 314R	Challenges and Dilemmas in American Foreign Policy	5

POLISCI 314S	Decision Making in U.S. Foreign Policy	5
POLISCI 337T	Designing Liberation Technology	3-4
POLISCI 346P	The Dynamics of Change in Africa	4-5
POLISCI 352	Introduction to Game Theoretic Methods in Political Science	3-5
PSYCH 155	Introduction to Comparative Studies in Race and Ethnicity	5
PSYCH 215	Mind, Culture, and Society	3
PSYCH 245	Social Psychological Perspectives on Stereotyping and Prejudice	3
PSYCH 383	International Conflict: Management and Resolution	3
PUBLPOL 307	Justice	4-5
PUBLPOL 364	Policy & Strategy Issues in Financial Engineering	2
REES 320	State and Nation Building in Central Asia	5
SOC 146	Introduction to Comparative Studies in Race and Ethnicity	5
SOC 218	Social Movements and Collective Action	5
SOC 240	Introduction to Social Stratification	5
SOC 245	Race and Ethnic Relations in the USA	5
SOC 310	Political Sociology	4-5

## International Relations

Courses offered by the Program in International Relations are listed under the subject code INTNLREL on the Stanford Bulletin's ExploreCourses web site.

The Program in International Relations offers an undergraduate Bachelor of Arts program, an honors program, and a minor in International Relations.

## Mission of the Undergraduate Program in International Relations

The undergraduate program in International Relations is an interdisciplinary undergraduate major allowing students to explore how global, regional and domestic factors influence relations between actors on the world stage. The program equips students with the skills and knowledge necessary to analyze choices and challenges that arise in this arena. IR majors pursue study in world politics, including courses in political science, economics, history, and language, focusing on issues such as international security, political economy, economic development, and democratization. Students must spend at least one quarter overseas. The major prepares students for careers in government and the corporate sector, and for admission into graduate programs in law, business, economics, and political science.

## Learning Outcomes (Undergraduate)

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in International Relations. Students are expected to demonstrate:

1. understanding of core knowledge necessary to understand contemporary world politics.

2. ability to analyze international issues and draw correct inferences using qualitative and/or quantitative analysis.
3. ability to write clearly and persuasively, communicating ideas clearly.
4. ability to evaluate theory and critique research within the discipline.

## Coterminal Programs in Related Fields

It is possible for students majoring in International Relations to work simultaneously for a coterminal master's degree in a number of related fields. Coterminal students should consult advisers in both departments or programs to ensure that they fulfill the degree requirements in both fields. For information on the M.A. program in International Policy Studies, see the "International Policy Studies (p. 446)" section in this bulletin. University requirements for the coterminal M.A. are described in the "Coterminal Degree (p. 36)s" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Honors Program

The International Relations honors program offers qualified students the opportunity to conduct a major independent research project under faculty guidance. Such a project requires a high degree of initiative and dedication, significant amounts of time and energy, and demonstrated skills in research and writing.

In their junior year, students should consult with prospective honors advisers, choose the courses that provide academic background in their areas of inquiry, and demonstrate an ability to conduct independent research. Students can also select to complete an Interdisciplinary honors thesis with other programs on campus.

Prerequisites for participation include a 3.5 grade point average (GPA), a strong overall academic record, good academic standing, successful experience in writing a research paper, and submission of an acceptable thesis proposal. Students should submit their honors thesis proposal late in Winter Quarter of the junior year; please check with IR office for the exact deadline. Students are required to enroll in INTNLREL 200A International Relations Honors Field Research, in Spring Quarter of their junior year and should consider participating in Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)). In their senior year, honors students must enroll in INTNLREL 200B International Relations Honors Seminar in Autumn Quarter and in research units each quarter with their faculty adviser. Honors students present a formal defense of their theses in mid-May. Students must receive at least a grade of 'B+' in order to graduate with honors in International Relations.

## Bachelor of Arts in International Relations

The International Relations major must be declared by the end of the sophomore year. Students must submit an acceptable major proposal to the Director of the Program in International Relations and declare IR on Axess. Students completing a double major, or fulfilling International Relations as a secondary major, are also required to file a proposal by the end of the second quarter of the junior year.

Students majoring in International Relations must complete a minimum of 70 units (35 units of Core Courses as well as 35 units of Specialization Courses). Students who declared the major prior to September 1, 2012 should consult the Stanford Bulletin for the year in which they submitted their declaration. Requirements for students declaring the major after September 1, 2012 are as follows:

## Core Courses (35 units):

	Units
<b>Required Courses: (35)</b>	
International Politics:	5
POLISCI 1 Introduction to International Relations	
American Foreign Policy (Select one of the following):	5
POLISCI 110C America and the World Economy	
POLISCI 110D War and Peace in American Foreign Policy	
Introductory Economics (Select two of the following):	10
ECON 1A Introductory Economics A	
ECON 1B Introductory Economics B	
ECON 50 Economic Analysis I	
ECON 51 Economic Analysis II	
ECON 52 Economic Analysis III	
Comparative Governance (Select one of the following):	5
POLISCI 4 Introduction to Comparative Politics	
HISTORY 102 The History of the International System since 1914	
Skills Classes (Select one of the following):	5
ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists	
STATS 60 Introduction to Statistical Methods: Precalculus	
Applied Economics Courses (Select one of the following):	5
INTNLREL 149 The Economics and Political Economy of the Multilateral Trade System	
ECON 106 World Food Economy	
ECON 111 Money and Banking	
ECON 118 Development Economics	
ECON 123 Regulation and Competition in Less Developed Countries	
ECON 126 Economics of Health and Medical Care	
ECON 127 Economics of Health Improvement in Developing Countries	
ECON 150 Economic Policy Analysis	
ECON 164 Law, Economics and Politics of International Trade	
ECON 165 International Finance	
ECON 166 International Trade	
IPS 202 Topics in International Macroeconomics	
IPS 203 Issues in International Economics	
IPS 207 Governance, Corruption, and Development	
OSPBEIJ 75 China in the Global Economy	
OSPPARIS 124X Building the European Economy: Economic Policies and Challenges Ahead	
OSPSANTG 130X The Chilean Economy in Comparative Perspective	
POLISCI 110C America and the World Economy	
PUBLPOL 184 Poverty and Policies in Developing Economies	
POLISCI 218S Political Economy of International Trade and Investment	
SOC 114 Economic Sociology	
<b>Total Units</b>	<b>35</b>

## Specialization Courses (35 units):

The nine specializations are:

1. Africa
2. East and South Asia
3. Europe
4. Latin America and Iberian Studies
5. MECA (Middle East and Central Asia)
6. Comparative International Governance
7. Economic Development/World Economy
8. International Security
9. Social Development/Human Well-Being

Students must complete a total of 35 units (usually seven courses) in their primary and secondary specializations. Twenty units must be from the student's primary specialization; fifteen units from the secondary specialization. Specializations are not declared on Axess nor are they printed on the diploma or transcript.

The following courses are approved for each functional specialization.

### Africa

		Units
AFRICAST 112	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 145B	Africa in the 20th Century	5
HISTORY 248S	African Societies and Colonial States, Part 1	4-5
OSPCPTWN 31	Theory and Politics of Foreign Aid	3
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPCPTWN 38	Genocide: The African Experience	3-5
OSPCPTWN 68	Cities in the 21st Century: Urbanization, Globalization and Security	4
POLISCI 246P	The Dynamics of Change in Africa	4-5

### East and South Asia

		Units
ANTHRO 149	South Asia: History, People, Politics	5
EASTASN 189K	Changing North Korean Society	3
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 195	Modern Korean History	5
HISTORY 195C	Modern Japanese History: From Samurai to Pokemon	5
HISTORY 198	The History of Modern China	5
HISTORY 291E	Maps, Borders, and Conflict in East Asia	4-5
HISTORY 292D	Japan in Asia, Asia in Japan	4-5
HISTORY 292G	Modern Korea	4-5
HISTORY 295J	Chinese Women's History	5
IPS 244	U.S. Policy toward Northeast Asia	5
IPS 264	Behind the Headlines: An Introduction to Contemporary South Asia	3-5
JAPANGEN 51	Japanese Business Systems	3-5
OSPBEIJ 41	Chinese Society and Business Culture	4
OSPBEIJ 42	Chinese Media Studies	4
OSPBEIJ 55	Chinese Economy in Transition	5

OSPBEIJ 67	China-Africa and Middle East Relations	4
OSPBEIJ 75	China in the Global Economy	5
OSPKYOTO 15	Postwar Japanese Society	4-5
OSPKYOTO 60	Japan in World War II: Experiences and Memory	4-5
OSPKYOTO 215X	The Political Economy of Japan	4-5
POLISCI 140L	China in World Politics	5
POLISCI 148	Chinese Politics: The Transformation and the Era of Reform	5
POLISCI 211P	International Security in South Asia: Pakistan, India and the United States.	5
POLISCI 218J	Japanese Politics and International Relations	5
POLISCI 243E	Political Economy of Development in Rural India	5
RELIGST 119	Gandhi and His Legacy: Violence and Nonviolence	4-5

### Europe

		Units
FRENCH 120	Coffee and Cigarettes: The Making of French Intellectual Culture	4-5
FRENCH 132	Literature, Revolutions, and Changes in 19th- and 20th-Century France	4
FRENCH 235	Nation in Motion: Film, Race, and Immigration in Contemporary French Cinema	3-5
GERMAN 120Q	Contemporary Politics in Germany	3
HISTORY 221B	The Woman Question in Modern Russia	5
HISTORY 227	East European Women and War in the 20th Century	4-5
ILAC 130	Introduction to Iberia: Cultural Perspectives	3-5
ILAC 136	Modern Iberian Literatures	3-5
INTNLREL 122A	The Political Economy of the European Union	5
ITALIAN 129	Modern Italian History and Literature	4
ITALIAN 155	The Mafia in Society, Film, and Fiction	3-5
OSPBER 15	Shifting Alliances? The European Union and the U.S.	4-5
OSPBER 70	The Long Way to the West: German History from the 18th Century to the Present	4-5
OSPBER 115X	The German Economy: Past and Present	4-5
OSPBER 126X	A People's Union? Money, Markets, and Identity in the EU	4-5
OSPBER 161X	The German Economy in the Age of Globalization	4-5
OSPBER 174	Sports, Culture, and Gender in Comparative Perspective	5
OSPBER 177A	Culture and Politics in Modern Germany	4-5
OSPFLO 35	European Economic and Monetary Integration	5
OSPFLO 49	The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema	5
OSPFLO 51	Italian Foreign Policy and the Global Players	5
OSPFLO 78	An Extraordinary Experiment: Politics and Policies of the New European Union	5
OSPFLO 79	Migration, Media and Identity in Italy	5
OSPMADR 42	A European Model of Democracy: The Case of Spain	5
OSPMADR 54	Contemporary Spanish Economy and the European Union	5
OSPMADR 57	Health Care: A Contrastive Analysis between Spain and the U.S.	5
OSPMADR 61	Society and Cultural Change: The Case of Spain	5
OSPMADR 72	Issues in Bioethics Across Cultures	5

OSPMADRD 74	Islam in Spain and Europe: 1300 Years of Contact	5
OSPMOSC 62	Economic Reform and Economic Policy in Modern Russia	5
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5
OSPOXFRD 18	Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics	4-5
OSPOXFRD 24	British and American Constitutional Systems in Comparative Perspective	4-5
OSPOXFRD 35	Modern UK and European Government and Politics	4-5
OSPOXFRD 45	British Economic Policy since World War II	5
OSPOXFRD 92	Britain and the Second World War	5
OSPOXFRD 117W	Gender and Social Change in Modern Britain	4-5
OSPPARIS 29	Colonization, Decolonization and Immigration in France	5
OSPPARIS 32	Understanding French Politics	4-5
OSPPARIS 74	Climate Change Challenges in France and Europe: from Project to Policy	4
OSPPARIS 81	France During the Second World War: Between History and Memory	5
OSPPARIS 91	Globalization and Its Effect on France and the European Union	5
OSPPARIS 122X	Challenges of Integration in the European Union	4-5
OSPPARIS 124X	Building the European Economy: Economic Policies and Challenges Ahead	5
OSPPARIS 153X	Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time	5
POLISCI 142B	British Politics	5

## Latin American and Iberian Studies

		Units
COMPLIT 142	The Literature of the Americas	5
HISTORY 275B	Governance, Resistance, and Identity in Modern Mexico	5
ILAC 130	Introduction to Iberia: Cultural Perspectives	3-5
ILAC 131	Introduction to Latin America: Cultural Perspectives	3-5
ILAC 136	Modern Iberian Literatures	3-5
ILAC 193Q	Spaces and Voices of Brazil through Film	3-4
ILAC 225E	Theater, Society, and Politics in 20th-Century Spain	3-5
ILAC 257	Dictatorships in Latin America through testimonies and film	3-5
OSPMADRD 42	A European Model of Democracy: The Case of Spain	5
OSPMADRD 54	Contemporary Spanish Economy and the European Union	5
OSPMADRD 57	Health Care: A Contrastive Analysis between Spain and the U.S.	5
OSPMADRD 61	Society and Cultural Change: The Case of Spain	5
OSPMADRD 72	Issues in Bioethics Across Cultures	5
OSPMADRD 74	Islam in Spain and Europe: 1300 Years of Contact	5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 119X	The Chilean Economy: History, International Relations, and Development Strategies	5

OSPSANTG 129X	Latin America in the International System	4-5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5
POLISCI 244P	Religion and Politics in Latin America	5
POLISCI 248L	Political-Economy of Crime and Violence in Latin America	5

## MECA (Middle East and Central Asia)

		Units
COMPLIT 121	Poems, Poetry, Worlds: The Origins, Evolution, and Migration of the Ghazal	5
HISTORY 181B	Formation of the Contemporary Middle East	5
HISTORY 187	The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan	5
HISTORY 224A	The Soviet Civilization	4-5
HISTORY 246C	Islam and Christianity in Africa	4-5
HISTORY 288	Palestine and the Arab-Israeli Conflict	4-5
INTNLREL 151	Decoding the Arab Spring and the Future of the Middle East	5
POLISCI 118P	U.S. Relations in Iran	5
POLISCI 149S	Islam, Iran, and the West	5
POLISCI 245R	Politics in Modern Iran	5
RELIGST 102	Modern Islam	5

## Comparative International Governance

		Units
COMPLIT 147B	From Greece to Tahrir Square: The Rhetoric of Democracy	3-5
INTNLREL 114D	Democracy, Development, and the Rule of Law	5
INTNLREL 122A	The Political Economy of the European Union	5
INTNLREL 140A	International Law and International Relations	5
INTNLREL 140C	The U.S., U.N. Peacekeeping, and Humanitarian War	5
INTNLREL 149	The Economics and Political Economy of the Multilateral Trade System	5
IPS 207	Governance, Corruption, and Development	3-5
IPS 210	The Politics of International Humanitarian Action	3-5
IPS 211	The Transition from War to Peace: Peacebuilding Strategies	3-5
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPMADRD 42	A European Model of Democracy: The Case of Spain	5
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPOXFRD 18	Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics	4-5
OSPOXFRD 24	British and American Constitutional Systems in Comparative Perspective	4-5
OSPOXFRD 35	Modern UK and European Government and Politics	4-5
OSPOXFRD 45	British Economic Policy since World War II	5
OSPPARIS 32	Understanding French Politics	4-5



OSPPARIS 91	Globalization and Its Effect on France and the European Union	5
OSPPARIS 122X	Challenges of Integration in the European Union	4-5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 129X	Latin America in the International System	4-5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5
POLISCI 147	Comparative Democratic Development	5

## Economic Development/World Economy

		Units
ECON 106	World Food Economy	5
ECON 111	Money and Banking	5
ECON 116	American Economic History	5
ECON 118	Development Economics	5
ECON 123	Regulation and Competition in Less Developed Countries	5
ECON 127	Economics of Health Improvement in Developing Countries	5
ECON 150	Economic Policy Analysis	4-5
ECON 155	Environmental Economics and Policy	5
ECON 164	Law, Economics and Politics of International Trade	5
ECON 165	International Finance	5
ECON 166	International Trade	5
HISTORY 234K	Economic Miracles? Crisis and Recovery in Modern Europe	5
INTNLREL 122A	The Political Economy of the European Union	5
INTNLREL 123	The Future of the European Union: Challenges and Opportunities	5
INTNLREL 149	The Economics and Political Economy of the Multilateral Trade System	5
IPS 202	Topics in International Macroeconomics	5
IPS 203	Issues in International Economics	5
JAPANGEN 51	Japanese Business Systems	3-5
OSPBEIJ 75	China in the Global Economy	5
OSPBER 115X	The German Economy: Past and Present	4-5
OSPBER 161X	The German Economy in the Age of Globalization	4-5
OSPFLOR 35	European Economic and Monetary Integration	5
OSPFLOR 78	An Extraordinary Experiment: Politics and Policies of the New European Union	5
OSPKYOTO 215X	The Political Economy of Japan	4-5
OSPMOSC 62	Economic Reform and Economic Policy in Modern Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5
OSPOXFRD 45	British Economic Policy since World War II	5
OSPPARIS 91	Globalization and Its Effect on France and the European Union	5
OSPPARIS 122X	Challenges of Integration in the European Union	4-5
OSPPARIS 124X	Building the European Economy: Economic Policies and Challenges Ahead	5

OSPSANTG 119X	The Chilean Economy: History, International Relations, and Development Strategies	5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5
POLISCI 110C	America and the World Economy	5
POLISCI 140L	China in World Politics	5
POLISCI 218S	Political Economy of International Trade and Investment	5
POLISCI 243L	Politics of Economic Reform	5
POLISCI 248L	Political-Economy of Crime and Violence in Latin America	5
PUBLPOL 184	Poverty and Policies in Developing Economies	5
POLISCI 247G	Governance and Poverty	5
SOC 114	Economic Sociology	5

## International Security

		Units
HISTORY 102	The History of the International System since 1914	5
HISTORY 103E	History of Nuclear Weapons	5
HISTORY 103F	Introduction to Military History	5
HISTORY 138A	Germany and the World Wars, 1870-1990	5
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 158	The United States Since 1945	4-5
HISTORY 202	International History and International Relations Theory	5
HISTORY 256	U.S.-China Relations: From the Opium War to Tiananmen	4-5
INTNLREL 154	The Cold War: An International History	5
INTNLREL 168	America as a World Power: U.S. Foreign Relations, 1914 to Present	5
INTNLREL 173	Presidents and Foreign Policy in Modern History	5
IPS 211	The Transition from War to Peace: Peacebuilding Strategies	3-5
IPS 219	Intelligence and National Security	3-4
IPS 244	U.S. Policy toward Northeast Asia	5
MS&E 193	Technology and National Security	3
OSPBEIJ 67	China-Africa and Middle East Relations	4
OSPBER 15	Shifting Alliances? The European Union and the U.S.	4-5
OSPFLOR 51	Italian Foreign Policy and the Global Players	5
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5
POLISCI 110D	War and Peace in American Foreign Policy	5
POLISCI 114S	International Security in a Changing World	5
POLISCI 116	History of Nuclear Weapons	5
POLISCI 140L	China in World Politics	5
POLISCI 149S	Islam, Iran, and the West	5
POLISCI 211P	International Security in South Asia: Pakistan, India and the United States.	5
POLISCI 213S	A Post American Century? American Foreign Policy in a Multi-unipolar World	5
POLISCI 214R	Challenges and Dilemmas in American Foreign Policy	5
POLISCI 215F	Nuclear Weapons and International Politics	5
POLISCI 216E	International History and International Relations Theory	5
POLISCI 218T	Terrorism	5

## Social Development and Human Well-Being

		Units
AFRICAST 112	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
BIO 147	Controlling Climate Change in the 21st Century	3
COMPLIT 147B	From Greece to Tahrir Square: The Rhetoric of Democracy	3-5
ECON 155	Environmental Economics and Policy	5
EDUC 136	World, Societal, and Educational Change: Comparative Perspectives	4-5
HISTORY 103D	Human Society and Environmental Change	4
HISTORY 105C	Human Trafficking: Historical, Legal, and Medical Perspectives	5
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 206	History and Geography of Contemporary Global Issues	5
HISTORY 221B	The Woman Question in Modern Russia	5
HISTORY 224C	Genocide and Humanitarian Intervention	3
HISTORY 227	East European Women and War in the 20th Century	4-5
HISTORY 295J	Chinese Women's History	5
HUMBIO 129	Critical Issues in International Women's Health	4
HUMBIO 129S	Global Public Health	4
INTNLREL 114D	Democracy, Development, and the Rule of Law	5
INTNLREL 140C	The U.S., U.N. Peacekeeping, and Humanitarian War	5
INTNLREL 141A	Camera as Witness: International Human Rights Documentaries	5
INTNLREL 154	The Cold War: An International History	5
IPS 210	The Politics of International Humanitarian Action	3-5
OSPBEIJ 41	Chinese Society and Business Culture	4
OSPBEIJ 42	Chinese Media Studies	4
OSPPER 174	Sports, Culture, and Gender in Comparative Perspective	5
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPCPTWN 38	Genocide: The African Experience	3-5
OSPCPTWN 68	Cities in the 21st Century: Urbanization, Globalization and Security	4
OSPFLO 79	Migration, Media and Identity in Italy	5
OSPMADRD 57	Health Care: A Contrastive Analysis between Spain and the U.S.	5
OSPMADRD 61	Society and Cultural Change: The Case of Spain	5
OSPMADRD 72	Issues in Bioethics Across Cultures	5
OSPOXFRD 117W	Gender and Social Change in Modern Britain	4-5
OSPPARIS 29	Colonization, Decolonization and Immigration in France	5
OSPPARIS 81	France During the Second World War: Between History and Memory	5
OSPPARIS 153X	Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time	5
PHIL 171	Justice	4-5
RELIGST 102	Modern Islam	5
STS 110	Ethics and Public Policy	5

## Additional Policies/Requirements:

- At least one course must be an upper-division seminar or colloquium.
- At least one writing intensive course designated as Writing in the Major (WIM) for International Relations.
- No more than 25 units can be lower-division courses.
- All courses must be taken for a letter grade, and a minimum grade of 'C' is required for courses to count towards major requirements.
- Completion of one quarter study overseas either through the Stanford Overseas Studies Program or an approved non-Stanford program; non-Stanford programs must be pre-approved by the IR program before the student enrolls in the program.
- All IR majors must demonstrate proficiency in a foreign language by either completing two years of course work (second-year, third-quarter) or passing a proficiency exam. Foreign language units do not count towards the major.
- Upon approval, a maximum of 15 non-Stanford units may be applied to the major for credit.

## Independent Study/Honors

		Units
INTNLREL 197	Directed Reading in International Relations	1-5
INTNLREL 198	Senior Thesis	2-10
INTNLREL 200A	International Relations Honors Field Research	3
INTNLREL 200B	International Relations Honors Seminar	3

## Minor in International Relations

A minor in International Relations is intended to provide an interdisciplinary background allowing a deeper understanding of contemporary international issues. Declaration of the minor must take place no later than the end of the second quarter of the junior year. To declare, complete the application for a minor on Axess.

Students complete the minor by taking 35 units (that do not duplicate with your major) from the IR curriculum, including the following:

	Units
<b>Required Courses: (35)</b>	
International Politics	5
POLISCI 1 Introduction to International Relations	
American Foreign Policy (Select one of the following):	5
POLISCI 110C America and the World Economy	
POLISCI 110D War and Peace in American Foreign Policy	
Upper Division Specialization Courses (25 units)	25
<b>Total Units</b>	<b>35</b>

Complete at least 25 units in one of the following specializations:

- Africa
- East and South Asia
- Europe, Latin America, and Iberian Studies
- MECA (Middle East and Central Asia)
- Comparative International Governance
- Economic Development/World Economy

- International Security
- Social Development and Human Well-Being

*Director:* Michael Tomz (Political Science)

*Faculty Committee:* Kyle Bagwell (Economics), Judith L. Goldstein (Political Science), Norman Naimark (History), Kenneth Schultz (Political Science), Kenneth Scheve (Political Science), Kathryn Stoner (Freeman Spogli Institute)

*Affiliated Faculty:* Lisa Blaydes (Political Science), Gordon Chang (History), Joshua Cohen (Political Science), Larry J. Diamond (Hoover Institution), Amir Eshel (German Studies), James Fearon (Political Science), Zephyr Frank (History), Lawrence H. Goulder (Economics), Stephen H. Haber (Political Science), David J. Holloway (History, Political Science), Karen Jusko (Political Science), Terry L. Karl (Political Science), Stephen D. Krasner (Political Science), Philip Lipsky (Political Science), Beatriz Magaloni (Political Science), Robert McGinn (Management Science and Engineering), Norman Naimark (History), Rosamond Naylor (Freeman Spogli Institute for International Studies), Jean C. Oi (Political Science), William J. Perry (Freeman Spogli Institute for International Studies, Management Science and Engineering), Richard Roberts (History), Jonathan Rodden (Political Science), Scott Sagan (Political Science), Debra M. Satz (Philosophy), Andrew Walder (Sociology), Amir Weiner (History), Jeremy Weinstein (Political Science)

*Other Affiliation:* Jasmina Bojic (International Relations), Christophe Crombez (Freeman Spogli Institute for International Studies), John Dunlop (Hoover Institution), Erica Gould (International Relations), Katherine Jolluck (History), Anjini Kochar (Stanford Institute for Economic Policy Research), Martin W. Lewis (History), Pawel Lutomski (International Relations), Emad Mekay (International Relations), Alice Lyman Miller (Hoover Institution), Bertrand Patenaude (Hoover Institution), Robert Rakove (International Relations), Miriam Abu Sharkh (CIEPR), Stephen Stedman (Political Science), Richard Steinberg (International Comparative and Area Studies), Kathryn Stoner (Freeman Spogli Institute for International Studies)

## Overseas Studies Courses in International Relations

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/internationalrelations/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/internationalrelations/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/internationalrelations/http://bosp.stanford.edu>).

		Units
OSPBEIJ 41	Chinese Society and Business Culture	4
OSPBEIJ 42	Chinese Media Studies	4
OSPBEIJ 55	Chinese Economy in Transition	5
OSPBEIJ 67	China-Africa and Middle East Relations	4
OSPBEIJ 75	China in the Global Economy	5
OSPBER 15	Shifting Alliances? The European Union and the U.S.	4-5

OSPBER 70	The Long Way to the West: German History from the 18th Century to the Present	4-5
OSPBER 78	Identity on the Move: Migrating From, In, and To Germany	4-5
OSPBER 115X	The German Economy: Past and Present	4-5
OSPBER 126X	A People's Union? Money, Markets, and Identity in the EU	4-5
OSPBER 161X	The German Economy in the Age of Globalization	4-5
OSPBER 174	Sports, Culture, and Gender in Comparative Perspective	5
OSPBER 177A	Culture and Politics in Modern Germany	4-5
OSPCPTWN 31	Theory and Politics of Foreign Aid	3
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPCPTWN 33	From Apartheid to Democracy: Namibia and South Africa	4
OSPCPTWN 38	Genocide: The African Experience	3-5
OSPCPTWN 68	Cities in the 21st Century: Urbanization, Globalization and Security	4
OSPFLOR 35	European Economic and Monetary Integration	5
OSPFLOR 49	The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema	5
OSPFLOR 51	Italian Foreign Policy and the Global Players	5
OSPFLOR 78	An Extraordinary Experiment: Politics and Policies of the New European Union	5
OSPFLOR 79	Migration, Media and Identity in Italy	5
OSPKYOTO 15	Postwar Japanese Society	4-5
OSPKYOTO 60	Japan in World War II: Experiences and Memory	4-5
OSPKYOTO 215X	The Political Economy of Japan	4-5
OSPMADRD 42	A European Model of Democracy: The Case of Spain	5
OSPMADRD 54	Contemporary Spanish Economy and the European Union	5
OSPMADRD 57	Health Care: A Contrastive Analysis between Spain and the U.S.	5
OSPMADRD 61	Society and Cultural Change: The Case of Spain	5
OSPMADRD 72	Issues in Bioethics Across Cultures	5
OSPMADRD 74	Islam in Spain and Europe: 1300 Years of Contact	5
OSPMOSC 62	Economic Reform and Economic Policy in Modern Russia	5
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5
OSPOXFRD 18	Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics	4-5
OSPOXFRD 24	British and American Constitutional Systems in Comparative Perspective	4-5
OSPOXFRD 35	Modern UK and European Government and Politics	4-5
OSPOXFRD 45	British Economic Policy since World War II	5
OSPOXFRD 92	Britain and the Second World War	5
OSPOXFRD 117W	Gender and Social Change in Modern Britain	4-5
OSPPARIS 29	Colonization, Decolonization and Immigration in France	5
OSPPARIS 32	Understanding French Politics	4-5
OSPPARIS 74	Climate Change Challenges in France and Europe: from Project to Policy	4

OSPPARIS 81	France During the Second World War: Between History and Memory	5
OSPPARIS 91	Globalization and Its Effect on France and the European Union	5
OSPPARIS 122X	Challenges of Integration in the European Union	4-5
OSPPARIS 124X	Building the European Economy: Economic Policies and Challenges Ahead	5
OSPPARIS 153X	Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time	5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 119X	The Chilean Economy: History, International Relations, and Development Strategies	5
OSPSANTG 129X	Latin America in the International System	4-5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5

## Jewish Studies

The Taube Center for Jewish Studies investigates all aspects of Jewish culture, history, religion, literature, language and education from biblical times to the present. Courses are offered on the undergraduate and graduate levels in a program complemented by a full range of guest lectures, conferences, and symposia. The Center annually sponsors the Donald and Robin Kennedy Undergraduate Award for the best undergraduate essay on any theme in Jewish Studies, the Dr. Bernard Kaufman Undergraduate Research Award in Jewish Studies awarded to an undergraduate engaged in research on Jews in modernity, and the Koret Award for best essay written in Hebrew by an undergraduate.

Graduate students must apply and enroll in the program through the departments of English, History, Comparative Literature, Religious Studies, or the School of Education, and meet the requirements of those departments. All graduate students in the university with an academic interest in Jewish Studies are encouraged to participate in the Colloquium for Jews, Judaism and Jewish Culture, an ongoing opportunity to share work and meet with faculty and visiting scholars. For more information about graduate studies in Jewish Studies, please contact the Center manager or Director.

## Undergraduate Program in Jewish Studies

An undergraduate program in Jewish Studies is offered through Comparative Studies in Race and Ethnicity (CSRE) (p. 340). It is interdisciplinary in that it draws together a wide range of disciplines including history, literary studies, religious studies, gender studies, education and other fields. Through its courses and extra-curricular programs, the Taube Center seeks to introduce students to the ideas and experience of the Jewish people over its entire history, from the biblical period to the Holocaust and contemporary Israeli culture.

Undergraduates interested in completing a major or minor in Jewish Studies should visit the Comparative Studies in Race and Ethnicity (CSRE) (p. 340) section of this bulletin for program descriptions and courses.

*Director:* Steven Weitzman (Religious Studies)

*Affiliated Faculty and Teaching Staff:* Zachary Baker (Stanford University Libraries), Joel Beinin (History), Jonathan Berger (Music), Arnold Eisen (Religious Studies, emeritus), Amir Eshel (German Studies), John Felstiner (English, emeritus), Shelley Fisher Fishkin (English), Charlotte Fonrobert

(Religious Studies), Avner Greif (Economics), Katherine Jolluck (History), Ari Kelman (Education), Jon Levitow (Language Center), Mark Mancall (History, emeritus), Norman Naimark (History), Reviel Netz (Classics), Jack Rakove (History), Aron Rodrigue (History), Gabriella Safran (Slavic Languages and Literatures), Vered KartiShemtov (Language Center, Comparative Literature), Lee Shulman (Education, emeritus), Peter Stansky (History, emeritus), Amir Weiner (History), Sam Wineburg (Education), Steven Zipperstein (History)

*Hebrew Instructional Staff:* Gallia Porat, Estee Greif

*Visiting Faculty:* Arie Dubnov (History)

*Writer in Residence:* Maya Arad

## Language Center

The Stanford Language Center oversees all language instruction at Stanford. The center's charge is to guarantee that Stanford language programs are of the highest quality; to develop and administer achievement and proficiency tests needed to implement the language requirement; to provide technical assistance and support to the graduate students, lecturers, and faculty who deliver Stanford's language instruction; and to take leadership in research and development efforts in language learning. The Language Center is a unit within the Division of Literatures, Cultures, and Languages (p. 340).

## Courses

Courses offered by the Language Center are listed under the following subject codes on the Stanford Bulletin's ExploreCourses web site:

- AMELANG (African and Middle Eastern Languages and Literatures) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AMELANG&filter-catalognumber-AMELANG=on>)
- ARABLANG (Arabic Language) (<https://explorecourses.stanford.edu/search?view=catalog&catalog=71&page=0&q=ARABLANG&filter-catalognumber-ARABLANG=on&filter-coursestatus-Active=on>)
- CATLANG (Catalan Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CATLANG&filter-catalognumber-CATLANG=on>)
- CHINLANG (Chinese Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CHINLANG&filter-catalognumber-CHINLANG=on>)
- EFSLANG (English for Foreign Students) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=EFSLANG&filter-catalognumber-EFSLANG=on>)
- FRENLANG (French Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=FRENLANG&filter-catalognumber-FRENLANG=on>)
- GERLANG (German Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GERLANG&filter-catalognumber-GERLANG=on>)
- IBERLANG (<http://explorecourses.stanford.edu/search?jsessionid=9EE7576BA00BF8D0937CF47D0068C127?view=catalog&catalog=&page=0&q=IBERLANG&filter-catalognumber-IBERLANG=on&filter-coursestatus-Active=on>) (Iberian Languages)

- ITALLANG (Italian Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=ITALLANG&filter-catalognumber-ITALLANG=on>)
- JAPANLNG (Japanese Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=JAPANLNG&filter-catalognumber-JAPANLNG=on>)
- KORLANG (Korean Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=KORLANG&filter-catalognumber-KORLANG=on>)
- PORTLANG (Portuguese Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PORTLANG&filter-catalognumber-PORTLANG=on>)
- SLAVLANG (Slavic Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SLAVLANG&filter-catalognumber-SLAVLANG=on>)
- SPANLANG (Spanish Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SPANLANG&filter-catalognumber-SPANLANG=on>)
- SPECLANG (Special Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SPECLANG&filter-catalognumber-SPECLANG=on>)
- TIBETLNG (Tibetan Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=TIBETLNG&filter-catalognumber-TIBETLNG=on>)

## Beginning-Level, First-Year Courses

Beginning-level, first-year language courses require no previous knowledge of the language. The beginning-level sequence emphasizes development of the full range of language skills, reading, listening comprehension, the use of grammatical structures, and oral and written communication, through a variety of learning themes. Individual, small group, interactive work and multimedia-based activities reinforce language skills and provide the platform for adapting the curriculum to specific student learning goals. Cultural awareness is a strong component of the curriculum.

## Intermediate-Level, Second-Year Courses

Intermediate-level, second-year language courses require completion of the beginning sequence, or consent of instructor. The intermediate-level sequence focuses on continuous mastery and development of learning skills that help students to converse accurately and more fluently, incorporate more advanced grammatical structures in their oral and written work, use idiomatic expressions in the right context, and write simple compositions. Curricular objectives and enhanced understanding of the culture are built into the courses through a multimodal approach.

## Advanced-Level, Third-Year Courses

Advanced-level, third-year language courses require completion of the intermediate-year sequence and consent of the program coordinator. The advanced-level sequence focuses on accurate understanding and use of structures through authentic texts and multimedia materials, and readings from various genres. Individual learning goals and student proficiency are

taken into account to provide a learning environment that helps students become more autonomous learners.

# Proficiency in Foreign Language Notation

A student who demonstrates levels of achievement equivalent to those expected at the end of the third quarter of the third year of study in a language may be awarded the notation "proficiency in" that language on the official transcript. Successful candidates tend to have completed the third year or beyond of language study at Stanford and spent considerable time studying abroad in the foreign language.

In order to receive the proficiency notation and for it to appear on the official transcript, the student must complete the following oral and written requirements according to the timeline below. Successful completion of the oral component is required before proceeding with the written component.

Both oral and written components must be completed no later than the quarter preceding the graduating quarter.

For more information contact Patricia de Castries ([patricia@stanford.edu](mailto:patricia@stanford.edu)).

## Application and Oral Component: Two quarters prior to graduation

1. Notify the Language Center via email of the intent to pursue the notation and request an official Oral Proficiency Interview (OPI). Since this is a formal interview conducted according to national academic and professional standards, at least two quarters of lead time are essential for scheduling.
2. Complete the 30 minute Oral Proficiency Interview as scheduled through the Language Center and conducted by a certified OPI tester. The interview must take place no later than one quarter prior to graduation and be administered on campus
3. Receive an official rating of Advanced Low or higher on the Foreign Service Institute/American Council on the Teaching of Foreign Languages (FSI/ACTFL) scale of oral proficiency, except in the non-cognate languages which require a minimum rating of Intermediate High. Students who do not meet the minimum level for the notation will nonetheless receive an official OPI rating, which carries national recognition of their oral proficiency.

## Writing Component: One quarter prior to graduation

1. Once approved to continue with the writing component, schedule a Writing Proficiency Test (WPT) through the Language Center. As an official writing assessment, the 90 minute exam must take place no later than one quarter prior to graduation and as soon as possible after the interview. The WPT is administered on campus and rated by a certified rater.
2. Receive an official rating of Advanced Low or higher on the Foreign Service Institute/American Council on the Teaching of Foreign Languages (FSI/ACTFL) scale of writing proficiency, except in the non-cognate languages which require a minimum rating of Intermediate High. Students who do not meet the minimum level for the notation will nonetheless receive an official WPT rating, which carries national recognition of their writing proficiency.

## Proficiency Notation Timetable

1. Graduating Spring/Summer: Apply Autumn. Interview Autumn/Winter: writing Winter.
2. Graduating Autumn: Apply Winter, interview Winter/Spring: writing Spring.

3. Graduating Winter: Apply Spring, interview Spring/Autumn: writing Autumn.

## Overseas Studies Courses in the Language Center

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/languagecenter/http://explorecourses.stanford.edu>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/languagecenter/http://bosp.stanford.edu>) web site. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

## African and Middle Eastern Languages and Literatures Program

The African and Middle Eastern Languages and Literatures Program offers classes in Hebrew, Persian, Swahili, Turkish, and African languages not regularly taught at Stanford. Based on current funding and student requests, the courses planned for 2012-13 are listed in the "ExploreCourses" section of this Bulletin under the AMELANG (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=AMELANG&filter-catalognumber-AMELANG=on>) program. Additional languages may still be offered upon request, provided funding is available. Requests for the 2013-14 academic year should be made by Spring Quarter of this year to the AME program office by email to [ebemhar@stanford.edu](mailto:ebemhar@stanford.edu).

First, second, and third year each refer to the yearly sequence of language study. Letter suffixes refer to the quarter within the sequence: "A" courses are typically taught in Autumn; "B" courses, in Winter; and "C" courses in Spring. Courses are 3, 4 or 5 units as listed. In some circumstances, a beginning or intermediate course may be offered in alternate years. Language courses may not be repeated for credit, and must be taken in sequence.

### Fulfilling the Language Requirement in AME

Students can fulfill the language requirement by taking an African or Middle Eastern Language. At least 12 units are needed to complete the requirement. Normally, the requirement is completed after the first quarter of intermediate-level language. In the case of African and Middle Eastern Languages taught only at the beginning level, students may petition the Language Center to fulfill the requirement by taking a directed reading course in the fourth quarter. Contact [patricia@stanford.edu](mailto:patricia@stanford.edu) for more information.

Students who have taken courses in the relevant language at another institution, or have previous knowledge of the language, can request to be tested. Tests are comprised of two parts, written and oral. Students must display first-year level proficiency in the requested language to fulfill the requirement. Testing is guaranteed only for languages currently offered. Students planning to take a test must contact the AME Program no later than the Spring Quarter of their sophomore year. To submit a request for language testing, or to request that a language be taught, and for further information on the program, see <https://www.stanford.edu/dept/lc/language/courses/africanMidEastern/index.html>.

## Special Language Program

The Special Language Program (SLP) offers foreign languages not otherwise taught at Stanford. Based on current funding and student requests, the courses planned for 2012-13 are listed in the "Explore Courses (<http://explorecourses.stanford.edu>)" section of this Bulletin under the Special Languages (SPECLANG) Program; however, not every course listed is taught. Additional languages may still be offered upon request, provided funding is available. Requests for the 2013-14 academic year should be made by Spring Quarter of this year at the Special Language Program office ([epriomas@stanford.edu](mailto:epriomas@stanford.edu)).

First-year courses are offered for 3, 4 or 5 units, as listed. The 3-unit first-year courses are offered on a satisfactory/no credit basis only. The 4 and 5-unit first-year courses are offered with a letter grade option. Second-year as well as third-year courses are offered with a grade option. Most 3-unit language courses are offered for a two-year, three quarter sequence.

First, second, and third year each refer to the sequence of language study. Letter suffixes refer to the quarter within the sequence:

'A' suffix courses are typically taught Autumn.

'B' suffix courses are typically taught Winter.

'C' suffix courses are typically taught Spring.

In some circumstances, a beginning or intermediate course may be offered in alternate years. For more information, see <http://www.stanford.edu/dept/SLP>. Language courses may not be repeated for credit, and must be taken in sequence.

### Fulfilling the Language Requirement in Special Language Program

Students can fulfill the language requirement by taking courses offered by the Special Language Program. At least 12 units are needed to complete the requirement. Students who have already taken courses in the relevant language at another institution, or who have previous knowledge of the language, can request to be tested. Tests are comprised of written and oral parts. A student must display first-year level proficiency in the requested language in order to fulfill the requirement. Testing is guaranteed only for these languages currently offered. Students planning to take a test must contact the Special Language Program no later than the Spring Quarter of sophomore year. To submit a request for language testing, or to request a language, apply via the Special Language Program (<http://www.stanford.edu/dept/SLP>) web site.

## Minor in Middle Eastern Languages, Literatures, and Cultures

The undergraduate minor in Middle Eastern Languages, Literatures, and Cultures has been designed to give students majoring in other departments an opportunity to gain a substantial introduction to Middle Eastern and African languages, and to the cultures and civilizations of the Middle East and Africa. Contact the minors adviser before declaring at [kyobeid@stanford.edu](mailto:kyobeid@stanford.edu).

Students declaring a minor must do so no later than the last day of the fourth quarter before degree conferral. For example, students graduating in June (Spring Quarter) must declare the minor no later than the last day of Spring Quarter of their junior year. If a student is not able to meet this deadline, he or she may petition the Language Center director and request a revised declaration date, which may be granted at the director's discretion.

The requirements for a minor in Middle Eastern Languages, Literatures, and Cultures are:

1. Courses for the minor must be taken for a letter grade unless only offered for faculty-elected satisfactory/no credit.
2. All courses must be completed with a letter grade of 'C' or better.
3. Courses may not overlap with those taken for a major course of study.
4. Relevant courses taken to fulfill a GER may count toward fulfilling both minor and GER requirements.

## Cultural Studies Track

Requirements are:

1. Completion of the language prerequisite at the beginning level, or a demonstrated equivalent competence.
2. In the case of Arabic, completion of six non-language courses, including three from the AME program.
3. In the case of Hebrew and African languages, completion of six non-language related courses. Consult minor adviser for course options.

## Language Track

- Option one:
  - A. Completion of prerequisite language study at the beginning level, or a demonstrated equivalent competence.
  - B. Completion of one year of language study at the intermediate level.
  - C. Completion of three related non-language courses, including, in the case of Arabic, one of the ARABLANG 10-16 (formerly AMELANG 30-36) series. ARABLANG 10 Arabic Calligraphy is offered this year. Consult the minor adviser ([kyobeid@stanford.edu](mailto:kyobeid@stanford.edu)) for course options.
- Option two:
  - A. Completion of prerequisite language study at the advanced level in Arabic, Hebrew, or an African language, for the equivalent of three years of language study.
  - B. Completion of one African and Middle Eastern literature and culture course relevant to the language studied in the case of Arabic or Hebrew; or, in the case of African languages, completion of one non-language African Studies course relevant to the language studied. Consult the minor adviser ([kyobeid@stanford.edu](mailto:kyobeid@stanford.edu)) for course options.
- Option three:

Completion of four years of language study, at least two of which must be concluded at Stanford.

## Minor in Modern Languages

An undergraduate minor in Modern Languages is offered through the Division of Literatures, Cultures, and Languages and includes courses offered through the Language Center. Students should consult the "Division of Literatures, Cultures, and Languages (p. )" section of this bulletin for further details about the minor and its requirements.

*Director:* Elizabeth Bernhardt

*Associate Director:* Joan Molitoris

*Assistant Director:* Patricia de Castris

## African and Middle Eastern Languages

*Coordinator:* Elizabeth Bernhardt (Director, Language Center)

*Senior Lecturer:* Vered Shemtov (Jewish Language and Literature)

*Lecturers:* Ameneh Shervin Emami, Ebru Ergul, Shahla Fahimi, Estee Greif, Nursevinc Karakus (Fulbright Scholar) Jon Levitow, Gallia Porat, Samuel Mukoma

## Arabic Language

*Senior Lecturer:* Khalil Barhoum (on professional development leave)

*Lecturers:* Samar Ahmed (Fulbright Scholar), Salem Aweiss, Touria Boumehdi, Eva Hashem, Khalid Obeid (Coordinator and Minor Adviser), Ramzi Salti

## Catalan Language

*Coordinator:* Joan Molitoris (Associate Director, Language Center)

*Lecturer:* to be announced

## Chinese Language

*Coordinator:* Chao Fen Sun (Professor, Asian Languages and Cultures)

*Lecturers:* Marina Chung, Michelle DiBello, Sik Lee Dennig, Nina Lin, Yu-hwa Liao Rozelle, Le Tang, Huazhi Wang, Hong Zeng, Youping Zhang, Xiaofang Zhou, Xiaiya Zhu

## English for Foreign Students

*Director and Senior Lecturer:* Philip Hubbard

*Lecturers:* Robyn Brinks Lockwood, Carole Mawson, Andrea Kevech, Andrew Oman, Kenneth Romeo, Constance Rylance, Seth Streichler, Dominic Wang

## French Language

*Lecturers:* Jane Dozer-Rabedeau, Heather Howard (Coordinator), Miranda Kershaw, Marie Lasnier, Guillaume Massas, Vera Shapirshsteyn

## German Language

*Senior Lecturers:* William E. Petig, Kathryn Strachota

*Lecturer:* Paul Nissler (Coordinator)

## Iberian Languages

*Coordinator:* Joan Molitoris (Associate Director, Language Center)

*Lecturer:* Joseba Iñaki Lopez de Luzuriaga

## Italian Language

*Lecturers:* Marta Baldocchi, Anna Cellinese (Coordinator), Alessandra McCarty, Giovanni Tempesta

## Japanese Language

*Coordinator:* Yoshiko Matsumoto (Professor, Asian Languages and Cultures)

*Lecturers:* Hisayo O. Lipton, Momoyo K. Lowdermilk, Emiko Yasumoto Magnani, Kiyomi Nakamura, Michelle Rogoyski, Momoe Saito Fu (Winter and Spring only), Yoshiko Tomiyama

## Korean Language

*Lecturers:* Hee-Sun Kim (Coordinator), Su Kyung Seo (Fulbright Scholar)

## Portuguese Language

Senior Lecturer: Lyris Wiedemann (Coordinator)

Lecturer: Fernanda Consoni, Agripino Silveira

## Slavic Language

Senior Lecturer: Rima Greenhill

Lecturer: Eugenia Khassina (Coordinator)

## Spanish Language

Lecturers: Vivian Brates, Loreto Catoira, Citlalli del Carpio, Irene Corso, Alice Miano (Coordinator), Joan Molitoris (Associate Director, Language Center), Paul Nissler, Carimer Ortiz Cuevas, Veronika Reinhold, Kara Sanchez, Ana Maria Sierra, María Cristina Urruela, Hae-Joon Won

## Special Language Program

Lecturers: Pratibha Bhattacharya (Fulbright Scholar), Cathy Haas, Dzung Nguyen, Eva Prionas (Coordinator, Modern Greek Language and Literature), Brajesh Samarth

## Tibetan Language Program

Lecturer and Coordinator: Robert W. Clark

## Overseas Studies Courses in the Language Center

Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsocieties/languagecenter/http://explorecourses.stanford.edu>) web site or the Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsocieties/languagecenter/http://bosp.stanford.edu>) web site.

## Overseas Studies Courses in Chinese

	Units	
OSPBEIJ 1C	First-Year Modern Chinese, First Quarter	5
OSPBEIJ 3C	First-Year Modern Chinese, Third Quarter	5
OSPBEIJ 6C	Beginning Conversational Chinese, First Quarter	2
OSPBEIJ 21C	Second-Year Modern Chinese	5
OSPBEIJ 23C	Second-Year Modern Chinese	5
OSPBEIJ 101C	Third-Year Modern Chinese	5
OSPBEIJ 103C	Third-Year Modern Chinese	5
OSPBEIJ 211C	Fourth-Year Modern Chinese	5

## Overseas Studies Courses in French

	Units	
OSPPARIS 22P	Intermediate French I	5

OSPPARIS 23P	Intermediate French II	4-5
OSPPARIS 124P	Advanced French I	4-5
OSPPARIS 125P	Advanced French II	4-5

## Overseas Studies Courses in German

	Units	
OSPBER 1Z	Accelerated German: First and Second Quarters	8
OSPBER 2Z	Accelerated German, Second and Third Quarters	8
OSPBER 3B	German Language and Culture	5
OSPBER 21B	Intermediate German	5
OSPBER 100B	Berlin Heute	2
OSPBER 101B	Advanced German	5

## Overseas Studies Courses in Italian

	Units	
OSPFLOR 21F	Accelerated Second-Year Italian, Part A	5
OSPFLOR 22F	Accelerated Second-Year Italian Part B,	5
OSPFLOR 31F	Advanced Oral Communication: Italian	3

## Overseas Studies Courses in Japanese

	Units	
OSPKYOTO 2K	First-Year Japanese Language, Culture, and Communication, Second Quarter	5
OSPKYOTO 3K	First-Year Japanese Language, Culture, and Communication, Third Quarter	5
OSPKYOTO 21K	Second-Year Japanese Language, Culture, and Communication, First Quarter	5
OSPKYOTO 22K	Second-Year Japanese Language, Culture, and Communication, Second Quarter	5
OSPKYOTO 23K	Second-Year Japanese Language, Culture, and Communication, Third Quarter	5
OSPKYOTO 102K	Third-Year Japanese Language, Culture, and Communication, Second Quarter	5
OSPKYOTO 103K	Third-Year Japanese Language, Culture, and Communication, Third Quarter	5
OSPKYOTO 210K	Advanced Japanese	5

## Overseas Studies Courses in Russian

	Units	
OSPMOSC 10M	Intensive First-Year Russian	8
OSPMOSC 51M	Second-Year Russian	5
OSPMOSC 111M	Third-Year Russian	5
OSPMOSC 177M	Fourth-Year Russian	5



## Overseas Studies Courses in Spanish

		Units
OSPMADRD 102M	Composition and Writing Workshop for Students in Madrid	3-5
OSPMADRD 120	The Sounds of Spanish	5
OSPSANTG 12S	Accelerated Second-Year Spanish, Part I: Chilean Emphasis	5
OSPSANTG 13S	Accelerated Second-Year Spanish, Part II: Chilean Emphasis	5
OSPSANTG 102S	Composition and Writing Workshop for Students in Santiago	3-5

## Latin American Studies

Courses offered by the Interdisciplinary Program in Latin American Studies are listed under the subject code LATINAM on the Stanford Bulletin's ExploreCourses web site (<https://explorecourses.stanford.edu/search?filter-term-Autumn=on&filter-catalognumber-LATINAM=on&filter-term-Summer=on&page=0&q=LATINAM&filter-coursestatus-Active=on&view=catalog&filter-term-Spring=on&collapse=&filter-term-Winter=on&catalog=71>).

The Center for Latin American Studies (CLAS) supports research and teaching in all fields of study as they relate to Latin America. Academic programs encourage interdisciplinary approaches and draw on the expertise of nearly sixty active affiliated faculty members representing Stanford's various schools and departments. Stanford University Libraries' substantial Latin American collections are valuable resources for students, faculty, and visiting researchers alike. Each year CLAS hosts a number of Tinker Visiting Professors, highly distinguished Latin American and Iberian scholars who come to Stanford to teach a course in their field of specialization. The Center for Latin American Studies maintains a highly active public events calendar and provides funding to students and faculty for a variety of research, teaching, internship, and conference activities. Stanford offers three formal academic programs in Latin American Studies: an Undergraduate Minor, Interdisciplinary Honors, and a Master of Arts degree. The Center is a U.S. Department of Education Title VI National Resource Center for Latin America.

## Undergraduate Programs in Latin American Studies

Stanford University offers an interdisciplinary honors and a minor in Latin American Studies. Although we currently do not offer an undergraduate major in Latin American Studies, students may concentrate on Latin America through other departmental and interdisciplinary degree programs, such as Anthropology (p. 261), History (p. 421), Political Science (p. 511), Iberian and Latin American Cultures (p. 439), or International Relations (p. 452). Interested students should consult the relevant departmental web sites and sections of this bulletin for further information.

Undergraduates can obtain a coterminal M.A. degree in Latin American Studies while concurrently working on their undergraduate major by applying during the regular admissions cycle no later than their senior year.

## Financial Aid

Each summer, CLAS awards grants to a small number of undergraduates to complete internships in Latin America. Applications include a proposal, academic transcript, and letters of recommendation. Students from any department are eligible to apply. See the Center for Latin American Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://las.stanford.edu>) website.

Students in undergraduate programs who plan to enroll in Portuguese or Quechua language and area or international studies courses may be eligible for Academic Year and Summer Foreign Language and Area Studies (FLAS) fellowships. Recipients of FLAS fellowships must be American citizens or permanent residents. For detailed program information and eligibility, see the Center for Latin American Studies (<http://las.stanford.edu>) website.

## Graduate Programs in Latin American Studies

The one-year master's program in Latin American Studies is designed for students who have experience working, living, or studying in Latin America or Iberia and little prior course work on Latin America.

Stanford University does not offer a Ph.D. program in Latin American Studies; however, doctoral candidates may concentrate on Latin America through other departmental programs, such as Anthropology, History, Political Science, or Iberian and Latin American Cultures. Interested applicants should consult the relevant departmental web sites and sections of this bulletin for admissions information and further details.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Latin American Studies and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

## Admission

The application deadline for the 2013-14 academic year is January 8, 2013. Applicants submit an online application, including a 500-word statement of purpose, resumé, 10-15 page double-spaced academic writing sample, and three letters of recommendation. In addition, all applicants must submit official transcripts and GRE general test scores. TOEFL scores are required of applicants whose first language is not English or who did not earn a degree from an undergraduate institution where English is the primary language of instruction. For information on university graduate admissions and to access the online application, visit the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://gradadmissions.stanford.edu>) website.

Applicants must meet the University admission requirements, have a working knowledge of Spanish or Portuguese at the university third-year level or higher, and have experience working, living, or studying in Latin America or Iberia prior to admission.

CLAS takes a broad approach to evaluating applications for admission. As important as GRE scores and grades are the applicant's essay, letters of recommendation, academic writing sample, and the experiences and goals conveyed through the personal statement and resume.

Students interested in pursuing the joint degree program in Latin American Studies and Law (J.D.) or a dual degree in Latin American Studies and Business (M.B.A.) or Medicine (M.D.) must apply to each program

separately and be accepted by both. Details about the joint and dual degree programs can be found in the "Master's (p. 466)" tab in this section.

## Financial Aid

The Center for Latin American Studies provides several graduate fellowships as well as limited course assistantships with the Tinker Visiting Professors each quarter.

Students in graduate programs who plan to enroll in Portuguese or Quechua language and area or international studies courses may be eligible for Academic Year and Summer Foreign Language and Area Studies (FLAS) fellowships. Recipients of FLAS fellowships must be American citizens or permanent residents. Applicants to the M.A. program have priority in the annual FLAS competition; in recent years CLAS has also awarded FLAS fellowships to students enrolled in the School of Engineering and the School of Law. For detailed program information and eligibility, see the Center for Latin American Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://las.stanford.edu>) website.

CLAS awards Working Group grants to graduate students across the University who wish to organize events such as lectures, speaker series, symposia, exchange of working papers, and collaborative research efforts. For detailed program information and eligibility, see the Center for Latin American Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://las.stanford.edu>) website.

## Minor in Latin American Studies

The Minor in Latin American Studies is open to students in any major. Students who wish to complete the minor must declare online (through Axess (<http://axess.stanford.edu>)) and submit a proposal of course work no later than the second quarter of their junior year. The minor must be completed by the second quarter of the senior year. Units taken for a student's major cannot be double-counted towards the minor.

Requirements for the minor include:

1. Completion of 25 units as follows:
  - A. A 5-unit course surveying Latin America: either HISTORY 170B Culture, Society and Politics in Latin America or an approved substitute.
  - B. 20 additional units in a number of courses which together comprise a coherent focus on a theoretical problem or issue of the region, such as (but not limited to) culture and identity, political economy, or sustainable development. All courses, with the exception of Overseas Studies courses, must be at the 100-level or higher. For approved courses, see the "Related Courses (p. 467)" tab in this section.
  - C. At least 10 of the 25 units must be completed at Stanford. All courses to be counted toward the minor must be taken for a letter grade.
2. Fulfill the Foreign Language Requirement. The minimum requirement for completion of the minor in Latin American Studies is advanced proficiency in Spanish or Portuguese by any one of the following means:
  - A. Completion of seven quarters of college-level study of Spanish or Portuguese.
  - B. Completion of a course taught in Spanish or Portuguese at the 100-level or higher, with a letter grade of 'B' (3.0) or higher. This may be a course on Spanish or Portuguese language or literature, or some other subject, as long as it fulfills the above criteria.

C. Achievement of the advanced proficiency level on the ACTFL scale in a test administered by the Stanford Language Center. Contact the Language Center (p. 459) for test dates and procedures.

3. Recommended: experience in Latin America such as study abroad, field research, or an internship.

Upon completion of all requirements, the CLAS subcommittee on undergraduate programs authorizes the designation of the Minor in Latin American Studies on the student's transcript.

## Honors in Latin American Studies

The Honors Program in Latin American Studies is open to undergraduate students in any major. The aim of the honors program is to prepare students to pursue individualized research on Latin America, culminating in an honors thesis completed under the supervision of a faculty adviser. The honors program is particularly suited to the student who wishes to go on to graduate school or pursue employment in an institution emphasizing research and independent work. Although not required, students are encouraged to undertake independent field research in Latin America for their thesis. It is strongly recommended that students enroll in (1 unit), during their sophomore or junior year for an overview of research design and methods for international field research.

Admission to the honors program is by application by the end of the junior year. Applications are reviewed and approved by the CLAS director and associate director. Applicants must have a cumulative grade point average (GPA) of 3.3 (B+) or higher and maintain this average in courses taken to satisfy the requirements. Courses must be taken for a letter grade where that option is available. Courses credited toward LAS honors may be double-counted toward the student's major requirements.

To graduate with interdisciplinary honors in Latin American Studies a student must:

1. Complete a total of 35 units in courses certified for honors by the Center for Latin American Studies, distributed as follows:
  - A. A 5-unit survey course, normally taken in the sophomore year: either or an approved substitute.
  - B. For breadth: two 4-5-unit courses at the 100-level or higher with a focus on Latin America. These courses are normally taken during the sophomore and junior years. For approved courses, see the "Related Courses (p. 467)" tab in this section.
  - C. For depth: one 4-5-unit course, approved by the honors adviser, at the 100-level or higher with a focus on Latin America that explores in depth an issue of particular interest to the student. See the "Related Courses (p. 467)" tab in this section.
  - D. (1-10 units), under the supervision of the honors adviser. Normally these units are spread over two or three quarters of the senior year and are devoted to the completion of the honors thesis.
  - E. Honors Seminar in Latin American social history, taken in the senior year. Please consult the Center for Latin American Studies website for the 2012-13 honors seminar.
  - F. Additional courses at the 100-level or higher focusing on Latin America to bring the total to 35 units. Up to 5 units may come from study of Spanish or Portuguese beyond the seventh quarter. For approved courses, see the "Related Courses (p. 467)" tab in this section.

- G. Of the courses applied to 'b' and 'c' above, up to 10 units may be completed in Overseas Studies, and up to 5 units may be taken as directed individual study. For approved Overseas Studies courses, see the "Related Courses (p. 467)" tab in this section.
- H. All courses to be counted toward the honors program must be taken for a letter grade.
2. Fulfill the Foreign Language Requirement. The minimum requirement for completion of the honors program in Latin American Studies is advanced proficiency in Spanish or Portuguese by any one of the following means:
- A. Completion of seven quarters of college-level study of Spanish or Portuguese.
  - B. Completion of a course taught in Spanish or Portuguese at the 100-level or higher, with a letter grade of 'B' (3.0) or higher. This may be a course on Spanish or Portuguese language or literature, or another subject, as long as it fulfills the above criteria.
3. Achievement of the advanced proficiency level on the ACTFL scale in a test administered by the Stanford Language Center. Contact the Language Center (p. 459) for test dates and procedures.
4. Submit an honors thesis that meets standards of scholarly excellence and is approved by the thesis adviser. If graduating in June, participate in the LAS honors symposium in late May or early June.

## Master of Arts in Latin American Studies

The Master of Arts in Latin American Studies is an interdisciplinary program. The curriculum consists of a core set of courses surveying the history, politics, society, ecology, and culture of the Latin American region; advanced language training; and in-depth course work. In consultation with a faculty adviser, students select a course of study suited to their individual interests.

## Coterminal Bachelor's and Master's Degrees in Latin American Studies

Undergraduates at Stanford may apply for admission to the coterminal master's program in Latin American Studies when they have earned a minimum of 120 units toward graduation, including advanced placement and transfer credit, and no later than the quarter prior to the expected completion of their undergraduate degree. The application deadline for the 2013-14 academic year is January 8, 2013.

Coterminal applicants must submit:

- an application form
- a 500-word statement of purpose
- a resumé
- a 10-15 page double-spaced academic writing sample
- three letters of recommendation
- a Stanford transcript
- GRE general test scores

Coterminal applicants must have a minimum cumulative GPA of 3.5 and a working knowledge of Spanish or Portuguese at a university third-year level or higher.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Degree Requirements

University requirements for the master's degree are described in the "Graduate Degrees General Requirements (p. 38)" section of this bulletin.

The program requires completion of a minimum of 45 graduate units. Each student is assigned a faculty adviser who works with the student to develop a customized program of study. All courses for the M.A. degree must be at the 100-level or higher, with at least half being at the 200-level or higher.

Candidates to the M.A. in Latin American Studies must complete the following:

1. Core courses (15 units): one core 5-unit course in each of three fields of specialization:

	Units
a. Culture and Society HISTORY 371 Graduate Colloquium: Explorations in Latin American Social History	5
b. Environment and Ecology ANTHRO 262 Indigenous Peoples and Environmental Problems	5
c. Political Economy POLISCI 348S Latin American Politics	5
<b>Total Units</b>	<b>15</b>

3. *Related courses (15 units)*: three courses (5 units each), one from each of the three fields of specialization listed in '1' above. For approved courses, see the "Related Courses (p. 467)" tab in this section.
  4. *Elective courses (10-15 units)*: three elective courses (3-5 units each) in one of the three fields of specialization (see '1' above) from across the University's offerings, selected with guidance and approval from the faculty adviser.
  5. *Language requirement*: at least 3 units of course work on a second Latin American language. Students proficient in both Spanish and Portuguese must take an advanced third-year language course in either Spanish or Portuguese; students proficient in only Spanish or only Portuguese must take a basic course in the language in which they are not already proficient. Up to 6 units of foreign language coursework may be applied toward the M.A. degree. All foreign language coursework must be taken at the 100-level or higher.
  6. *Seminar requirement*: 3 units (1 per quarter) of:
- |  | Units |
|--|-------|
| LATINAM 200 Seminar on Contemporary Issues in Latin American Studies | 1     |
8. *Thesis option*: students may elect to write a master's thesis; they may register for LATINAM 398 Master's Thesis for up to 10 units of thesis research under the guidance of an Academic Council faculty member. Thesis units may be counted toward the elective field unit requirements (requirement number 3, above).
  9. *Grade requirements*: All courses to be counted toward the MA (with the only exception being LATINAM 200 Seminar on Contemporary Issues in Latin American Studies) must be taken for a letter grade and earn a B- or better. M.A. candidates must maintain a cumulative GPA of 3.0 or higher.

# Joint Degree Program in Latin American Studies and Law

The joint degree program in Latin American Studies and Law allows students to pursue the M.A. degree in Latin American Studies concurrently with the Doctor of Jurisprudence (J.D.) degree, with a significant number of courses that may apply to both degrees. It is designed to train students interested in a career in teaching, research, or the practice of law related to Latin American legal affairs. Students must apply separately to the Latin American Studies M.A. program and to the Stanford School of Law and be accepted by both. Completing this combined course of study requires approximately four academic years, depending on the student's background and level of language training. For more information, see the "Joint Degree Programs (p. )" section of this bulletin and consult with the program offices for the two programs.

## Dual Master's Degree with Medicine or Business

Stanford offers dual degree programs that grant an M.A. degree in Latin American Studies and a Master of Business Administration degree or a Medical Doctor degree. Students must apply separately to and be accepted by both the Latin American Studies M.A. program and the Graduate School of Business or School of Medicine.

*Director of the Center:* Rodolfo Dirzo

*Associate Director:* Elizabeth Sáenz-Ackermann

*Tinker Visiting Professors:* Leonor Arfuch, Roberto J. Blancarte, Andres Laguens, Roberto Morales, Pablo Neumeyer, Vidal Romero, Liliana Suárez

## Affiliated Faculty and Staff:

*Anthropology:* Clifford Barnett (emeritus), George Collier (emeritus), Lisa Curran, Carolyn Duffey, William Durham, James Fox, Angela Garcia, John Rick, Ian Robertson

*Art and Art History:* Enrique Chagoya

*Biology:* Gretchen Daily, Rodolfo Dirzo, Harold Mooney (emeritus), Peter Vitousek, Virginia Walbot

*Carnegie Institution for Science:* Gregory Asner

*Comparative Literature:* Roland Greene, Hans Ulrich Gumbrecht, José David Saldívar

*Dance:* Susan Cashion (emerita)

*Earth Sciences, School of:* Pamela Matson

*Economics:* Roger Noll (emeritus)

*Education, School of:* Martin Carnoy, Amado Padilla, Guadalupe Valdés

*Engineering, School of:* Jenna Davis, Bruce Lusignea (emeritus), Leonard Ortolano

*English:* Ramón Saldívar (also Comparative Literature)

*Freeman Spogli Institute for International Studies:* Rosamond Naylor

*History:* Zephyr Frank, Tamar Herzog

*Hoover Institute:* Herbert Klein

*Human Biology:* Anne Firth Murray

*Iberian and Latin American Cultures:* Héctor Hoyos, Marília Librandi Rocha, Michael Predmore, Joan Ramon Resina, Jorge Ruffinelli, Lisa Surwillo, Yvonne Yarbro-Bejarano

*Language Center:* José Carlos Fajardo, Alice Miano, Ana Sierra, Lyris Wiedemann, Agripino Silveira

*Law, School of:* James Cavallaro, Jonathan Greenberg, Thomas Heller (emeritus)

*Linguistics:* John Rickford

*Medicine, School of:* Michele Barry, Gabriel Garcia, Grant Miller, Paul Wise

*Political Science:* Stephen Haber, Terry Karl, Beatriz Magaloni, Robert Packenham (emeritus), Gary Segura, Michael Tomz

*Religious Studies:* Thomas Sheehan

*Sociology:* Tomás Jiménez, Michael Rosenfeld

*Stanford University Libraries:* Adán Griego, Sergio Stone, Robert Trujillo

## Latin American Studies Related Courses

The following courses may be used to satisfy requirements for the M.A. degree, honors, or minor in Latin American Studies. Consult the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site for full course descriptions and class schedules.

When selecting courses from this list, please be aware of the following:

- Overseas Studies courses, denoted by the subject code OSPSANTG, apply only to the undergraduate minor or honors programs and are not options for M.A. students.
- Courses with numbers ending in the letter N or Q are Introductory Seminars for undergraduates and are not options for M.A. students. Courses ending in N give preference to freshmen; courses ending in Q give preference to sophomores.
- All courses to be counted toward the M.A., minor, or honors in Latin American Studies must be taken at the 100-level or higher, with the exception of Overseas Studies courses included on this list (see also note 1, above).
- All courses to be counted toward the M.A., minor, or honors in Latin American Studies must be taken for a letter grade.
- For the M.A. degree, cognate courses must be taken for 5 units each. M.A. elective courses may be taken for 3-5 units each.
- Some courses have prerequisites or special enrollment requirements. Students are responsible for making sure they have completed any prerequisites and/or secured an instructor's permission, as needed.

## Culture and Society

Courses related to the Culture and Society field of specialization include:

		Units
ANTHRO 100C	Chavin de Huantar Research Seminar	2-5
ANTHRO 101	The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology	3-5
ANTHRO 211A	Archaeology of the Andes of Argentina	3-5
COMPLIT 142	The Literature of the Americas	5
FILMSTUD 316	International Documentary	4
HISTORY 70	Culture, Politics, and Society in Latin America	3
HISTORY 108B	The Great Divergence: Latin American and East Asian Historical Development	5
HISTORY 170B	Culture, Society and Politics in Latin America	5
HISTORY 175B	Transnational Latin American Migration to the United States	5
HISTORY 203E	Global Catholicism	5

HISTORY 275B	Governance, Resistance, and Identity in Modern Mexico	5
HISTORY 371	Graduate Colloquium: Explorations in Latin American Social History	4-5
HISTORY 375B	Borders and Borderlands in Modern Mexico	4-5
ILAC 114N	Introduction to Lyric Poetry	3-5
ILAC 120	Advanced Critical Reading in Spanish	3-5
ILAC 131	Introduction to Latin America: Cultural Perspectives	3-5
ILAC 140	Migration in 21st Century Latin American Film	3-5
ILAC 143	The Latin American Women's Novel	3-5
ILAC 145	Poets, Journalists and Collectors: Latin American Modernismo	3-5
ILAC 161	Modern Latin American Literature	3-5
ILAC 193Q	Spaces and Voices of Brazil through Film	3-4
ILAC 243	The Millenium Novel in Latin America	3-5
ILAC 245	Brazilian Songs	3-5
ILAC 251	Latin American Literary Theory	3-5
ILAC 257	Dictatorships in Latin America through testimonies and film	3-5
ILAC 261	Voices in Brazilian Fiction	3-5
ILAC 278A	Senior Seminar: Latin American Fiction and Theory	3-5
ILAC 280	Latin@ Literature	3-5
ILAC 316	Realism and Surrealism in the Cinema of Luis Bunuel	3-5
ILAC 320	The Biographical Space in Contemporary Culture	3-5
ILAC 345	Biopolitics and Sovereignty in Andean Culture, 1920-1940	3-5
LAW 511	Legal Cultures and Legal Professionals in Latin America and Latin Europe	2
RELIGST 188A	Issues in Liberation: El Salvador	4
SOC 350W	Workshop: Migration, Race, Ethnicity and Nation	1-3
OSPSANTG 10	Borges and Argentina	4-5
OSPSANTG 14	Women Writers of Latin America in the 20th Century	4-5
OSPSANTG 24	A Cultural History of Soccer in South America	3-5
OSPSANTG 26	Typology of the "Intellectual" in South America	3-5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5
OSPSANTG 62	Topics in Chilean History	5
OSPSANTG 73	An Approach to Cultural History in Latin America through Films	5
OSPSANTG 74	Independent Studies in Latin American Literature and Culture	2-4
OSPSANTG 118X	Artistic Expression in Latin America	5

## Environment and Ecology

Courses related to the Environment and Ecology field of specialization include:

		Units
ANTHRO 247	Nature, Culture, Heritage	5
ANTHRO 262	Indigenous Peoples and Environmental Problems	3-5
HUMBIO 129	Critical Issues in International Women's Health	4
OSPSANTG 29	Sustainable Cities: Comparative Transportation Systems in Latin America	4-5
OSPSANTG 58	Living Chile: A Land of Extremes	5

OSPSANTG 71	Santiago: Urban Planning, Public Policy, and the Built Environment	4-5
OSPSANTG 76	Ecology and Biodiversity of Latin America	4
OSPSANTG 85	Marine Ecology of Chile and the South Pacific	5

## Political Economy

Courses related to the Political Economy field of specialization include:

		Units
ANTHRO 361	Life and Death in Contemporary Latin America: An Anthropological Inquiry	5
ECON 127	Economics of Health Improvement in Developing Countries	5
ECON 217	Topics in International Macroeconomics: Theory and Evidence for Latin America:	2-5
EDUC 306A	Economics of Education in the Global Economy	5
HISTORY 277D	U.S. Intervention and Regime Change in Latin America	5
INTNLREL 141A	Camera as Witness: International Human Rights Documentaries	5
POLISCI 244P	Religion and Politics in Latin America	5
POLISCI 248L	Political-Economy of Crime and Violence in Latin America	5
POLISCI 348S	Latin American Politics	5
POLISCI 440B	Political Economy of Development	5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 119X	The Chilean Economy: History, International Relations, and Development Strategies	5
OSPSANTG 129X	Latin America in the International System	4-5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5

## Overseas Studies Courses in Latin American Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/latinamericanstudies/http://bosp.stanford.edu>).

		Units
OSPMADRD 40	Introduction to Literary and Cultural Analysis in the Spanish World	4-5
OSPMADRD 50	Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Almodóvar	4-5
OSPSANTG 10	Borges and Argentina	4-5

OSPSANTG 14	Women Writers of Latin America in the 20th Century	4-5
OSPSANTG 24	A Cultural History of Soccer in South America	3-5
OSPSANTG 26	Typology of the "Intellectual" in South America	3-5
OSPSANTG 29	Sustainable Cities: Comparative Transportation Systems in Latin America	4-5
OSPSANTG 58	Living Chile: A Land of Extremes	5
OSPSANTG 62	Topics in Chilean History	5
OSPSANTG 68	The Emergence of Nations in Latin America	4-5
OSPSANTG 71	Santiago: Urban Planning, Public Policy, and the Built Environment	4-5
OSPSANTG 73	An Approach to Cultural History in Latin America through Films	5
OSPSANTG 74	Independent Studies in Latin American Literature and Culture	2-4
OSPSANTG 76	Ecology and Biodiversity of Latin America	4
OSPSANTG 85	Marine Ecology of Chile and the South Pacific	5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 118X	Artistic Expression in Latin America	5
OSPSANTG 119X	The Chilean Economy: History, International Relations, and Development Strategies	5
OSPSANTG 129X	Latin America in the International System	4-5
OSPSANTG 130X	The Chilean Economy in Comparative Perspective	5

## Linguistics

Courses offered by the Department of Linguistics are listed under the subject code LINGUIST on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=LINGUIST&filter-catalognumber-LINGUIST=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=LINGUIST&filter-catalognumber-LINGUIST=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=LINGUIST&filter-catalognumber-LINGUIST=on>).

Linguistics concerns itself with the fundamental questions of what language is and how it is related to the other human faculties. In answering these questions, linguists consider language as a cultural, social, and psychological phenomenon and seek to determine what is unique in languages, what is universal, how language is acquired, and how it changes. Linguistics is, therefore, one of the cognitive sciences; it provides a link between the humanities and the social and natural sciences, as well as education, and hearing and speech sciences.

The department offers courses at the undergraduate and graduate levels in the areas central to linguistic theory and analysis. Many of them deal with the analysis of structural patterns in the different components that make up language, including sounds (phonetics and phonology), meanings (semantics and pragmatics), words (morphology), sentences (syntax), and the ways they vary and change over time. Other courses integrate the analysis of linguistic structure with phenomena that directly concern other disciplines. These include courses in computational linguistics, language acquisition, the philosophy of language, psycholinguistics, and sociolinguistics.

A variety of open forums provide for the discussion of linguistic issues, including colloquia and regularly scheduled workshops in child language,

computational linguistics, phonology, psycholinguistics, semantics, sociolinguistics, and syntax.

## Mission of the Undergraduate Program in Linguistics

The mission of the undergraduate program in Linguistics is to provide students with basic knowledge in the principal areas of linguistics (phonetics, phonology, morphology, syntax, semantics, pragmatics, historical linguistics, and sociolinguistics) and the skills to do more advanced work in these subfields. Courses in the major also involve interdisciplinary work with connections to other departments including computer science, psychology, cognitive science, communication, anthropology, and foreign language. The program provides students with excellent preparation for further study in graduate or professional schools as well as careers in business, social services, government agencies, and teaching.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to formulate theoretically interesting and tractable research questions.
2. the ability to identify sources of data relevant to answering their research questions.
3. facility with methods of collecting data relevant to their research questions.
4. knowledge of analytical methods to apply to the data they have collected.
5. the ability to bring the results of their data analysis to bear on their research questions.

## Graduate Programs in Linguistics

The department offers an M.A., Ph.D., and Ph.D. minor in Linguistics.

## Learning Outcomes (Graduate)

The purpose of the master's program is to develop students' knowledge and skills in Linguistics and to prepare them for a professional career or doctoral studies. This is achieved through completion of courses, including coursework in an area of specialization within the field, and experience with independent research.

The Ph.D. is conferred upon candidates who have demonstrated the ability to conduct substantive, independent research in Linguistics. Through completion of advanced coursework and rigorous methodological and analytical training, the doctoral program prepares students to make original contributions to knowledge in linguistics, to articulate the results of their work, and to demonstrate its significance to linguistics and related fields.

## Cognitive Science

Linguistics is participating with the departments of Philosophy and Psychology in an interdisciplinary program in Cognitive Science for doctoral students. The program is intended to provide an interdisciplinary

education as well as a deeper concentration in linguistics. Students who complete the Linguistics and Cognitive Science requirements receive a special designation in Cognitive Science along with the Ph.D. in Linguistics. To receive this field designation, students must complete 30 units of approved courses, to be determined in consultation with the graduate studies adviser.

## Linguistics Course Catalog Numbering System

Courses numbered under 100 are designed primarily for pre-majors. Courses with 100-level numbers are designed for majors, minors, and M.A. and Ph.D. minor candidates in Linguistics. Those with numbers 200 and above are primarily for graduate students, but with consent of instructor some of them may be taken for credit by qualified undergraduates. At all levels, the course numberings indicate a special area, as follows:

Number	Special Area
00-04	General
05-09	Phonetics
10-14	Phonology
15-19	Morphology
20-29	Syntax
30-39	Semantics, Pragmatics, Discourse
40-49	Language Acquisition, Psycholinguistics
50-61	Sociolinguistics, Language Variation, Change
62-73	Language and Culture, Structure of a Language
74-79	Methods, Mathematical Linguistics, Statistics
80-89	Computational Linguistics
90-99	Directed Work, Theses, Dissertations

## Bachelor of Arts in Linguistics

The undergraduate major stresses the study of language both as a fundamental human faculty and as a changing social institution. At the core of the program is a set of departmental courses on the nature of human language; the major also draws on courses offered by other departments and programs.

The Linguistics major cuts across the humanities and the social and physical sciences. It provides a solid general education as a background for advanced studies in such disciplines as anthropology, cognitive science, communication, computer science, education (language, literacy, and culture), hearing and speech sciences, languages, law, linguistics, philosophy, and psychology.

### Degree Requirements

Requirements for the B.A. include at least 50 units of course work in Linguistics and approved courses in related fields. Of the 50 units required for the major, no more than 12 may be below the 100 level. No more than two courses, neither of which can be a core course, may be taken on a credit/no credit basis. Students must receive a 'C-' or better in courses used towards the requirements.

### Core Courses

The core courses are:

		Units
LINGUIST 1	Introduction to Linguistics	4
LINGUIST 110	Introduction to Phonetics and Phonology	4
LINGUIST 120	Introduction to Syntax	4
LINGUIST 130A or LINGUIST 130B	Introduction to Semantics and Pragmatics Introduction to Lexical Semantics	4
LINGUIST 150	Language in Society (which fulfills the Writing in the Major requirement (WIM))	4
Select one of the following:		4
LINGUIST 160	Introduction to Language Change	

or, in advance consultation with the Linguistics undergraduate studies adviser, a course in historical linguistics or the history of a language.

All majors must complete at least five core courses, including LINGUIST 150 Language in Society.

### Other Courses

Other courses counting toward the unit requirement should form a coherent program with emphases from among the areas of concentration listed below. Students should consult with the Linguistics undergraduate studies adviser when declaring the major, and maintain regular contact during the remainder of their Stanford career. Each student's major program must be approved by the Linguistics undergraduate studies adviser, or approved department adviser.

Students in the major must also take:

- At least two 200-level Linguistics courses, typically in their area of concentration

### Other Requirements

- Foreign language: majors must have competence in at least one language other than English as part of their understanding of the field of linguistics and its study. This is usually demonstrated by the completion of six quarters of language study at Stanford or equivalent; level of proficiency is determined by the Language Center or the relevant language department. Students may petition to be exempted from the Language Requirement if they have grown up speaking a language other than English and can use it for everyday purposes and for linguistic analysis.

### Areas of Concentration

Students select an area of concentration or develop one themselves in advance consultation with the Linguistics undergraduate studies adviser. These areas of concentration are not declared on Axess, and they do not appear on the transcript or diploma.

### Honors Program

Students who wish to undertake a more intensive program of study, including independent research, should pursue departmental honors. Students should apply for honors by the end of Spring Quarter of their junior year. As part of the application, the student must write a research proposal describing the honors project which must be approved by the faculty adviser. Approval is given only to students who have maintained a grade point average (GPA) of 3.3 (B+) or better in the courses required for the major.

Honors students complete a total of 60 units including the 50 units for the major, plus 10 additional units of independent study and Honors Research. In addition, they must complete an honors thesis based on

research conducted with a principal adviser who must be a member of the Linguistics faculty, and a secondary faculty adviser who may, with the approval of the Undergraduate Studies Committee, be a member of another department. In the Autumn Quarter of the senior year, honors students enroll in LINGUIST 199 Independent Study, to work closely with one of their advisers on the research project. In Winter and Spring quarters, honors students enroll in LINGUIST 198 Honors Research, with the student's principal adviser for close supervision of the honors thesis. The thesis must be submitted in final, acceptable, form by May 15. The thesis topic is presented orally at a department Honors Colloquium late in Spring Quarter.

## Minor in Linguistics

Requirements for the minor include at least 28 units of course work (typically seven courses) in Linguistics and related fields, approved in advance by the Linguistics undergraduate studies adviser. No more than two courses, neither of which can be a core course, may be taken on a credit/no credit basis. The courses counting towards the minor must be incremental units beyond those needed to satisfy the student's major course of study. The minor consists of:

1.		<b>Units</b>
	LINGUIST 1 Introduction to Linguistics	4
	Select two of the following:	8
	LINGUIST 110 Introduction to Phonetics and Phonology	
	LINGUIST 120 Introduction to Syntax	
	LINGUIST 130A Introduction to Semantics and Pragmatics	
	Select one of the following:	4
	LINGUIST 150 Language in Society	
	LINGUIST 160 Introduction to Language Change	

or, in advance consultation with the Linguistics undergraduate studies adviser, a course in historical linguistics or the history of a language.

- At least four other courses determined in advance consultation with the Linguistics undergraduate studies adviser. Students are encouraged to take at least one 200-level Linguistics course. Students may also choose to do independent work with a faculty member of their choice.

## Master of Arts in Linguistics

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The following are additional departmental requirements. Candidates should review the department's Guidelines for the M.A. Degree in Linguistics for further particulars concerning these requirements.

- Courses:** candidates must complete 45 units of graduate work in Linguistics. Individual programs should be worked out in advance with an adviser in Linguistics. The majority of courses should be chosen to provide a broad foundation in Linguistics. Candidates should also develop an area of specialization; at least four courses should be in this area. No more than two courses should be at the 100 level. The overall grade point average (GPA) must be at least 3.0 (B) for all degree program course work.

- Language:** reading knowledge of a non-native language in which a substantial linguistic literature is written, with sufficient facility to understand and interpret linguistic research published in that language, or in-depth research on the structure of a non-native language.
- Thesis or Thesis Project:** a research paper supervised by a committee of three faculty (normally fulfilled by up to 6 units of LINGUIST 398 Directed Research).

## Coterminal Bachelor's and Master's Degree Program in Linguistics

The Department of Linguistics admits a limited number of undergraduates to the coterminal degree program. Students are required to submit to the department a complete application, which includes a statement of purpose identifying a thesis topic, a Stanford transcript, three letters of recommendation (at least one of which must be from a faculty member in Linguistics), and a proposed course of study (worked out in advance with a Linguistics adviser). Applicants for the coterminal degree may apply as early as their eighth quarter and no later than early in the eleventh quarter of undergraduate study. Decisions on admission to the coterminal degree program rest with the Graduate Admissions Committee of the Department of Linguistics. For further application information, see the department's web pages.

For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://registrar.stanford.edu/shared/publications.htm#Coterm>) web site.

## Doctor of Philosophy in Linguistics

The following requirements are in addition to the basic University requirements for the degree sought; see the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. Candidates should review the department's Guidelines for the Degree of Ph.D. in Linguistics, downloadable at <https://linguistics.stanford.edu/department-resources/> for further particulars concerning these requirements.

- Language**—candidates must demonstrate the ability to read at least one foreign language in which a substantial linguistic literature is written, with sufficient facility to understand and to interpret linguistic research published in that language. (Particular areas of specialization may require additional research languages.) In addition, each candidate must demonstrate an explicit in-depth knowledge of the structure of at least one language (normally neither the candidate's native language nor the language used for the reading exam). This requirement is fulfilled by writing an original research paper on a language.
- Courses**—a minimum of 135 units of graduate work beyond the bachelor's degree, or 90 units beyond the master's degree. The course requirements detailed in the Guidelines for the Degree of Ph.D. in Linguistics guarantee that each student covers a sufficient set of subareas within the field. Candidates must maintain a satisfactory record in the number and distribution of units completed. The overall course work GPA must be at least 3.0 (B), and all of the basic courses should be completed with at least a 'B.'
- Research**—the prospective Ph.D. candidate is expected to complete two substantial qualifying papers. The deadline for completion of the first qualifying paper is the end of Autumn Quarter of the second



year; the deadline for completion of the second qualifying paper is the end of Autumn Quarter of the third year. The subject matter of the two papers, although it may be related (for example, same language), must be clearly distinct. The requirement is fulfilled by two quarters of LINGUIST 395 Research Workshop (1-2 units each), and by oral discussion with a committee of at least three faculty members selected by the student and the faculty.

4. *Candidacy*—students must complete a prescribed portion of the basic course requirement (see item 2 above), one foreign language requirement (see item 1 above), and one qualifying paper (see item 3 above) by the end of their sixth academic quarter, normally the Spring Quarter of the second year. The department faculty reviews each sixth quarter student and votes on whether to admit the student to candidacy. A student is only admitted to candidacy if, in addition to the student's fulfilling the specified department prerequisites, the faculty makes the judgment that the student has the ability to complete the remaining stages of the Ph.D. program at a level of superior quality. Students who are not admitted to candidacy are terminated from the program; at the department's discretion, they may be allowed to complete any requirements that remain for the M.A. degree and receive this degree.
5. *Teaching*—at least three quarters serving as a teaching assistant in Linguistics courses.
6. *Colloquia*—two oral presentations exclusive of the public portion of the University oral (see item 7b below). This requirement is satisfied by class presentations, conference papers, or colloquium talks. Normally, both should be given during the first four years of study.
7. *Dissertation*—
  - A. appointment of a dissertation committee.
  - B. an approved written dissertation proposal is required by the end of Autumn Quarter of the fourth year.
  - C. oral discussion of the dissertation proposal with an augmented dissertation committee.
  - D. passing a University oral examination on the dissertation and related areas which includes a public presentation of the dissertation research.
  - E. dissertation (up to 15 units of LINGUIST 399 Dissertation Research).

## Ph.D. Minor in Linguistics

1. Courses: the candidate must complete 30 units of course work in linguistics. The University requires that at least 20 of these units be at the 200 level or above; the remaining 10 units must be at the 100 level or above. The course work for the minor must include LINGUIST 110 Introduction to Phonetics and Phonology, LINGUIST 120 Introduction to Syntax, and either LINGUIST 130A Introduction to Semantics and Pragmatics or LINGUIST 130B Introduction to Lexical Semantics or 200-level introductory courses in the same areas and at least three courses related to the area of specialization. Courses submitted for the minor must be incremental units beyond those used to satisfy the major. Individual programs should be worked out in advance with the student's Ph.D. minor adviser in Linguistics.
2. Research Project (optional): the candidate may elect to present a paper which integrates the subject matter of linguistics into the field of specialization of the candidate.
3. The Linguistics minor adviser or designee serves on the candidate's University oral examination committee and may request that up to one-third of the examination be devoted to the minor subject.

*Emeriti:* (Professors) Joan Bresnan, Clara N. Bush, Shirley Brice Heath, William R. Leben, Stanley Peters, Elizabeth C. Traugott

*Chair:* Thomas A. Wasow

*Professors:* Eve V. Clark (on leave), Penelope Eckert, Daniel Jurafsky (on leave), Martin Kay (leave Fall), Paul Kiparsky, Beth Levin, Christopher Manning, John R. Rickford (leave Fall/Winter), Ivan A. Sag (leave Fall/Spring), Thomas A. Wasow

*Associate Professors:* Arto Anttila, Christopher Potts

*Assistant Professors:* Vera Gribova, Robert Podesva, Meghan Sumner

*Courtesy Professors:* Herbert H. Clark, Kenji Hakuta, Yoshiko Matsumoto, James McClelland, Orrin W. Robinson III, Chao Fen Sun

*Courtesy Associate Professors:* H. Samy Alim, James A. Fox, Miyako Inoue,

*Courtesy Assistant Professor:* Michael C. Frank, Noah Goodman

*Senior Lecturer:* Philip L. Hubbard, Language Center

*Lecturers:* Bill MacCartney (Winter), Kamal Mansour (Spring), Asya Pereltsvaig

*Consulting Professors:* Jared Bernstein, Ronald Kaplan, Lauri Karttunen, Paul Kay, Livia Polanyi, Annie Zaenen, Arnold Zwicky

# Mathematical and Computational Science

Courses offered by the program in Mathematical and Computational Science are listed under the subject code MCS on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) website.

This interdepartmental interschool undergraduate program provides a major for students interested in the mathematical and computational sciences, or in the use of mathematical ideas and analysis in problems in the social or management sciences. It provides a core of mathematics basic to all the mathematical sciences and an introduction to concepts and techniques of computation, optimal decision making, probabilistic modeling, and statistical inference. It also provides an opportunity for elective work in any of Stanford's mathematical science disciplines.

The program uses the faculty and courses of the departments of Computer Science, Management Science and Engineering, Mathematics, and Statistics. It prepares students for graduate study or employment in the mathematical and computational sciences or in those areas of applied mathematics which center around the use of computers and are concerned with the problems of the social and management sciences. A biology option is offered for students interested in applications of mathematics, statistics, and computer science to the biological sciences (bioinformatics, computational biology, statistical genetics, neurosciences); and in a similar spirit, an engineering option.

## Undergraduate Mission Statement for Mathematical and Computational Science

The mission of the Mathematical and Computational Science Program is to provide students with a core of mathematics basic to all the mathematical sciences and an introduction to concepts and techniques of computation, optimal decision making, probabilistic modeling and statistical inference. The program is interdisciplinary in its focus, and students are required to complete course work in mathematics, computer science, statistics, and management science and engineering. A computational biology track is available for students interested in biomedical applications. The program

prepares students for careers in academic, financial and government settings as well as for study in graduate or professional schools.

## Learning Outcomes

The program expects undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to be able to demonstrate:

1. understanding of principles and tools of statistics.
2. command of optimization and its applications and the ability to analyze and interpret problems from various disciplines.
3. an understanding of computer applications emphasizing modern software engineering principles.
4. an understanding of multivariate calculus, linear algebra, and algebraic and geometric proofs.

## Bachelor of Science in Mathematical and Computational Science

The requirement for the bachelor's degree, beyond the University's basic requirements, is an approved course program of 73-77 units, distributed as follows:

	Units
<b>Mathematics (MATH) (31)</b>	
MATH 41      Calculus *	5
MATH 42      Calculus *	5
Select one of the following:	5
MATH 51      Linear Algebra and Differential Calculus of Several Variables	
MATH 51H     Honors Multivariable Mathematics	
Select one of the following:	5
MATH 52      Integral Calculus of Several Variables	
MATH 52H     Honors Multivariable Mathematics	
Select one of the following:	5
MATH 53      Ordinary Differential Equations with Linear Algebra	
MATH 53H     Honors Multivariable Mathematics	
Select one of the following:	3
MATH 109     Applied Group Theory (satisfies WIM)	
MATH 110     Applied Number Theory and Field Theory (satisfies WIM)	
MATH 120     Groups and Rings (satisfies WIM)	
MATH 171     Fundamental Concepts of Analysis (satisfies WIM)	
Select one of the following:	3
MATH 104     Applied Matrix Theory	
MATH 113     Linear Algebra and Matrix Theory	
<b>Computer Science (CS) (18-24)</b>	
CS 103          Mathematical Foundations of Computing	5
Select one of the following:	5-10
CS 106X       Programming Abstractions (Accelerated)	
or both	
CS 106A       Programming Methodology	
CS 106B       Programming Abstractions	

Select two of the following:	8-9
CME 108       Introduction to Scientific Computing	
CS 107        Computer Organization and Systems	
CS 154        Introduction to Automata and Complexity Theory	
CS 161        Design and Analysis of Algorithms	
CS 181W       Computers, Ethics and Public Policy (satisfies WIM)	

<b>Management Science and Engineering (MS&amp;E) (6-7)</b>		
MS&E 211        Linear and Nonlinear Optimization		3-4
MS&E 221        Stochastic Modeling		3

Or select three of the following:		
MS&E 111     Introduction to Optimization		
MS&E 121     Introduction to Stochastic Modeling		
MS&E 211     Linear and Nonlinear Optimization		
MS&E 212     Mathematical Programming and Combinatorial Optimization		
MS&E 221     Stochastic Modeling		
MS&E 251     Stochastic Decision Models		

<b>Statistics (STATS) (11-12)</b>		
STATS 116       Theory of Probability		5
STATS 200       Introduction to Statistical Inference		3
Select one of the following:		3-4
STATS 191    Introduction to Applied Statistics		
STATS 203    Introduction to Regression Models and Analysis of Variance		

\* Students with AP credit receive 10 units for Math 41 & 42 and should enroll in Math 51-53 series.

## Mathematical and Computational Science Electives (9 Units)

Three courses in mathematical and computational science, 100-level or above, at least 3 units each.

	Units
Select at least one of the following:	9-15
ECON 140     Introduction to Financial Economics	
ECON 160     Game Theory and Economic Applications	
ECON 179     Experimental Economics	
EE 261        The Fourier Transform and Its Applications	
EE 263        Introduction to Linear Dynamical Systems	
EE 278B      Introduction to Statistical Signal Processing	
EE 282        Computer Systems Architecture	
EE 364B      Convex Optimization II	
MS&E 211     Linear and Nonlinear Optimization	
MS&E 221     Stochastic Modeling	
MS&E 212     Mathematical Programming and Combinatorial Optimization	
MS&E 251     Stochastic Decision Models	
MATH 104     Applied Matrix Theory	
MATH 106     Functions of a Complex Variable	
MATH 108     Introduction to Combinatorics and Its Applications	
MATH 113     Linear Algebra and Matrix Theory	
MATH 115     Functions of a Real Variable	
MATH 116     Complex Analysis	
MATH 131P    Partial Differential Equations I	
MATH 136/    Stochastic Processes	
STATS 219	

MATH 171	Fundamental Concepts of Analysis
MATH 172	Lebesgue Integration and Fourier Analysis
MATH 174	Calculus of Variations
PHIL 151	First-Order Logic (Winte)
STATS 202	Data Mining and Analysis
STATS 208	Introduction to the Bootstrap
STATS 215	Statistical Models in Biology
STATS 217	Introduction to Stochastic Processes

For Computer Science (CS), electives can include courses not taken as units under the CS list above and the following:

CME 206	Introduction to Numerical Methods for Engineering
CME 302	Numerical Linear Algebra
CS 108	Object-Oriented Systems Design
CS 110	Principles of Computer Systems
CS 140	Operating Systems and Systems Programming
CS 143	Compilers
CS 157	Logic and Automated Reasoning
CS 161	Design and Analysis of Algorithms
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion
CS 194	Software Project
CS 221	Artificial Intelligence: Principles and Techniques
CS 223A	Introduction to Robotics
CS 225A	Experimental Robotics
CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 229	Machine Learning
CS 243	Program Analysis and Optimizations
CS 248	Interactive Computer Graphics

With the adviser's approval, courses other than those offered by the sponsoring departments may be used to fulfill part of the elective requirement. These may be in fields such as biology, economics, electrical engineering, industrial engineering, and medicine, that might be relevant to a mathematical sciences major, depending on a student's interests.

- At least three quarters before graduation, majors must file with their advisers a plan for completing degree requirements.
- All courses used to fulfill major requirements must be taken for a letter grade with the exception of courses offered satisfactory/no credit only.
- A course used to fulfill the requirements of one section of the program may not be applied toward the fulfillment of the requirements of another section.
- The student must have a grade point average (GPA) of 2.0 or better in all course work used to fulfill the major requirement.
- Electives that are not offered this year, but may be offered in subsequent years, are eligible for credit toward the major: CME 311, Econ 102C, MCS 100/ Stats 50

## Mathematical and Computational Science Biology Option

STATS/BIO 141 Biostatistics <sup>1</sup>

Units  
3-5

Select two of the following from the Biology Core:

BIO 41	Genetics, Biochemistry, and Molecular Biology
BIO 42	Cell Biology and Animal Physiology
BIO 43	Plant Biology, Evolution, and Ecology

Select one of the following:

BIO 41	Genetics, Biochemistry, and Molecular Biology
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BIO 42	Cell Biology and Animal Physiology
BIO 43	Plant Biology, Evolution, and Ecology
BIO 102	Demography: Health, Development, Environment
BIO 136	Evolutionary Paleobiology
BIO 143	Evolution
BIO 144	Conservation Biology
BIO 160A	Developmental Biology I
BIO 160B	Developmental Biology II
BIO 183	Theoretical Population Genetics
BIO 230	Molecular and Cellular Immunology

Honors students select the following three courses:

BIO 113	Fundamentals of Molecular Evolution
BIO 146	Population Studies

<sup>1</sup> Replaces STATS 191 Introduction to Applied Statistics/STATS 203 Introduction to Regression Models and Analysis of Variance with STATS 141 Biostatistics/BIO 141 Biostatistics

## Mathematical and Computational Science Engineering Option

Students in the Engineering option take the introductory courses for the Mathematics and Computational Sciences major with the following allowable substitutions.

	Units
The MATH 51-53 series may be replaced by:	
CME 100/ENGR 154	5
CME 102/ENGR 155A	5
CME 104/ENGR 155B	5
CME 200	3
STATS 116 may be replaced by:	
STATS 110	3
STATS 191/STATS 203 may be replaced by:	
STATS 202	3
Engineering Track Electives:	
Select one of the following:	
MATH 106	3
MATH 108	3
MATH 116	3
MATH 174	3
PHIL 151	3
Select two of the following:	
ENGR 15	3
ENGR 20	3
ENGR 25B	3
ENGR 30	3
ENGR 40	3
ENGR 50	3
ENGR 105	3

## Honors Program

The honors program is designed to encourage a more intensive study of mathematical sciences than the B.S. program. In addition to meeting all requirements for the B.S., the student must:

1. Maintain an average letter grade equivalent to at least a 3.5 in all academic work.
2. Complete at least 15 units in mathematical sciences in addition to the requirements for the major listed above. Include in these 15 units at least one of the following:
  - A. An approved higher-level graduate course
  - B. Participation in a small group seminar
  - C. At least 3 units of directed reading
3. Prepare a statement describing major area of concentration for honors work.
4. Describe how each course selected added to the student's knowledge and understanding in area chosen for concentration.
5. Students interested in honors should consult with their adviser by last quarter of their junior year to prepare their program of study. Honors work may be concentrated in fields such as biological sciences, environment, physics, etc.
6. Suggested electives for students pursuing Honors: EE 364, CME 206, CS 229, CS 248

## Minor in Mathematical and Computational Science

The minor in Mathematical and Computational Science is intended to provide an experience of the four constituent areas: Computer Science, Mathematics, Management Science and Engineering, and Statistics. Five basic courses are required:

Select one of the following:	Units	3
CS 106X	Programming Abstractions (Accelerated)	3-5
or		
CS 106A & CS 106B	Programming Methodology and Programming Abstractions	
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
or		
MATH 104	Applied Matrix Theory	
MS&E 211	Linear and Nonlinear Optimization	3-4
or		
MS&E 221	Stochastic Modeling	
STATS 116	Theory of Probability	3-5
and		
STATS 191	Introduction to Applied Statistics	3-4
or		
STATS 200	Introduction to Statistical Inference	
In addition to the above, the minor requires three courses from the following, two of which must be in different departments:	Units	9
CME 108	Introduction to Scientific Computing	
CS 103	Mathematical Foundations of Computing	
CS 107	Computer Organization and Systems	

CS 154	Introduction to Automata and Complexity Theory
CS 161	Design and Analysis of Algorithms
EE 261	The Fourier Transform and Its Applications
ECON 160	Game Theory and Economic Applications
MS&E 211	Linear and Nonlinear Optimization
MS&E 221	Stochastic Modeling
MS&E 251	Stochastic Decision Models
MATH 104	Applied Matrix Theory
MATH 106	Functions of a Complex Variable
MATH 108	Introduction to Combinatorics and Its Applications
MATH 109	Applied Group Theory
MATH 110	Applied Number Theory and Field Theory
MATH 115	Functions of a Real Variable
MATH 131P	Partial Differential Equations I
MATH 171	Fundamental Concepts of Analysis
MATH 174	Calculus of Variations
PHIL 151	First-Order Logic
STATS 191	Introduction to Applied Statistics
STATS 200	Introduction to Statistical Inference
STATS 202	Data Mining and Analysis
STATS 203	Introduction to Regression Models and Analysis of Variance
STATS 217	Introduction to Stochastic Processes

Other upper-division courses appropriate to the program major may be substituted with consent of the program director. Undergraduate majors in the constituent programs may not count courses in their own departments.

*Co-Directors:* Bradley Efron, Susan Holmes

*Committee in Charge:* Takeshi Amemiya (Economics, emeritus), Emmanuel Candes (Mathematics, Statistics), Gunnar Carlsson (Mathematics), Richard Cottle (Management Science and Engineering, emeritus), Bradley Efron (Statistics), Margot Gerritsen (ICME), J. Michael Harrison (Graduate School of Business), Susan Holmes (Statistics), Parviz Moin (Engineering), George Papanicolaou (Mathematics), Eric Roberts (Computer Science), David Rogosa (Education), Tim Roughgarden (Computer Science), Chiara Sabatti (Statistics), Amin Saberi (Management Science and Engineering), David Siegmund (Statistics), Jonathan Taylor (Statistics), Arthur F. Veinott, Jr. (Management Science and Engineering, emeritus), Brian White (Mathematics).

## Mathematics

Courses offered by the Department of Mathematics are listed under the subject code MATH on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MATH&filter-catalognumber-MATH=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MATH&filter-catalognumber-MATH=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MATH&filter-catalognumber-MATH=on>).

The Department of Mathematics offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy in Mathematics, and participates in the program leading to the B.S. in Mathematical and Computational Science. The department also participates in the M.S. and Ph.D. degree programs in Scientific Computing and Computational Mathematics and the M.S. degree program in Financial Mathematics.

# Mission of the Undergraduate Program in Mathematics

The mission of the undergraduate program in Mathematics is to provide students with a broad understanding of mathematics encompassing logical reasoning, generalization, abstraction, and formal proof. Courses in the program teach students to create, analyze, and interpret mathematical models and to communicate sound arguments based on mathematical reasoning and careful data analysis. The mathematics degree prepares students for careers in the corporate sector and government agencies, and for graduate programs in mathematics.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. problem solving skills.
2. the ability to formulate proofs and to structure mathematical arguments.
3. the ability to communicate mathematical ideas via extended written presentation.

## Advanced Placement in Mathematics for Freshmen

Students of unusual ability in mathematics often take one or more semesters of college-equivalent courses in mathematics while they are still in high school. Under certain circumstances, it is possible for such students to secure both advanced placement and credit toward the bachelor's degree. A decision as to placement and credit is made by the department after consideration of the student's performance on the Advanced Placement Examination in Mathematics (forms AB or BC) of the College Entrance Examination Board, and also after consideration of transfer credit in mathematics from other colleges and universities.

The department does not give its own advanced placement examination. Students can receive either 5 or 10 units of advanced placement credit, depending on their scores on the CEEB Advanced Placement Examination. Entering students who have credit for two quarters of single variable calculus (10 units) are encouraged to enroll in:

Select one of the following series:			Units
<b>Standard Series (15)</b>			
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5	
MATH 52	Integral Calculus of Several Variables	5	
MATH 53	Ordinary Differential Equations with Linear Algebra	5	
<b>Honors Series (15)</b>			
MATH 51H	Honors Multivariable Mathematics	5	
MATH 52H	Honors Multivariable Mathematics	5	
MATH 53H	Honors Multivariable Mathematics	5	

These three-course sequences, which can be completed during the freshman year, supply the necessary mathematics background for most majors in science and engineering. They also serve as excellent background for the

major or minor in Mathematics, or in Mathematical and Computational Science.

Students who have credit for one quarter of single variable calculus (5 units) should take:

		Units
MATH 42	Calculus (Autumn Quarter)	5
MATH 51	Linear Algebra and Differential Calculus of Several Variables (Winter Quarter)	5
Options available in Spring Quarter include:		
MATH 52	Integral Calculus of Several Variables	5
or MATH 53	Ordinary Differential Equations with Linear Algebra	

For proper placement, contact the Department of Mathematics.

## Bachelor of Science in Mathematical and Computational Science

The Department of Mathematics participates with the departments of Computer Science, Management Science and Engineering, and Statistics in a program leading to a B.S. in Mathematical and Computational Science. See the "Mathematical and Computational Science (p. 472)" section of this bulletin.

## Introductory and Undergraduate Courses

The department offers two sequences of introductory courses in single variable calculus.

1. and MATH 42 Calculus present single variable calculus. Differential calculus is covered in the first quarter, integral calculus in the second.
2. MATH 19 Calculus, MATH 20 Calculus, and MATH 21 Calculus cover the material in MATH 41 Calculus, MATH 42 Calculus in three quarters instead of two.

There are options for studying multivariable mathematics:

1. MATH 51 Linear Algebra and Differential Calculus of Several Variables, MATH 52 Integral Calculus of Several Variables, and MATH 53 Ordinary Differential Equations with Linear Algebra cover differential and integral calculus in several variables, linear algebra, and ordinary differential equations. These topics are taught in an integrated fashion and emphasize application. MATH 51 Linear Algebra and Differential Calculus of Several Variables covers differential calculus in several variables and introduces matrix theory and linear algebra; MATH 52 Integral Calculus of Several Variables covers integral calculus in several variables and vector analysis; MATH 53 Ordinary Differential Equations with Linear Algebra studies further topics in linear algebra and applies them to the study of ordinary differential equations. This sequence is strongly recommended for incoming freshmen with 10 units of advanced placement credit.
2. MATH 51H Honors Multivariable Mathematics, MATH 52H Honors Multivariable Mathematics, and MATH 53H Honors Multivariable Mathematics cover the same material as MATH 51 Linear Algebra and Differential Calculus of Several Variables, MATH 52 Integral Calculus of Several Variables, and MATH 53 Ordinary Differential Equations with Linear Algebra, but with more emphasis on theory and rigor.

The department offers three classes on linear algebra:

		Units
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
or MATH 51H	Honors Multivariable Mathematics	

MATH 104	Applied Matrix Theory	3
MATH 113	Linear Algebra and Matrix Theory	3

## Learning Outcomes (Graduate)

The Master's Degree is conferred upon candidates who have developed advanced knowledge and skills in Mathematics. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Mathematics. Through completion of advanced coursework and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Mathematics and to interpret and present the results of such research.

## Bachelor of Science in Mathematics

The following department requirements are in addition to the University's basic requirements for the bachelor's degree:

Students wishing to major in Mathematics must satisfy the following requirements:

1. Department of Mathematics courses (other than MATH 100 Mathematics for Elementary School Teachers) totaling at least 49 units credit; such courses must be taken for a letter grade. For the purposes of this requirement, STATS 116 Theory of Probability, PHIL 151 First-Order Logic, and PHIL 152 Computability and Logic count as Department of Mathematics courses.
2. Additional courses taken from Department of Mathematics courses numbered 101 and above or from approved courses in other disciplines with significant mathematical content, totaling at least 15 units credit. At least 9 of these units must be taken for a letter grade.
3. A Department of Mathematics adviser must be selected, and the courses selected under items '1' and '2' above must be approved by the department's director of undergraduate study, acting under guidelines laid down by the department's Committee for Undergraduate Affairs. The Department of Mathematics adviser can be any member of the department's faculty.
4. To receive the department's recommendation for graduation, a student must have been enrolled as a major in the Department of Mathematics for a minimum of two full quarters, including the quarter immediately before graduation. Students are encouraged to declare as early as possible, preferably by the end of the sophomore year.

Students are normally expected to complete either the sequence MATH 19 Calculus, MATH 20 Calculus, MATH 21 Calculus or the sequence MATH 41 Calculus, MATH 42 Calculus (but not both). Students with an Advanced Placement score of at least 4 in BC math or 5 in AB math may receive 10 units credit and fulfill requirement '1' by taking at least 39 units of Department of Mathematics courses numbered 51 and above. Students with an Advanced Placement score of at least 3 in BC math or at least 4 in AB math may receive 5 units credit and fulfill requirement '1' by taking at least 44 units of Department of Mathematics courses numbered 42 and above.

Sophomore seminar courses may be counted among the choice of courses under item '1'. Other variations of the course requirements laid down above (under items '1' and '2') may, in some circumstances, be allowed. For example, students transferring from other universities may be allowed

credit for some courses completed before their arrival at Stanford. However, at least 24 units of the 49 units under item '1' above and 9 of the units under item '2' above must be taken at Stanford. In all cases, approval for variations in the degree requirements must be obtained from the department's Committee for Undergraduate Affairs. Application for such approval should be made through the department's director of undergraduate studies. The policy of the Mathematics Department is that no courses other than the MATH 50 series and below may be double-counted toward any other University major or minor.

It is to be emphasized that the above regulations are minimum requirements for the major; students contemplating graduate work in mathematics are strongly encouraged to include the courses MATH 116 Complex Analysis, MATH 120 Groups and Rings, MATH 121 Galois Theory, MATH 147 Differential Topology or MATH 148 Algebraic Topology, and MATH 171 Fundamental Concepts of Analysis in their selection of courses, and in addition, take at least three Department of Mathematics courses over and above the minimum requirements laid out under items '1' and '2' above, including at least one 200-level course. Such students are also encouraged to consider the possibility of taking the honors program, discussed below.

To help develop a sense of the type of course selection (under items '1' and '2' above) that would be recommended for math majors with various backgrounds and interests, see the following examples. These represent only a few of a very large number of possible combinations of courses that could be taken in fulfillment of the Mathematics major requirements:

### Example 1

A general program (a balanced program of both pure and applied components, without any particular emphasis on any one field of mathematics or applications) as follows:

	Units
Select one of the following series or Advanced Placement credit (see the Overview tab for details):	10
MATH 19 Calculus & MATH 20 and Calculus & MATH 21 and Calculus	
MATH 41 Calculus & MATH 42 and Calculus	
Math 50 Series:	15
MATH 51 Linear Algebra and Differential Calculus of Several & MATH 52 Variables & MATH 53 and Integral Calculus of Several Variables and Ordinary Differential Equations with Linear Algebra	
MATH 104 Applied Matrix Theory	3
or MATH 113 Linear Algebra and Matrix Theory	
MATH 106 Functions of a Complex Variable	3
MATH 109 Applied Group Theory	3
MATH 110 Applied Number Theory and Field Theory	3
MATH 115 Functions of a Real Variable	3
Plus any selection of at least eight of the following courses, including three Department of Mathematics courses:	24
MATH 108 Introduction to Combinatorics and Its Applications	
MATH 131P Partial Differential Equations I	
MATH 132 Partial Differential Equations II	
MATH 143 Differential Geometry	
MATH 146 Analysis on Manifolds	
MATH 147 Differential Topology	
MATH 148 Algebraic Topology	
MATH 152 Elementary Theory of Numbers	
MATH 161 Set Theory	
CME 108 Introduction to Scientific Computing	

ECON 50	Economic Analysis I
PHYSICS 41	Mechanics
PHYSICS 43	Electricity and Magnetism
PHYSICS 45	Light and Heat
STATS 116	Theory of Probability
<hr/>	
Total Units	64

The courses from other departments are only meant as examples; there are many suitable courses in several departments that can be taken to fulfill part or all of requirement '2'.

## Example 2

A theoretical program recommended for those contemplating possible later graduate work providing an introduction to the main areas of mathematics both broader and deeper than the general program outlined above:

	<b>Units</b>
Select one of the following series or Advanced Placement credit (see the Overview tab for details):	10
MATH 19 & MATH 20 & MATH 21	Calculus and Calculus and Calculus
MATH 41 & MATH 42	Calculus and Calculus
Math 50 Series:	15
MATH 51	Linear Algebra and Differential Calculus of Several Variables
or MATH 51H	Honors Multivariable Mathematics
MATH 52	Integral Calculus of Several Variables
or MATH 52H	Honors Multivariable Mathematics
MATH 53	Ordinary Differential Equations with Linear Algebra
or MATH 53H	Honors Multivariable Mathematics
In addition to the series, the following courses are recommended:	
MATH 106	Functions of a Complex Variable
or MATH 116	Complex Analysis
MATH 113	Linear Algebra and Matrix Theory
MATH 120	Groups and Rings
MATH 171	Fundamental Concepts of Analysis
Plus nine or more 3-unit math courses numbered 121 or higher (the logic courses PHIL 151 and PHIL 152 are considered to be such courses), including at least one algebra course, one analysis course, and one geometry/topology course. (See the description of the honors program below)	27
<hr/>	
Total Units	64

In addition, those contemplating eventual graduate work in Mathematics should consider including at least one graduate-level math course such as MATH 205A Real Analysis, MATH 210A Modern Algebra I, or MATH 215A Complex Analysis, Geometry, and Topology or MATH 215B Complex Analysis, Geometry, and Topology. Such students should also consider the possibility of entering the honors program.

## Example 3

An applied mathematics\* program:

	<b>Units</b>
Select one of the following series or Advanced Placement credit (see the Overview tab for details):	10

MATH 19 & MATH 20 & MATH 21	Calculus and Calculus and Calculus
MATH 41 & MATH 42	Calculus and Calculus
Math 50 Series:	15
MATH 51 & MATH 52 & MATH 53	Linear Algebra and Differential Calculus of Several Variables and Integral Calculus of Several Variables and Ordinary Differential Equations with Linear Algebra
MATH 104	Applied Matrix Theory
MATH 106	Functions of a Complex Variable
MATH 108	Introduction to Combinatorics and Its Applications
MATH 109	Applied Group Theory
MATH 110	Applied Number Theory and Field Theory
MATH 115	Functions of a Real Variable
MATH 131P	Partial Differential Equations I
MATH 132	Partial Differential Equations II
STATS 116	Theory of Probability
Plus at least 12 units of additional courses in applied mathematics, including, for example, suitable courses from the departments of Physics, Computer Science, Economics, Engineering, and Statistics.	12
<hr/>	
Total Units	64-66

\* Students interested in applied mathematics, but desiring a broader-based program than the type of program suggested in Example 3, including significant computational and/or financial and/or statistical components, are encouraged to also consider the Mathematics and Computational Science program.

## Honors Program

The honors program is intended for students who have strong theoretical interests and abilities in mathematics. The goal of the program is to give students a thorough introduction to the main branches of mathematics, especially analysis, algebra, and geometry. Through the honors thesis, students may be introduced to a current or recent research topic, although occasionally more classical projects are encouraged. The program provides an excellent background with which to enter a Master's or Ph.D. program in Mathematics. Students completing the program are awarded a B.S. in Mathematics with Honors.

It is recommended that the sequence MATH 51H Honors Multivariable Mathematics, MATH 52H Honors Multivariable Mathematics, and MATH 53H Honors Multivariable Mathematics be taken in the freshman year. To graduate with a B.S. in Mathematics with Honors, the following conditions apply in addition to the usual requirements for math majors:

- The selection of courses under items '1' and '2' above must contain:

	<b>Units</b>
MATH 106	Functions of a Complex Variable
or MATH 116	Complex Analysis
MATH 120	Groups and Rings
MATH 171	Fundamental Concepts of Analysis

And must also include seven additional 3-unit Math courses numbered 121 or higher. (The logic courses PHIL 151 First-Order Logic and PHIL 152 Computability and Logic can also be used.) These seven courses must include at least:

	<b>Units</b>
One Algebra Course:	
MATH 121	Galois Theory
MATH 122	Modules and group representations
MATH 152	Elementary Theory of Numbers

MATH 154	Algebraic Number Theory	3
MATH 155	Analytic Number Theory	3
One Analysis Course:		
MATH 131P	Partial Differential Equations I	3
MATH 132	Partial Differential Equations II	3
MATH 136	Stochastic Processes	3
MATH 151	Introduction to Probability Theory	3
MATH 175	Elementary Functional Analysis	3
One Geometry/Topology Course:		
MATH 143	Differential Geometry	3
MATH 146	Analysis on Manifolds	3
MATH 147	Differential Topology	3
MATH 148	Algebraic Topology	3

- Students in the honors program must write a senior thesis. In order to facilitate this, the student must, by the end of the junior year, choose an undergraduate thesis adviser from the Department of Mathematics faculty, and map out a concentrated reading program under the direction and guidance of the adviser. During the senior year, the student must enroll in MATH 197 Senior Honors Thesis for a total of 6 units (typically spread over two quarters), and work toward completion of the thesis under the direction and guidance of the thesis adviser. The thesis may contain original material, or be a synthesis of work in current or recent research literature. The 6 units of credit for MATH 197 Senior Honors Thesis are required in addition to the course requirements laid out under items '1' and '2' above and in addition to all other requirements for math majors.

In addition to the minimum requirements laid out above, it is strongly recommended that students take at least one graduate-level course (that is, at least one course in the 200 plus range). MATH 205A Real Analysis, MATH 210A Modern Algebra I, and MATH 215A Complex Analysis, Geometry, and Topology or MATH 215B Complex Analysis, Geometry, and Topology are especially recommended in this context.

Students with questions about the honors program should see the director of undergraduate advising.

## Minor in Mathematics

To qualify for the minor in Mathematics, a student should complete, for a letter grade, at least six Department of Mathematics courses (other than MATH 100 Mathematics for Elementary School Teachers) numbered 51 or higher, totaling a minimum of 24 units. For the purposes of this requirement, STATS 116 Theory of Probability, PHIL 151 First-Order Logic, and PHIL 152 Computability and Logic count as Department of Mathematics courses. No other courses from outside the Department of Mathematics may be used towards the minor in Mathematics.

It is recommended that these courses include:

	Units	
<b>Math Minor (24)</b>		
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
or MATH 51H	Honors Multivariable Mathematics	
MATH 52	Integral Calculus of Several Variables	5
or MATH 52H	Honors Multivariable Mathematics	
MATH 53	Ordinary Differential Equations with Linear Algebra	5
or MATH 53H	Honors Multivariable Mathematics	
Plus three additional MATH courses		9
<hr/> Total Units		24

At least 12 of the units applied toward the minor in Mathematics must be taken at Stanford. The policy of the Mathematics Department is that no courses other than the MATH 50 series and below may be double-counted toward any other University major or minor.

## Master of Science in Mathematics

The University's basic requirements for the master's degree are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. Students should pay particular attention to the University's course requirements for graduate degrees. The following are specific departmental requirements:

Candidates must complete an approved course program of 45 units of courses beyond the department requirements for the B.S. degree, of which at least 36 units must be Mathematics Department courses, taken for a letter grade. The Mathematics Department courses must include at least 18 units numbered 200 or above. The candidate must have a grade point average (GPA) of 3.0 (B) over all course work taken in Mathematics, and a GPA of 3.0 (B) in the 200-level courses considered separately. Course work for the M.S. degree must be approved during the first quarter of enrollment in the program by the department's Director of Graduate Studies.

For the M.S. degree in Financial Mathematics, see the "Financial Mathematics (p. 398)" section of this bulletin.

## Doctor of Philosophy in Mathematics

The University's basic requirements for the doctorate (residence, dissertation, examinations, etc.) are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The following are specific departmental requirements.

To be admitted to candidacy, the student must have successfully completed 27 units of graduate courses (that is, courses numbered 200 and above). In addition, the student must pass qualifying examinations given by the department.

Beyond the requirements for candidacy, the student must complete a course of study approved by the Graduate Affairs Committee of the Department of Mathematics and submit an acceptable dissertation. In accordance with University requirements, Ph.D. students must complete a total of 135 course units beyond the bachelor's degree. These courses should be Department of Mathematics courses or approved courses from other departments. The course program should display substantial breadth in mathematics outside the student's field of application. The student must receive a grade point average (GPA) of 3.0 (B) or better in courses used to satisfy the Ph.D. requirement. In addition, the student must pass the Department area examination and the University oral examination.

Experience in teaching is emphasized in the Ph.D. program. Each student is required to complete nine quarters of such experience. The nature of the teaching assignment for each of those quarters is determined by the department in consultation with the student. Typical assignments include teaching or assisting in teaching an undergraduate course or lecturing in an advanced seminar.

For further information concerning degree programs, fellowships, and assistantships, inquire of the department's student services office.

## Ph.D. Minor in Mathematics

Requirements for the Ph.D. in Mathematics are:



Complete both of the following Sequences: <sup>1,2</sup>

**Sequence 1 (9)**

MATH 106 Functions of a Complex Variable 3  
or MATH 116 Complex Analysis

MATH 131P Partial Differential Equations I 3

MATH 132 Partial Differential Equations II 3

**Sequence 2 (6)**

MATH 113 Linear Algebra and Matrix Theory 3

MATH 120 Groups and Rings 3

or MATH 152 Elementary Theory of Numbers

**Additional Courses (21)**

21 units of 200-level MATH courses <sup>3</sup> 21

Total Units 36

<sup>1</sup> The 100-level courses may have been completed during undergraduate study, and their equivalents from other universities are acceptable.

<sup>2</sup> A third coherent sequence designed by the student, subject to the approval of the graduate committee, may be considered as a substitute for Sequence 1 or 2.

<sup>3</sup> The 200-level courses must be taken at Stanford and approved by the Department of Mathematics Ph.D. minor adviser.

*Emeriti:* Gregory Brumfiel, Solomon Feferman, Robert Finn, Yitzhak Katznelson, Joseph Keller, Georg Kreisel, Harold Levine, Tai-Ping Liu, R. James Milgram, Donald Ornstein

*Chair:* Steven Kerckhoff

*Professors:* Simon Brendle, Daniel Bump, Emmanuel Candes, Gunnar Carlsson, Ralph L. Cohen, Brian Conrad, Amir Dembo, Persi Diaconis, Yakov Eliashberg, Soren Galatius, Eleny Ionel, Steven Kerckhoff, Jun Li, Rafe Mazzeo, Maryam Mirzakhani, George Papanicolaou, Lenya Ryzhik, Richard Schoen, Leon Simon, Kannan Soundararajan, Ravi Vakil, Andras Vasy, Akshay Venkatesh, Brian White, Lexing Ying

*Assistant Professor:* Zhiwei Yun

*Szegő Assistant Professors:* Ricardo Andrade, Isabelle Camilier, Thomas Church, Sheel Ganatra, Zhiyuan Li, Martin Luu, Peter McNamara, Georg Menz, Yi Wang

*Lecturers:* Mark Lucianovic, Rob Rhoades, Christelle Vincent, Wojciech Wiczcerek

*Courtesy Professors:* Renata Kallosh, Grigori Mints

*Consulting Professors:* Brian Conrey, David Hoffman

*Simons Fellows:* Richard Bamler, Alexander Subotic

## Medieval Studies

Stanford Center for Medieval and Early Modern Studies (CMEMS) is a multidisciplinary community working together to produce new perspectives on medieval and early modern studies. The mission of CMEMS is to promote innovative research and foster a lively dialogue among faculty, students, librarians, and research affiliates, to rethink the nature of the field across time, space, and disciplinary boundaries, and to explore the significance of these earlier periods for our understanding of today's world.

There are a number of programs and courses related to medieval and early modern studies. To learn more, please visit our website (<http://cmems.stanford.edu>).

At present, Stanford University does not offer any degrees in Medieval Studies.

### Units

*Affiliated Faculty:* Vincent Barletta (Iberian and Latin American Cultures), Shahzad Bashir (Religious Studies), Carl Bielefeldt (Religious Studies), George H. Brown (English, Emeritus), Steven Carter (Asian Languages), Paula Findlen (History), Charlotte Fonrobert (Religious Studies), Marisa Galvez (French and Italian), Hester Gelber (Religious Studies), Avner Greif (Economics), Hans Ulrich Gumbrecht (French and Italian), Robert Harrison (French and Italian), Michelle Karnes (English), Nancy S.Kollmann (History), Mark E. Lewis (History), William Mahrt (Music), Patricia Parker (Comparative Literature), Bissera Pentcheva (Art and Art History), Barbara Pitkin (Religious Studies, *Lecturer*), Orrin W. Robinson (German Studies), David Riggs (English, Emeritus), Jesse Rodin (Music), Behnam Sadeki (Religious Studies), Carolyn Springer (French and Italian), Kathryn Starkey (German Studies), Laura Stokes (History), Jennifer Summit (English), Elaine Treharne (English)

## Modern Thought and Literature

Courses offered by the Program in Modern Thought and Literature are listed under the subject code MTL on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MTL&filter-catalognumber-MTL=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MTL&filter-catalognumber-MTL=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MTL&filter-catalognumber-MTL=on>).

The program in Modern Thought and Literature admits students for the Ph.D. and a limited number for a coterminal B.A./M.A. Program.

## Graduate Programs in Modern Thought and Literature

Modern Thought and Literature (MTL) is an interdisciplinary humanities graduate program advancing the study of critical issues in the modern world. Since 1971, MTL students have helped to redefine the cutting edge of many interdisciplinary fields and to reshape the ways in which disciplinary scholarship is understood and practiced. MTL graduates are leaders in fields such as American studies, ethnic studies, film studies, social and cultural studies, and women's studies, as well as English and comparative literature.

The program trains students to understand the histories and methods of disciplines and to test their assumptions. It considers how disciplines shape knowledge and, most importantly, how interdisciplinary methods reshape objects of study. MTL students produce innovative analyses of diverse texts, forms, and practices, including those of literature, history, philosophy, anthropology, law, and science; film, visual arts, popular culture, and performance; and material culture and technology.

Each student constructs a unique program of study suited to his or her research. Students have focused on such areas as gender and sexuality; race and ethnicity; science, technology, and medicine; media and performance; legal studies; and critical and social theory. The program's affiliated faculty is drawn from fields throughout the humanities and humanistic social sciences, as well as from education and law. As interdisciplinary study is impossible without an understanding of the disciplines under consideration, each student is expected to master the methods of literary analysis and to gain a foundation in a second field or discipline.

# Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in interdisciplinary literary studies and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in interdisciplinary literary studies. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of interdisciplinary literary studies and to interpret and present the results of such research.

## Master of Arts

The Master of Arts is available to students who are admitted to the doctoral program and have not been awarded an M.A. previously. Students are not admitted into the program for the purpose of earning a terminal Master of Arts degree. Candidates for the Ph.D. who satisfy the committee of their progress and satisfactorily complete 45 units of course work forming a coherent program of study, may apply for an M.A. in Modern Thought and Literature.

## Coterminal Bachelor's and Master's Program in Modern Thought and Literature

Each year, one or two undergraduates who are exceptionally well prepared in literature and at least one foreign language and whose undergraduate course work includes a strong interdisciplinary component, may petition to be admitted to the program for the purpose of completing a coterminal M.A. degree. Admission to this program is granted only on condition that in the course of working on their master's degrees they do not apply to enter the Ph.D. program in Modern Thought and Literature. The deadline for application is early February.

To apply, applicants submit:

1. An unofficial grade transcript from Axess.
2. A Petition for Admission to the Coterminal Program from the Registrar's Office.
3. A statement giving the reasons the student wishes to pursue this program and its place in his or her future plans. This statement should pay particular attention to the reasons why the student could not pursue the studies he or she desires in some other way.
4. An initial plan of study listing, quarter by quarter, each course by name, units, and instructor, to be taken in order to fulfill the requirements for the degree for a total of 45 units, including at least 20 units of advanced work in one literature, and at least 20 units in a coherent interdisciplinary program of courses taken in non-literature departments. (Changes in the course list are to be expected.)
5. A writing sample of critical or analytical prose, 20 pages maximum.
6. Two letters of recommendation from members of the faculty who know the applicant well and who can speak directly to the question of his or her ability to do graduate-level work.
7. A designated adviser from among the Stanford faculty; normally one letter of recommendation will be from this faculty member.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University

application forms, see the Registrar's Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Degree Requirements

The candidate for the M.A. must complete at least 45 units of graduate work, to be divided in the following manner:

1. The introductory seminar, MTL 334A Concepts of Modernity 1: Philosophical Foundations, 5 units; students may substitute MTL 334B Concepts of Modernity 2: The Study of Culture in the Age of Globalization, with the director's permission.
2. At least 20 units of advanced course work in literature, to be approved by the director.
3. At least 20 units of course work in a coherent and individually arranged interdisciplinary program, to be approved by the director.

By the end of the course of study, each candidate must also demonstrate a reading knowledge of at least one foreign language.

## Doctor of Philosophy in Modern Thought and Literature

University requirements for the Ph.D. are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

A candidate for the Ph.D. degree in Modern Thought and Literature must complete three years (nine quarters) of full-time work, or the equivalent, in graduate study beyond the B.A. degree. He or she is expected to complete at least 18 courses of graduate work in addition to the dissertation. Students may spend one year of graduate study abroad.

Requirements for the Ph.D. in Modern Thought and Literature are:

- |    |  | Units |
|----|--|-------|
| 1. | MTL 334A Concepts of Modernity 1: Philosophical Foundations  | 5     |
|    | MTL 334B Concepts of Modernity 2: The Study of Culture in the Age of Globalization                             | 5     |
|    | MTL 299 Edgework: New Directions in the Study of Culture (Spring Quarter; required of all first-year students) | 1-3   |
2. A coherent program of eight courses of advanced work in literary studies to be worked out with the adviser, of which at least six must be regularly scheduled courses in literature. Courses in the teaching of composition, independent study, or thesis registration may not be counted among these six courses; ENGLISH 396L Pedagogy Seminar I, MTL 399 Reading for Orals, MTL 802 TGR Dissertation may not be counted toward these requirements under any circumstances. Petitions to modify this requirement to substitute a course from a non-literature department for one or more of the required eight literature courses must be approved by the MTL Committee in Charge.
  3. Eight courses of advanced work in non-literature departments, the core of which is completion of either a departmental minor or an interdepartmental concentration, typically consisting of six courses. Departmental minors are available from the departments of Anthropology, Art and Art History, Communication, History, Philosophy, Political Science, Religious Studies, and Sociology (see the relevant information in those sections of this bulletin). Individually designed concentrations may be approved by petition to the director. In addition to the required six courses in a minor or a concentration, two additional courses from non-literature departments are chosen in consultation with the student's academic adviser. At the end of the first year, each student must submit to the director a

preliminary statement of approximately 1500 words outlining the scope and coherence of the interdisciplinary focus, either as it relates to the departmental minor or to the interdepartmental concentration. In either case, the student should note the relevance of any proposed coursework to the overall program (see #7 below). Course restrictions noted above in item 2 also apply.

4. *Qualifying Paper:* This certifies that students are likely to be able to undertake the quality of research, sustained argumentation, and cogent writing demanded in a doctoral dissertation. The qualifying paper must be a substantial revision of a seminar paper written at Stanford during the first year and should embody a substantial amount of independent research, develop an intellectual argument with significant elements of original thinking, and demonstrate the ability to do interdisciplinary work. Each paper is evaluated by two or three readers (designated before the end of the first year of graduate study), one of whom must be a member of the Committee in Charge or have been a member within the previous five years. Qualifying papers must be submitted to the program office no later than the end of the third week of the fifth quarter of enrollment, normally, Winter Quarter of the second year.
5. *Teaching*, an essential part of the program, is normally undertaken in conjunction with the Department of English. Candidates are required to demonstrate competence in teaching.
6. Students must demonstrate, by the end of the third quarter of the first year, a reading knowledge of one foreign language and, by the beginning of the first quarter of the third year, a reading knowledge of one other foreign language. Reading knowledge means the ability to make a genuine scholarly use of the language: that is, to read prose of ordinary difficulty. Students may not take the University oral examination before completion of the foreign language requirement.
7. *Candidacy:* At the end of the second year, students apply for candidacy. The following qualifications are required before candidacy can be certified: the earlier submission of a satisfactory qualifying paper; demonstration of a reading knowledge of one foreign language; satisfactory progress in course work; a list of courses applicable to the degree, distinguishing between courses appropriate to the literary component and courses appropriate to the non-literary component; designation of a departmental minor or an interdisciplinary concentration; and the submission of a statement outlining the scope and coherence of the interdisciplinary component of the program in relation to the literary component, and noting the relevance of the course work to that program.
8. *Annual Review:* The program and progress of each student must be approved by the Committee in Charge at the end of each academic year. First-year students will submit the preliminary interdisciplinary statement along with the first year-end report (see #3 above).
9. *University Oral Examination:* This examination, covering the student's areas of concentration, is normally taken in the third year of graduate study. It is a two-hour oral examination administered by four faculty members specializing in the student's areas of concentration, and a chair from another department. The exam is based on a substantial reading list prepared by the student in conjunction with the faculty committee and designed to cover the areas of expertise pertinent to the student's dissertation project.
10. *Dissertation Proposal and Colloquium:* Within one quarter after the University oral examination, the student writes up the dissertation proposal: 15-20 pages with a general description of the project and a chapter breakdown plus a bibliography. The proposal is submitted to the program director and the dissertation committee for approval. After completion of the first chapter of the dissertation, the student sets up a meeting with the dissertation committee for one hour to discuss the work accomplished in the first chapter and plans for completing the rest of the dissertation.

11. *Dissertation:* The fourth and fifth years are devoted to the dissertation, which should be a substantial and original contribution acceptable to the Committee in Charge of Modern Thought and Literature. The subject is drawn from the literature of specialization and the area of nonliterary studies. The dissertation project will conclude with a two-hour defense. The first hour is open to the public and includes a brief presentation of the dissertation project on the part of the Ph.D. candidate. The second hour is reserved to the candidate and his/her Dissertation Committee.

*Director:* Paula M. L. Moya

*Committee in Charge:* Paula M.L. Moya (Chair), Scott Bukatman, Shelley Fisher Fishkin, Zephyr Frank, Sean Hanretta, Claire Jarvis, Pavle Levi, Alison McQueen, Jisha Menon (on leave), Vaughn Rasberry, José David Saldívar, Alex Woloch

*Affiliated Faculty:* Lanier Anderson (Philosophy), Russell Berman (German Studies), Joshua Cohen (Political Science, Philosophy, Law), Jean-Pierre Dupuy (French and Italian), Paulla Ebron (Anthropology), Harry Elam (Drama), Michele Elam (English), Amir Eshel (German Studies), Shelley Fisher Fishkin (English), Zephyr Frank (History), Estelle Freedman (History), Hans U. Gumbrecht (French and Italian, Comparative Literature), Sean Hanretta (History), Claire Jarvis (English), Matthew Kohrman (Anthropology), Aishwary Kumar (History), Pam Lee (Art and Art History), Pavle Levi (Art and Art History), Helen Longino (Philosophy), Andrea A. Lunsford (English), Saikat Majumdar (English), Douglas McAdam (Sociology), Alison McQueen (Political Science), Jisha Menon (Drama), Franco Moretti (English, Comparative Literature), Paula Moya (English), Sianne Ngai (English), Josiah Ober (Political Science), David Palumbo-Liu (Comparative Literature), Peggy Phelan (Drama), Vaughn Rasberry (English), José David Saldívar (Comparative Literature), Ramón Saldívar (English, Comparative Literature), Debra Satz (Philosophy), Londa Schiebinger (History), Stephen Sohn (English), Helen Stacy (Law), Fred Turner (Communication), Richard White (History), Bryan Wolf (Art and Art History), Alex Woloch (English), Yvonne Yarbro-Bejarano (Iberian and Latin American Cultures)

## Music

Courses offered by the Department of Music are listed under the subject code MUSIC on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MUSIC&filter-catalognumber=MUSIC=on>) web site.

## Mission of the Department of Music

The Department of Music promotes the practice, understanding and enjoyment of music in the university, offering a broad array of educational opportunities with specialization in composition, performance, musicology, ethnomusicology, and music technology.

## Learning Outcomes (Undergraduate)

Students majoring in music pursue foundational theoretical and historical coursework before moving on to this in-depth, writing intensive musical analysis course. This course provides the requisite skills needed to continue in advanced work for the major. Students must demonstrate an understanding of tonal music and facility in discussing it.

1. the ability to select and outline an appropriate topic area and select appropriate methodologies for tonal music analysis.
2. an appropriate mastery of the principles underpinning tonal music analysis, referencing appropriate authors and analytical tools and methodologies.
3. appropriate mastery of the use of primary source materials in written and oral presentations.
4. appropriate mastery of the use of secondary source materials in written and oral presentations.
5. the analytical writing skills necessary for the execution of the course papers.
6. the skills necessary to present a musical analysis to an audience in a coherent manner.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Music, including concentration in the fields of Composition, Music History, Computer-Based Music Theory and Acoustics, or Music, Science, and Technology, and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge and practice of Music and to interpret and present the results of such work in appropriate venues and publications.

The Doctor of Philosophy (Ph.D.) is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in either Musicology or Computer-Based Music Theory and Acoustics, based at the Center for Computer Research in Music and Acoustics (CCRMA).

The Doctor of Musical Arts (D.M.A.) in Composition is conferred upon candidates who have demonstrated substantial abilities in creating new musical works as demonstrated by their completed works under the supervision of composition faculty.

## Bachelor of Arts in Music

The undergraduate major in Music is built around a series of foundation courses in theory, musicianship, and music history, in addition to performance and the proficiency requirements outlined below. Majors must complete a minimum of 66 units within the department. All required courses for the B.A. in any concentration must be taken for a letter grade. Electives may be taken credit/no credit, but any courses taken towards concentration requirements must carry a letter grade.

## Suggested Preparation for the Major

Because of the sequence of courses, it takes more than two years to complete the requirements for the major. Students are required to meet with the undergraduate student services officer in the department prior to declaring the major. It is recommended that prospective majors schedule this consultation with the undergraduate student services officer as early as possible in their careers in order to plan a program that allows sufficient time for major course work, practice, and University requirements outside the major. Early planning is especially important for students wishing to double-major, for those contemplating overseas study during their undergraduate years, for those wishing to do an in-depth concentration in the Music major, and for those with particular musical talents and interests.

It is recommended that music majors complete MUSIC 21 Elements of Music I, MUSIC 22 Elements of Music II, and MUSIC 23 Elements of Music III in the freshman year; the series should be completed by Autumn Quarter of the junior year. It is recommended that music majors complete MUSIC 40 Music History to 1600, MUSIC 41 Music History 1600-1830, and MUSIC 42 Music History Since 1830 in the sophomore year; the series should be completed by the end of the junior year.

Suggested Preparatory Course:

		Units
MUSIC 19A	Introduction to Music Theory	3
MUSIC 19B	Intermediate Music Theory	3

## Fields of Study or Degree Options

Concentrations are offered in: performance; conducting; composition; history and theory; or music, science, and technology. Each concentration is declarable in Axxess as a subplan; guidelines and further information are available from the Department of Music office. In order to complete requirements in a timely manner, students are urged to select this option no later than the middle of the junior year for single-area concentrators and the middle of the sophomore year for multiple-area concentrators. Students pursuing multiple concentrations must fulfill all the requirements of each.

## Degree Requirements

In conjunction with the undergraduate student services officer, the student is assigned a departmental adviser with whom the student is required to meet at least once each quarter. Total units and courses required to graduate for each concentration are specified in the relevant section following.

## Required Courses

The following courses are required of all majors.

### 1. Theory

		Units
MUSIC 21	Elements of Music I	4
MUSIC 22	Elements of Music II	4
MUSIC 23	Elements of Music III	4

### 2. History

		Units
MUSIC 40	Music History to 1600	4
MUSIC 41	Music History 1600-1830	4
MUSIC 42	Music History Since 1830	4

### 3. Analysis

		Units
MUSIC 121	Analysis of Tonal Music	4
Select two, at the 4-unit level, of the following:		8
MUSIC 122A	Renaissance and Baroque Counterpoint	4
MUSIC 122B	Harmonic Materials of 19th Century	4
MUSIC 122C	Introduction to 20th-Century Composition	4

### 4. Writing in the Major (WIM)

		Units
Select three, at least two at the 4-unit level, of the following:		11-12
MUSIC 140	Studies in Medieval Music	4
MUSIC 141	Studies in Renaissance Music	4
MUSIC 142	Studies in Baroque Music	4
MUSIC 143	Studies in Classic Music	4

MUSIC 144	Studies in Romantic Music	4
MUSIC 145	Studies in Modern Music (Concepts of New Music)	4
MUSIC 146	Music and Urban Film	4
MUSIC 147	The Soul Tradition in African American Music	4
MUSIC 147A	Music Ethnography of the Bay Area	4
MUSIC 148	Musical Shakespeare: Theater, Song, Opera, and Film	4
MUSIC 149	Reactions to the Record: Interpreting Beethoven	4
MUSIC 251	Psychophysics and Music Cognition	4

## 5. Applied

- A minimum of five quarters totaling 15 units of private instruction in instrumental and/or vocal performance (MUSIC 172/272-177/277); students who do not qualify for private instruction at the intermediate or advanced level, but who wish to pursue the major may take introductory voice (MUSIC 65A Voice Class I and MUSIC 73 Intermediate Voice Class), piano (MUSIC 12A Introductory Piano Class MUSIC 12B Introductory Piano Class and MUSIC 72A Intermediate Piano Class), or guitar (MUSIC 74C Classical Guitar Class) to reach the minimum proficiency levels required to be accepted into a private studio and then complete their 5 quarters. Requirements for the minimum levels of proficiency in each instrument for private instruction are posted at: <http://music.stanford.edu/Academics/Auditions.html>.
- A minimum of five quarters totaling at least 5 units of work in one or more of the department's organizations or chamber groups. To fulfill the ensemble requirement, Music majors need at least three quarters of participation in the department's traditional large ensembles (MUSIC 159-167), with the exception of students whose primary instrument is harp, keyboard, or guitar, who need to participate at least one quarter in the ensembles above, but who may fulfill the rest of the requirement with chamber music (MUSIC 171 Chamber Music). MUSIC 156 "sic": Improvisation Collective may count for up to two of the ensemble-unit requirements for the Music major.

Note—The following courses do not satisfy this requirement:

		Units
MUSIC 128	Stanford Laptop Orchestra: Composition, Coding, and Performance	1-5
MUSIC 158	Soundwire Ensemble	2-3
MUSIC 160A	Stanford Philharmonia Orchestra	1
MUSIC 160B	Stanford New Ensemble	1
MUSIC 161C	Red Vest Band	1
MUSIC 161D	Stanford Brass Ensemble	1

## 6. Additional requirements

- Majors are required to pass a Piano Proficiency examination as part of the music theory core (MUSIC 21 Elements of Music I, MUSIC 22 Elements of Music II, MUSIC 23 Elements of Music III). The examination is given in the first two weeks of MUSIC 21 Elements of Music I. Students who do not pass the Piano Proficiency examination are required to enroll in either MUSIC 12A Introductory Piano Class, MUSIC 12B Introductory Piano Class, or MUSIC 12C Introductory Piano Class concurrently with the music theory core until they are able to pass the examination. The examination consists of scales and arpeggios, performance of a simple tune to be set by the examiner, sight-reading, and the performance of prepared pieces. Information regarding the proficiency examination may be downloaded at <http://music.stanford.edu/private/downloads/PIANO%20PROFICIENCY%20EXAM.doc>

- Majors must also pass an ear-training proficiency examination, which is one of the requirements to complete MUSIC 23 Elements of Music III. It may be taken by arrangement and demonstrates a student's ability to hear music accurately and to perform it at sight.

## Electives

### 1. Concentration in Performance

In addition to degree requirements required of majors listed above, students in the Performance concentration must:

- Complete at least 6 additional, graded course units in one area of performance. Acceptable courses are described under "Applied" in the section describing private instruction and ensemble course work above. Additional courses might include, but are not limited to:

		Units
MUSIC 126	Introduction to Thoroughbass	1-3
MUSIC 154	History of Electronic Music	1-5
MUSIC 182	Diction for Singers	1
MUSIC 269	Research in Performance Practices	1-5
MUSIC 183A	German Art Song Interpretation	1
MUSIC 183B	French Art Song Interpretation	1
MUSIC 184	Vocal Repertory Workshop	1-3
- Register for an independent project (MUSIC 198 Concentrations Project, 4 units) in the senior year under faculty supervision, leading to a senior recital.

### 2. Concentration in Conducting

In addition to degree requirements required of majors listed above, students in the Conducting concentration must:

- Complete at least 6 additional, graded course units in conducting. Additional courses might include, but are not limited to:

		Units
MUSIC 127	Instrumentation and Orchestration	3
MUSIC 130A	Introduction to Conducting	3
MUSIC 130B	Elementary Orchestral Conducting	3
MUSIC 130C	Elementary Choral Conducting	3
MUSIC 230	Advanced Orchestral Conducting	2-4
MUSIC 231	Advanced Choral Conducting	2-4
- Register for an independent project (MUSIC 198 Concentrations Project, 4 units) in the senior year under faculty supervision, leading to a senior conducting project.

### 3. Concentration in Composition

In addition to degree requirements required of majors listed above, students in the Composition concentration must:

- Complete at least 6 additional, graded course units in composition. Additional courses might include, but are not limited to:

		Units
MUSIC 123	Undergraduate Seminar in Composition	3
MUSIC 125	Individual Undergraduate Projects in Composition	1-3
MUSIC 127	Instrumentation and Orchestration	3
MUSIC 150	Musical Acoustics	3
MUSIC 154	History of Electronic Music	1-5

Select one of the following Series:

**Series A (6-12)**

MUSIC 220A	Fundamentals of Computer-Generated Sound	2-4
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MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	2-4
MUSIC 220C	Research Seminar in Computer-Generated Music	2-4

**Series B (0)**

Any of the series in computer-generated sound, music, and composition

3. Register for an independent project (MUSIC 198 Concentrations Project, 4 units) in the senior year under faculty supervision, leading to a composition.

## 4. Concentration in History and Theory

In addition to degree requirements required of majors listed above, students in the History and Theory concentration must:

1. Complete at least 6 additional, graded course units in history and theory. Additional courses might include, but are not limited to:

2. Units

Select any course not taken in fulfillment of the major requirement:

MUSIC 122A	Renaissance and Baroque Counterpoint	4
MUSIC 122B	Harmonic Materials of 19th Century	4
MUSIC 122C	Introduction to 20th-Century Composition	4
MUSIC 140	Studies in Medieval Music	3-4
MUSIC 141	Studies in Renaissance Music	3-4
MUSIC 142	Studies in Baroque Music	3-4
MUSIC 143	Studies in Classic Music	3-4
MUSIC 144	Studies in Romantic Music	3-4
MUSIC 145	Studies in Modern Music	4
MUSIC 146	Music and Urban Film	3-4
MUSIC 147	The Soul Tradition in African American Music	3-4
MUSIC 148	Musical Shakespeare: Theater, Song, Opera, and Film	3-4
MUSIC 149	Reactions to the Record: Interpreting Beethoven	3-4
MUSIC 251	Psychophysics and Music Cognition	1-5
MUSIC 221	Topics in the History of Theory	3-5

Select one of the following Series:

**Series A (6-12)**

MUSIC 220A	Fundamentals of Computer-Generated Sound	2-4
MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	2-4
MUSIC 220C	Research Seminar in Computer-Generated Music	2-4

**Series B (0)**

Any of the series in computer-generated sound, music, and composition.

3. Register for an independent project (MUSIC 198 Concentrations Project 4 units) in the senior year under faculty supervision, leading to a senior research paper.

## 5. Concentration in Music, Science, and Technology

Requires completion of 62 units of course work that differs from that of the major and is delineated below. This field of study is designed for those students interested in the musical ramifications of rapidly evolving computer technology and digital audio, and in the acoustic and psychoacoustic foundations of music. This program can serve as a

complementary major to students in the sciences and engineering. Students in the program are required to include the following courses in their studies:

1. Theory and Analysis
2. Units

MUSIC 21	Elements of Music I	4
MUSIC 22	Elements of Music II	4
MUSIC 23	Elements of Music III (includes passing the piano and ear-training proficiency examinations, as described for the major)	4
MUSIC 121	Analysis of Tonal Music	4
MUSIC 150	Musical Acoustics	3
MUSIC 251	Psychophysics and Music Cognition	1-5
MUSIC 220A	Fundamentals of Computer-Generated Sound	2-4
MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	2-4
MUSIC 220C	Research Seminar in Computer-Generated Music	2-4
MUSIC 220D	Research in Computer-Generated Music	1-10
MUSIC 250A	Physical Interaction Design for Music	3-4

3. Applied

- Individual studies in performance, MUSIC 172/272-177/277 (6 units) or the sequence below: Course List

MUSIC 192A	Foundations of Sound-Recording Technology	3
MUSIC 192B	Advanced Sound Recording Technology	3

- Ensemble as described above for the major (5 units) or MUSIC 192C: Session Recording (5 units)

1. History
2. Units

Select two of the following:

MUSIC 40	Music History to 1600	4
MUSIC 41	Music History 1600-1830	4
MUSIC 42	Music History Since 1830	4

3. The program requires a senior research project (4 units) completed under faculty guidance. May be completed in conjunction with enrollment in any of the following:

MUSIC 220D	Research in Computer-Generated Music	4
MUSIC 199	Independent Study	4
MUSIC 198	Concentrations Project	4

## Honors Program

Honors in Music are awarded by the faculty to Majors who have produced an independent project of exceptional quality through the Concentration program. Students who wish to pursue Honors must declare their Concentration(s) by May 31 of the Junior year (see the Undergraduate Student Services Officer for concentration-specific requirements). To receive Honors students must also have earned an overall GPA of 3.60 or higher and a GPA of 3.70 or higher in courses required for the Music Major. Honors are conferred solely through faculty adjudication. For students concentrating in multiple areas, a single jury will be convened.

## Overseas Study or Study Abroad

Courses in Music are often available at Stanford overseas programs, especially in Berlin, Paris, Florence, and Oxford. See the "Overseas Studies Program" section of this bulletin for this year's listings. Music majors and

minors should talk to the Department of Music undergraduate administrator prior to going overseas.

## Minor in Music

Minors in Music in the concentration areas of performance, conducting, composition and history and theory, as well as in the concentration in music, science, and technology provide the student with a core of essential Music courses in the disciplines that establish both a foundation for informed appreciation of music and a basis for more advanced study, should the student wish to pursue it.

### Degree Requirements

Total of 36 units required course work as delineated below. Students in either minor must also pass the piano and ear-training proficiency examinations required of Music majors.

### Required Courses: Performance, Conducting, Composition, and History and Theory

#### 1. Theory

		Units
MUSIC 21	Elements of Music I	4
MUSIC 22	Elements of Music II	4
MUSIC 23	Elements of Music III	4

#### 2. History

		Units
MUSIC 40	Music History to 1600	4
MUSIC 41	Music History 1600-1830	4
MUSIC 42	Music History Since 1830	4

#### 3. Applied: Ensemble

Two quarters, 2 units total.

		Units
MUSIC 159	Early Music Singers	1
MUSIC 160	Stanford Symphony Orchestra	1
MUSIC 160S	Summer Orchestra	1
MUSIC 161A	Stanford Wind Ensemble	1
MUSIC 161B	Jazz Orchestra	1
MUSIC 162	Symphonic Chorus	1
MUSIC 163	Memorial Church Choir	1
MUSIC 165	Chamber Chorale	1
MUSIC 167	University Singers	1
MUSIC 167S	Summer Chorus	1

#### 4. Applied: Individual

Two quarters at 3 units per quarter, 6 units total.

		Units
MUSIC 159	Early Music Singers	1
MUSIC 160	Stanford Symphony Orchestra	1
MUSIC 160S	Summer Orchestra	1
MUSIC 161A	Stanford Wind Ensemble	1
MUSIC 161B	Jazz Orchestra	1
MUSIC 162	Symphonic Chorus	1

MUSIC 163	Memorial Church Choir	1
MUSIC 165	Chamber Chorale	1
MUSIC 167	University Singers	1
MUSIC 167S	Summer Chorus	1

### 4. WIM, 4 units

		Units
MUSIC 140	Studies in Medieval Music	4
MUSIC 141	Studies in Renaissance Music	4
MUSIC 142	Studies in Baroque Music	4
MUSIC 143	Studies in Classic Music	4
MUSIC 144	Studies in Romantic Music	4
MUSIC 145	Studies in Modern Music	4
MUSIC 146	Music and Urban Film	4
MUSIC 147	The Soul Tradition in African American Music	4
MUSIC 147A	Music Ethnography of the Bay Area	4
MUSIC 148	Musical Shakespeare: Theater, Song, Opera, and Film	4
MUSIC 149	Reactions to the Record: Interpreting Beethoven	4
MUSIC 251	Psychophysics and Music Cognition	4

### Required Courses: Music, Science and Technology

#### 1. Theory

		Units
MUSIC 21	Elements of Music I	4
MUSIC 22	Elements of Music II	4
MUSIC 23	Elements of Music III	4
MUSIC 150	Musical Acoustics	3
MUSIC 220A	Fundamentals of Computer-Generated Sound	2-4
MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	2-4

#### 2. Applied

		Units
MUSIC 192A	Foundations of Sound-Recording Technology	3
MUSIC 192B	Advanced Sound Recording Technology	3
MUSIC 192C	Session Recording (two quarters, 3 units total)	1-2

### 3. WIM, 4 units

		Units
MUSIC 251	Psychophysics and Music Cognition	4

## Performance Certificate Program for Non Music Majors

As a locus of great academic and artistic depth and diversity, the Department of Music's performance programs have long engaged students who, even though they are not music majors, are serious and dedicated to furthering their skills in music performance. The Certificate in Music Performance program provides a select cohort of these students the opportunity for further recognition of their artistic achievement.

This program is open by audition to undergraduate students who already demonstrate a high degree of accomplishment in their area of music performance, study privately with one of the Department of Music's faculty, and who wish to bolster their performance studies with coursework that may be drawn from the Department of Music's other areas of academic focus: history, theory, computer music, and composition. The Certificate in Music Performance is issued by the Department of Music and will not appear on any University record, including the student's transcript.

## Admission

Students are admitted to the Certificate in Music Performance program based on an audition adjudicated by Department of Music faculty at the beginning of spring quarter. To request an audition, the student should speak with the private lesson instructor and the Department of Music's undergraduate student services officer. Email [ugmusicinquiries@stanford.edu](mailto:ugmusicinquiries@stanford.edu) for additional information. At the time of the audition, students must have already declared a major outside of music.

## Requirements

Once admitted into the program, students must complete a course plan to be approved by Department faculty based on the requirements below

### 1. Performance

- A minimum of 6 quarters of individual lessons of private instruction and/or vocal performance (MUSIC 172/272-177/277). Any quarters of instruction taken prior to admission into the program may also count towards these requirements. Requirements for the minimum levels of proficiency in each instrument for private instruction are posted on the Music Department's (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/music/%20http://music.stanford.edu/Academics/Auditions.html.html>) web site. All 6 quarters of lesson study must be in the same instrument area.
- A minimum of 6 quarters of ensemble experience in the Department of Music's ensembles and chamber groups. For students whose primary instrument area is guitar, keyboard or harp, at least one quarter of ensemble experience must be in one of the department's traditional large ensembles (MUSIC 159-167, or MUSIC 184). The remaining ensemble requirements may be filled with chamber music (MUSIC 171). Keyboard students may also take MUSIC 183B French Art Song Interpretation, MUSIC 183B French Art Song Interpretation, and MUSIC 183B French Art Song Interpretation to fulfill this requirement. All non-keyboard, guitar or harp students must successfully complete 3 quarters in the department's traditional ensembles (MUSIC 159-167 and MUSIC 184), and 3 quarters in conductor-less, small ensembles such as chamber music or jazz combos MUSIC 183B French Art Song Interpretation. MUSIC 156 "sic": Improvisation Collective may count for up to two of the ensemble unit requirements. Any quarters of ensemble taken prior to admission into the program may also count towards these requirements.

### 2. Music Theory

Students are required to complete one course in Music Theory (MUSIC 21 Elements of Music I, MUSIC 22 Elements of Music II, MUSIC 23 Elements of Music III, or MUSIC 121 Analysis of Tonal Music). For the purposes of the Performance Certificate, the student may elect to take these courses on a Credit/No Credit grading basis. However, students must also pass the associated Piano Proficiency Exam and Ear Training Exam as part of the Music Theory course requirements.

### 3. Elective Courses

6 or more total course units in Music, dependent upon course-plan document submitted following acceptance into the program.

## 4. Final Project

To complete the Performance Certificate, students must enroll in a 4 unit MUSIC 199 Independent Study and complete a final, capstone performance-based project. Students must pass faculty adjudication, and, in addition, complete a writing project (essay or program notes) pre-approved by the lesson instructor.

## Master of Arts in Music

University requirements for the M.A. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

None of Stanford's required undergraduate courses may be credited toward an advanced degree unless specifically required for both degrees. Only work that receives a grade of 'A,' 'B,' or 'Satisfactory' (a passing grade in an instructor-mandated credit/no credit course) in Music courses numbered 100 or higher taken as a graduate student is recognized as fulfilling the advanced-degree requirements. Students may need to devote more than the minimum time in residence if preparation for graduate study is inadequate.

### Admission

Applicants are required to submit evidence of accomplishment (scores, recordings, and/or research papers) when they complete the application form. Applicants should arrange to take the Graduate Record Examination (GRE) well in advance of the December 11 application deadline. All components of the application are due by December 11. International students whose first language is not English are also required to take the TOEFL exam (with certain exceptions: see the Office of Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>) web site.

### Fields of Study or Degree Options

All of the following fields of study are declarable as subplans in Axxess; they appear on the transcript but they do not appear on the diploma:

- Master of Arts degree (M.A.)—in Composition.
- Master of Arts degree (M.A.)—in Music History.
- Master of Arts degree (M.A.)—in Computer-Based Music Theory and Acoustics.
- Master of Arts degree (M.A.)—in Music, Science, and Technology (M.A./M.S.T.)
  - Note: The M.A./M.S.T. program is the only terminal master's degree; it is two years in duration.

### Degree Requirements

A minimum of 45 academic units is required for the master's degree in Music. The Department of Music does not accept students for study only towards the M.A. degree except in the Music, Science, and Technology program, described below.

### Required Courses

#### 1. Composition

Students are not admitted into the M.A. as a terminal degree for composition: rather, students in the D.M.A. program in composition who enter directly from the bachelor's level may, upon completing 45 graduate-level units and advancing to candidacy by passing the qualifying examination, be recommended for the M.A. degree in composition.



## 2. Music History

Students are not admitted into the M.A. as a terminal degree for music history: rather, students in the Ph.D. program in musicology who enter directly from the bachelor's level may, upon completing 45 graduate-level units and advancing to candidacy by passing the qualifying examination, be recommended for the M.A. degree in music history.

## 3. Computer-Based Music Theory and Acoustics

Students are not admitted into the M.A. as a terminal degree for computer-based music theory and acoustics: rather, students in the Ph.D. program in computer-based music theory and acoustics who enter directly from the bachelor's level may, upon completing 45 graduate-level units and advancing to candidacy by passing the qualifying examination, be recommended for the M.A. degree in computer-based music theory and acoustics.

## 4. Music, Science, and Technology (M.S.T.)

The M.A. in music, science, and technology is the department's only terminal master's degree. This is a two-year program of 45 graduate-level units focusing on the integration of music perception, music-related signal processing and controllers, synthesis, performance, and composition. The program is designed for students who have an undergraduate music, engineering, or science degree. Required course work is listed below. A complete program with an individually-tailored list of electives will be formed in consultation with the student's adviser.

1. Required:

		Units
MUSIC 155	Intermedia Workshop	3-4
MUSIC 201	CCRMA Colloquium	1
MUSIC 220A	Fundamentals of Computer-Generated Sound	2-4
MUSIC 251	Psychophysics and Music Cognition	1-5
MUSIC 256A	Music, Computing, and Design I: Software Paradigms for Computer Music	1-4
MUSIC 320	Introduction to Digital Audio Signal Processing	3-4

3. Electives: students are required to complete an additional 24 units of graduate level work determined in consultation with the student's adviser and will include CCRMA electives, and may include courses taken outside the department.

## Doctor of Musical Arts (D.M.A.) and Doctor of Philosophy (Ph.D.) in Music

University requirements for the D.M.A and Ph.D. are described in the "Graduate Degrees" section of this bulletin. The following statements apply to all the graduate degrees described below, unless otherwise indicated.

### Admission

Applicants are required to submit evidence of accomplishment (scores, recordings, and/or research papers, according to the proposed field of concentration) when they complete the application form. Applicants should arrange to take the Graduate Record Examination (GRE) well in advance of the December 12 application deadline. All components of the application

are due by December 12. International students whose first language is not English are also required to take the TOEFL exam (with certain exceptions: see the Office of Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>) web site.

## Department Examinations

All entering doctoral graduate students are required to take:

1. a diagnostic examination testing the student in theory (counterpoint, harmony, and analysis) and (for musicologists only) the history of Western art music; and,
2. a proficiency examination in sight-singing and piano sight-reading.

These exams are given at the beginning of study in the department (usually the week before school begins). Teaching Assistant assignments and the funding associated with this portion of a graduate student's financial aid package are determined based upon successful completion of these exams.

## Graduate Credit

None of Stanford's required undergraduate courses may be credited toward an advanced degree unless specifically required for both degrees. Only work that receives a grade of 'A,' 'B,' or 'Satisfactory' (a passing grade in an instructor-mandated credit/no credit course) in music courses numbered 100 or higher taken as a graduate student is recognized as fulfilling the advanced-degree requirements. Students may need to devote more than the minimum time in residence if preparation for graduate study is inadequate.

The following may be taken as electives for graduate credit:

1. any course in another department numbered 100 or over (with adviser's consent)
2. any course in the Music department numbered 100 or over except those required for the B.A. degree. A letter grade of 'A,' 'B,' or 'S' (in an instructor-mandated pass/fail course) is required.
3. Music department group instruction:

MUSIC 72A	Intermediate Piano Class	1
MUSIC 72C	Harpsichord Class	1
MUSIC 72D	Jazz Piano Class	1
MUSIC 73	Intermediate Voice Class	1
MUSIC 74C	Classical Guitar Class	1
MUSIC 74D	Harp Class	1
MUSIC 75B	Renaissance Wind Instruments Class	1
MUSIC 76	Brass Instruments Class	1
MUSIC 77	Percussion Class	1

## Fields of Study or Degree Options

All of the following fields of study are declarable as subplans in Axxess:

### • Doctor of Musical Arts degree (D.M.A.) in Composition

The D.M.A. is offered to a limited number of students who demonstrate substantial training in the field and high promise of attainment as composers. Students may work in acoustic and/or electronic forms. Breadth is given through studies in other branches of music and in relevant fields outside music, as desirable. The final project for this degree is a large-scale composition.

## • Doctor of Philosophy degree (Ph.D.) in Musicology

## • Doctor of Philosophy degree (Ph.D.) in Computer-Based Music Theory and Acoustics

The Ph.D. is offered in areas of the research of Stanford's graduate faculty: Musicology, including specialties in musical aesthetics, history of music theory, and performance practice; and Computer-Based Music Theory and Acoustics (CBMTA), specializing in research in musical acoustics at the Center for Computer Research in Music and Acoustics (CCRMA). The department seeks students who demonstrate substantial scholarship, high promise of attainment, and the ability to do independent investigation and present the results of such research in a dissertation.

## Degree Requirements

### Residence

The candidate must complete a minimum of 135 academic units (see Residency under the "Graduate Degrees" section of this bulletin). Doctoral candidates working on Ph.D. dissertations or Doctor of Musical Arts (D.M.A.) final projects that require consultation with faculty members continue enrollment in the University under Terminal Graduate Registration (TGR), after they have reached the required 135 academic units and have completed their Special Area examinations.

### Qualifying Examination

A written and oral examination for admission to candidacy is given just prior to the fourth quarter of residence for D.M.A. students and Ph.D. students in the Computer-Based Music Theory and Acoustics programs; for Ph.D. students in Musicology, the exams are given just prior to the eighth quarter of residence. This exam tests knowledge of history, theory, repertory, and analysis. For D.M.A. students a *Special Area Examination* topic proposal is due at the time of the *Qualifying Examination*.

### Teaching

All students in the Ph.D. or D.M.A. degree programs, regardless of sources of financial support, are required to complete six quarters of supervised teaching at half time. Music 280 (given in Spring Quarter and taken at the end of the first year) is a required course for Teaching Assistants. Additional quarters of teaching may be required by the department.

## Required Department Convocations

Until advancing to candidacy, graduate students in all programs are required to attend three events per year, to be announced at the beginning of the fall quarter: one particular Alexander Lecture in Musicology, one particular CCRMA Colloquium, and one particular Graduate Composition Forum.

## I. Composition

The Doctor of Musical Arts (D.M.A.) degree in Composition is given breadth through collateral studies in other branches of music and in relevant studies outside music as seems desirable. In addition to degree requirements required of all doctoral graduate students and listed above, students must complete the following required courses:

Required Courses

MUSIC 280	TA Training Course	1
MUSIC 301C	Analysis of Music: Post-Tonal	4

MUSIC 323	Doctoral Seminar in Composition (4 quarters within 3-4 the first two years of study)	
MUSIC 324	Graduate Composition Forum *	1
MUSIC 325	Individual Graduate Projects in Composition †	1-5
One CCRMA elective course from the following list		
MUSIC 220A	Fundamentals of Computer-Generated Sound	
MUSIC 251	Psychophysics and Music Cognition	
MUSIC 255	Intermedia Workshop	
MUSIC 256A	Music, Computing, and Design I: Software Paradigms for Computer Music	
MUSIC 320	Introduction to Digital Audio Signal Processing	

\* The requirement is for all six quarters during years 1 & 2, and a minimum of three quarters during years 3 & 4.

† Two or more quarters per year are required until advancement to candidacy; by the end of the second year the student shall have enrolled with a minimum of two different faculty members; but the end of the third year the student shall have enrolled with a minimum of three different faculty.

- Besides those requirements listed above, candidates are expected to produce a number of works demonstrating their ability to compose in a variety of forms and for the common media: vocal, instrumental, and electronic music. If possible, the works submitted are presented in public performance prepared by the composer. Annual progress is reviewed by the composition faculty with a major portfolio review conducted during the Fall Quarter of the third year.
- Foreign Language Requirement—At the time of advancement to candidacy, all D.M.A. students are required to have demonstrated a reading knowledge of one language other than English and the ability to translate it into idiomatic English.
- Special-Area Examination—A written examination in the candidate's field of concentration, one-hour presentation followed by questions in the Graduate Composition Forum, sample course syllabus, and final project proposal are required to be completed during the Winter Quarter of the fourth year of study, no later than the ninth week of classes.
- Final Project Presentation—Required during the last quarter of residence, no later than the ninth week of classes, the purpose of the presentation is to demonstrate the ability of the candidate to organize and present the topic of the final project for public review. It should be one hour in length, followed by questions, treating aspects of the final project. Details regarding the D.M.A. final project presentation may be found in the Department of Music Graduate Handbook (<http://music.stanford.edu/Academics/gradStudies.html>).
- Final Project—Candidate's work culminates in a required Final Project. The final project in composition must be a substantial composition, the scope of which shall be agreed upon by the members of the committee. Typically, work on the final project encompasses several quarters. Usually, smaller works, for specific performances, are composed at the same time.
- Reading Committee—The membership of the reading committee is the principal final project adviser and a minimum of two additional members. The notice of appointment of a D.M.A. Final Project Reading Committee should be submitted to the department at the same time as the approved final project proposal and the completion of the special area exam. It is the responsibility of the student, with the advice of his or her adviser, to approach appropriate faculty members and obtain their consent to serve on the reading committee. Obtain the D.M.A. reading committee form from the department office; fill it out; obtain committee members' signatures; return to the department office.

## II. Musicology

In addition to degree requirements required of all doctoral graduate students and listed above, students must complete the following required courses:

### Required Courses

MUSIC 200	Graduate Proseminar (required of all musicology students regardless of entering degree level)	4
MUSIC 221	Topics in the History of Theory	3-5
MUSIC 280	TA Training Course	1
MUSIC 300A	Medieval Notation	4
MUSIC 300B	Renaissance Notation	4
MUSIC 301A	Analysis of Music: Modal	4
MUSIC 301B	Analysis of Music: Tonal	4
MUSIC 301C	Analysis of Music: Post-Tonal	4
MUSIC 310	Research Seminar in Musicology *	3-5
MUSIC 312A	Aesthetics and Criticism of Music, Ancients and Moderns: Plato to Nietzsche	4
MUSIC 312B	Aesthetics and Criticism of Music, Contemporaries: Heidegger to Today	4
MUSIC 330	Musicology Dissertation Colloquium †	1

\* The requirement is for eight seminars of 3-5 units each. Students may petition to take up to two graduate seminars in other departments, in consultation with their adviser.

† The requirement is for enrollment each Spring Quarter beginning in year four and continuing to graduation.

1. Foreign Language Requirement—At the time of advancement to candidacy, all Ph.D. students in Musicology must have passed a Ph.D. Language examination in German and in a second language, chosen from French, Italian, or Latin (or, on a case-by-case basis, another language, if it has significant bearing on the candidate's field of study). If one of these languages is the student's native language, the student may be exempted from an examination.
2. Special-Area Examination—A written and oral examination testing the student's knowledge of music and research in the student's field of concentration is completed during the fourth year of study, no later than the last day of classes in Autumn Quarter of that year. This includes an oral defense of the dissertation proposal. The examining committee comprises prospective readers of the dissertation.
3. University Oral Examination—Taken once the dissertation is substantially under way; an oral presentation is a defense of dissertation research methods and results.
4. Dissertation—After the first two years of graduate study, the student concentrates on research and writing of the dissertation. The dissertation demonstrates the student's ability to work systematically and independently to produce an essay of competent scholarship.
5. Reading Committee—The minimum membership of the reading committee is 1) the principal dissertation adviser, 2) a second member from the department, and 3) a third member from the major department or another department. If a third member is from another institution, a fourth member must be appointed from the department. The principal dissertation adviser and all other members of the committee must belong to the Academic Council. The notice of appointment of a Reading Committee should be submitted to the department at the same time as the approved dissertation proposal and the completion of the Special-Area Exam. It is the responsibility of the student, with the advice of his or her adviser, to approach appropriate faculty members and obtain their consent to serve on the reading committee.

## III. Computer-Based Music Theory and Acoustics

In addition to degree requirements required of all doctoral graduate students and listed above, students must complete the following required courses:

### Required Courses

MUSIC 200	Graduate Proseminar	3-4
MUSIC 220A	Fundamentals of Computer-Generated Sound	4
MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	4
MUSIC 220C	Research Seminar in Computer-Generated Music	2-4
MUSIC 220D	Research in Computer-Generated Music *	1-10
MUSIC 280	TA Training Course	1
MUSIC 301A	Analysis of Music: Modal	4
MUSIC 301B	Analysis of Music: Tonal	4
MUSIC 301C	Analysis of Music: Post-Tonal	4
MUSIC 320	Introduction to Digital Audio Signal Processing	4

\* The requirement is for 12 units.

1. Foreign Language Requirement—At the time of advancement to candidacy, all Ph.D. students in computer-based music theory and acoustics are required to have demonstrated a reading knowledge of one language other than English and the ability to translate it into idiomatic English.
2. Special-Area Examination—A written and oral examination testing the student's knowledge of music and research in the student's field of concentration is completed during the fourth year of study, no later than the last day of classes in Autumn Quarter of that year. This includes an oral defense of the dissertation proposal. The examining committee comprises prospective readers of the dissertation.
3. University Oral Examination—Taken once the dissertation is substantially under way; an oral presentation is a defense of dissertation research methods and results.
4. Dissertation—After the first two years of graduate study, the student concentrates on research and writing of the dissertation. The dissertation demonstrates the student's ability to work systematically and independently to produce an essay of competent scholarship.
5. Reading Committee—The minimum membership of the reading committee is 1) the principal dissertation adviser, 2) a second member from the department, and 3) a third member from the major department or another department. If a third member is from another institution, a fourth member must be appointed from the department. The principal dissertation adviser and all other members of the committee must belong to the Academic Council. The notice of appointment of a Reading Committee should be submitted to the department at the same time as the approved dissertation proposal and the completion of the Special-Area Exam. It is the responsibility of the student, with the advice of his or her adviser, to approach appropriate faculty members and obtain their consent to serve on the reading committee.

*Emeriti: (Professors)* John M. Chowning, Albert Cohen, George Houle, William H. Ramsey, Leland C. Smith; *(Professors, Performance)* Arthur P. Barnes, Marie Gibson

*Chair:* Stephen M. Sano

*Professors:* Jonathan Berger, Karol Berger, Chris Chafe, Brian Ferneyhough, Thomas Grey, Stephen Hinton, Julius O. Smith

*Associate Professors:* Mark Applebaum, Heather Hadlock (on leave), William P. Maht

*Assistant Professors:* Takako Fujioka, Jaroslaw Kapuscinski (on leave), Charles Kronengold, Jesse Rodin, Anna Schultz (on leave Autumn), Ge Wang (on leave)

*Professors (Teaching):* George Barth (Piano), Stephen M. Sano (Director of Choral Studies)

*Associate Professor (Performance):* Jindong Cai (Director of Orchestral Studies)

*Courtesy Professor:* Paul DeMarinis

*Senior Lecturers:* Giancarlo Aquilanti (Director of Theory; Wind Ensemble; on leave Autumn), Talya Berger (Theory), Stephen Harrison (Violoncello), Thomas Schultz (Piano), Gregory A. Wait (Voice; Director of Vocal Studies), Frederick R. Weldy (Piano)

*Lecturers:* Kumaran Arul (Piano), Fredrick Berry (Jazz Ensemble), Mark Brandenburg (Clarinet), Marie-Louise Catsalis (Voice), Marjorie Chauvel (Harp), Tony Clements (Tuba), Laura Dahl (Resident Collaborative Pianist), Anthony Doheny (Violin), John Dornenburg (Viola da Gamba), Charles A. Ferguson (Guitar), Debra Fong (Violin), Claire Giovannetti (Voice), Dawn Harms (Violin, Viola), Alexandra Hawley (Flute), David Henderson (Classical Saxophone), Wendy Hillhouse (Voice), Robert Hubbard (Oboe), Joyce Johnson-Hamilton (Trumpet), Wendy Ju (HCI theory), Jay Kadis (Audio Recording), McDowell Kenley (Trombone), Mary Linduska (Voice, Summer only), Murray Low (Jazz Piano), Janet Maestre (Flute), Anthony Martin (Baroque Violin), James Matheson (Oboe), Seward McCain (Jazz Bass), Charles McCarthy (Jazz Saxophone), Robert Huw Morgan (University Organist, Organ), Bruce Moyer (Contrabass), Herbert Myers (Early Winds), James Nadel (Jazz), Rufus Olivier (Bassoon), Larry S. Ragent (French Horn), Craig Sapp (CCARH), Melody Schaeffe (Flute), Robin Sharp (Violin), Livia Sohn (Violin), Elaine Thornburgh (Harpsichord), Erik Ulman (Composition, Theory), Linda Uyechi (Taiko), Rick Vandivier (Jazz Guitar), Mark Veregge (Percussion), Sharon Wei (Viola), John Worley (Jazz Trumpet), Hui (Daisy) You (Guzheng), Timothy Zerlang (University Carillonneur, Piano)

*Consulting Professors:* Jonathan Abel (CCRMA), David Berners (CCRMA), Poppy Crum (CCRMA), Marina Bosi-Goldberg (CCRMA), Pierre Divenyi (CCRMA), Walter Hewlett (Computer-Assisted Research in the Humanities), Eleanor Selfridge-Field (Computer-Assisted Research in the Humanities), Malcolm Slaney (CCRMA)

*Visiting Professor:* Thomas Rossing (CCRMA)

*Artists-in-Residence (St. Lawrence String Quartet):* Geoff Nuttall (Violin), Scott St. John (Violin), Lesley Robertson (Viola), Christopher Costanza (Violoncello)

# Philosophy

Courses offered by the Department of Philosophy are listed under the subject code PHIL on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PHIL&filter-catalognumber-PHIL=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PHIL&filter-catalognumber-PHIL=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PHIL&filter-catalognumber-PHIL=on>).

Philosophy concerns itself with fundamental problems. Some are abstract and deal with the nature of truth, justice, value, and knowledge; others are more concrete, and their study may help guide conduct or enhance understanding of other subjects. Philosophy also examines the efforts of past thinkers to understand the world and people's experience of it.

Although it may appear to be an assortment of different disciplines, there are features common to all philosophical inquiry. These include an emphasis on methods of reasoning and the way in which judgments are

formed, on criticizing and organizing beliefs, and on the nature and role of fundamental concepts.

Students of almost any discipline can find something in philosophy which is relevant to their own specialties. In the sciences, it provides a framework within which the foundations and scope of a scientific theory can be studied, and it may even suggest directions for future development. Since philosophical ideas have had an important influence on human endeavors of all kinds, including artistic, political, and economic, students of the humanities should find their understanding deepened by acquaintance with philosophy.

## Mission of the Undergraduate Program in Philosophy

The mission of the undergraduate program in Philosophy is to train students to think clearly and critically about the deepest and broadest questions concerning being, knowledge, and value and their connections to the full range of human activities and interests. The Philosophy major presents students with paradigms and perspectives of past thinkers and introduces students to a variety of methods of reasoning and the ways in which judgments are formed. Courses in the major equip students with core skills involved in critical reading, analytical thinking, sound argumentation, and the clear and well-organized expression of ideas. Philosophy is an excellent major for those planning a career in law, medicine, or business. It provides analytical skills and a breadth of perspective helpful to those called upon to make decisions about their own conduct and the welfare of others. Philosophy majors who have carefully planned their undergraduate program have an excellent record of admission to professional and graduate schools.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to communicate philosophical ideas effectively orally and in writing.
2. close reading, argument evaluation, and analytical writing.
3. dialectical ability to identify strengths and weaknesses of an argument and devise appropriate and telling responses.
4. the ability to think critically and demonstrate clarity of conceptualization.
5. the ability to differentiate good from unpromising philosophical questions.
6. the ability to sustain an argument of substantial scope, showing control over logical, argumentative, and evidential relations among its parts.

## Special and Joint Majors

The Special Program in the History and Philosophy of Science enables students to combine interests in science, history, and philosophy. Students interested in this program should see the special advisor.

The Special Option in Philosophical and Literary Thought enables students to combine interests in philosophy and literary studies. Interested students should see the Director of Undergraduate Studies for Philosophy and Literature.

The joint major in Philosophy and Religious Studies combines courses from both departments into a coherent theoretical pattern.

# Graduate Program in Philosophy

The Department of Philosophy offers an M.A. and a Ph.D. degree. The University's basic requirements for the M.A. and Ph.D. degrees are discussed in the "Graduate Degrees (<http://www.stanford.edu/dept/registrat/bulletin/4901.htm>)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Philosophy and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Philosophy. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Philosophy and to interpret and present the results of such research.

## Library and Associations

The Tanner Memorial Library of Philosophy contains an excellent working library and ideal conditions for study. Graduate students and undergraduate majors in philosophy have formed associations for discussion of philosophical issues and the reading of papers by students, faculty, and visitors.

## Bachelor of Arts in Philosophy

There are three ways of majoring in Philosophy:

- The General Program
- The Special Program in the History and Philosophy of Science
- The Special Option in Philosophical and Literary Thought.

A student completing any of these receives a B.A. degree in Philosophy. There is also a major program offered jointly with the Department of Religious Studies. To declare a major, a student should consult with the Director of Undergraduate Study and see the undergraduate student services administrator to be assigned an advisor and work out a coherent plan. The department recommends proficiency in at least one foreign language.

## General Program

1. Course requirements, minimum 55 units:
  - A. preparation for the major: an introductory course (under 100) and PHIL 80 Mind, Matter, and Meaning. (PHIL 80 Mind, Matter, and Meaning should normally be taken no later than the first quarter after declaring the major.) Students taking the Philosophy Thinking Matters course can count 4 units toward the introductory Philosophy requirement. Students who took the Winter/Spring Philosophy Introduction to the Humanities (IHUM) track may count 5 units toward the Introductory Philosophy requirement. IHUM courses are no longer offered.
  - B. the core: 24 additional Philosophy units as follows:
    - i logic:

**Units**

Select one of the following:

PHIL 50	Introductory Logic	4
PHIL 150	Basic Concepts in Mathematical Logic	4
PHIL 150E	Logic in Action: A New Introduction to Logic	4
PHIL 151	First-Order Logic	4
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4
PHIL 155	General Interest Topics in Mathematical Logic	4
PHIL 157	Topics in Philosophy of Logic	3

ii philosophy of science:

**Units**

Select any of the following:

PHIL 60	Introduction to Philosophy of Science	5
PHIL 61	Science, Religion, and the Birth of Modern Philosophy	5
PHIL 160A	Newtonian Revolution	4
PHIL 160B	Newtonian Revolution	4
PHIL 162	Philosophy of Mathematics	4
PHIL 163	Significant Figures in Philosophy of Science	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 165	Philosophy of Physics	4
PHIL 166	Probability: Ten Great Ideas About Chance	4
PHIL 167A	Philosophy of Biology	2-4
PHIL 167B	Philosophy, Biology, and Behavior	4

iii moral and political philosophy:

**Units**

Select one of the following:

PHIL 170	Ethical Theory	4
PHIL 171	Justice	4-5
PHIL 172	History of Modern Moral Philosophy	4
PHIL 172B	Recent Ethical Theory	4
PHIL 173A	Aesthetics: Metaphor across the Arts	4
PHIL 173B	Metaethics	4
PHIL 174	Freedom and the Practical Standpoint	4
PHIL 174A	Moral Limits of the Market	4

iv metaphysics and epistemology:

**Units**

Select one of the following:

PHIL 180	Metaphysics	4
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 181	Philosophy of Language	4
PHIL 182	Truth	4
PHIL 184	Theory of Knowledge	4
PHIL 185	Memory	4
PHIL 186	Philosophy of Mind	4
PHIL 187	Philosophy of Action	4
PHIL 188	Personal Identity	4
PHIL 189	Examples of Free Will	4

v language, mind and action:

vi		<b>Units</b>
	Select one of the following:	
	PHIL 181 Philosophy of Language	4
	PHIL 181B Philosophy of Language: Contemporary Debates	4
	PHIL 186 Philosophy of Mind	4
	PHIL 187 Philosophy of Action	4

vii	history of philosophy:	<b>Units</b>
	Select both of the following	
	PHIL 100 Greek Philosophy	4
	PHIL 102 Modern Philosophy, Descartes to Kant	4

- C. one undergraduate philosophy seminar from PHIL 194A Empiricism and the Philosophy of Mind to PHIL 194T Practical Reason (194 series).
  - D. electives: courses numbered 10 or above, at least 9 units of which must be in courses numbered above 99.
2. Units for Tutorial, Directed Reading (PHIL 196 Tutorial, Senior Year, PHIL 197 Individual Work, Undergraduate, PHIL 198 The Dualist), The Dualist (PHIL 198 The Dualist), Honors Seminar (PHIL 199 Seminar for Prospective Honors Students), or affiliated courses may not be counted in the 55-unit requirement. No more than 10 units completed with grades of 'satisfactory' and/or 'credit' may be counted in the 55-unit requirement.
  3. A maximum of 10 transfer units or two courses can be used for the departmental major. In general, transfer courses cannot be used to satisfy the six area requirements or the undergraduate seminar requirement. Students may not substitute transfer units for the PHIL 80 requirement.

## Special Program in History and Philosophy of Science

Undergraduates may major in Philosophy with a field of study in History and Philosophy of Science. This field of study is declared on Axess. Each participating student is assigned an advisor who approves the course of study. A total of 61 units are required for the sub-major, to be taken according to requirements 1 through 5 below. Substitutions for the listed courses are allowed only by written consent of the undergraduate adviser for History and Philosophy of Science. Students are encouraged to consider doing honors work with an emphasis on the history and philosophy of science. Interested students should see the description of the honors thesis in Philosophy and consult their advisers for further information.

1. Three science courses (for example, biology, chemistry, physics) for 12 units.
2. The following Philosophy (PHIL) core courses must be completed with a letter grade by the end of the junior year:
3.

Select one of the following:	<b>Units</b>
PHIL 50 Introductory Logic	4
PHIL 150 Basic Concepts in Mathematical Logic	4
PHIL 151 First-Order Logic	4
PHIL 154 Modal Logic	4
PHIL 60 Introduction to Philosophy of Science	5
or PHIL 61 Science, Religion, and the Birth of Modern Philosophy	
PHIL 80 Mind, Matter, and Meaning	5
4. Three history of science courses.

5. Three philosophy of science courses, of which one must be PHIL 164 Central Topics in the Philosophy of Science: Theory and Evidence.
6. Three additional courses related to the major, in philosophy or history, to be agreed on by the advisor.
7. At least six courses in the major must be completed at Stanford with a letter grade. Units for Tutorial, Directed Reading, or The Dualist (PHIL 196 Tutorial, Senior Year, PHIL 197 Individual Work, Undergraduate, PHIL 198 The Dualist) may not be counted in the 61-unit requirement. No more than 10 units completed with grades of 'satisfactory' and/or 'credit' may be counted in the 61-unit requirement.
8. Transfer units must be approved in writing by the Director of Undergraduate Study at the time of declaring a major. Transfer courses are strictly limited when used to satisfy major requirements.

## Special Option in Philosophical and Literary Thought

Undergraduates may major in Philosophy with a special option in philosophy and literature. This option is declared to the department; it is not declared on Axess, and it does not appear on the transcript or the diploma. Students in this option take courses alongside students from other major departments which also have a specialized option associated with the program for the study of philosophical and literary thought, with administrative staff in the DLCL. Each student in this option is assigned an advisor in Philosophy, and students' schedules and overall course of study must be approved in writing by the advisor, and the Directors of Undergraduate Studies of Philosophy and of the program.

A total of 65 units must be completed for this option, including the following requirements.

1. Core requirements for the major in Philosophy, including:
  - A. an introductory course
  - B. PHIL 80 Mind, Matter, and Meaning
  - C. the core distribution requirements listed in section 1b of the general program above.
2. Gateway course in philosophy and literature (PHIL 81 Philosophy and Literature). This course should be taken as early as possible in the student's career, normally in the sophomore year.
3. Three courses in a single national literature, chosen by the student in consultation with the advisor and the program director of undergraduate studies. This normally involves meeting the language proficiency requirements of the relevant literature department.
4. Electives within Philosophy beyond the core requirements totaling at least 5 units, and drawn from courses numbered 100 or higher.
5. Two upper division courses of special relevance to the study of philosophy and literature, as identified by the committee in charge of the program. A list of approved courses is available from the program director of undergraduate studies.
6. Capstone seminar in the PHIL 194A Empiricism and the Philosophy of Mind to PHIL 194T Practical Reason (194 series).
7. Capstone seminar of relevance to the study of philosophy and literature, as approved by the program committee. In some cases, with approval of the Philosophy Director of Undergraduate Study and the program director of undergraduate studies, the same course may be used to meet requirements 6 and 7 simultaneously. In any case, the student's choice of a capstone seminar must be approved in writing by the Philosophy Director of Undergraduate Study and the program director of undergraduate studies. For a Capstone course:
8.

Select one of the following:	<b>Units</b>
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ENGLISH 117A	Irony: From Socrates to David Foster Wallace	5
COMPLIT 199	Senior Seminar	3-5
COMPLIT 213A	Martin Heidegger	3-5

Students are encouraged to consider doing honors work in a topic related to philosophy and literature through the Philosophy honors program.

The following rules also apply to the special option:

1. Units for Honors Tutorial, Directed Reading (PHIL 196 Tutorial, Senior Year, PHIL 197 Individual Work, Undergraduate, PHIL 198 The Dualist), The Dualist (PHIL 198 The Dualist), Honors Seminar (PHIL 199 Seminar for Prospective Honors Students) may not be counted toward the 65-unit requirement. No more than 10 units with a grade of 'satisfactory' or 'credit' may be counted toward the unit requirement.
2. A maximum of 15 transfer units may be counted toward the major, at most 10 of which may substitute for courses within Philosophy. Transfer credits may not substitute for PHIL 80 Mind, Matter, and Meaning or PHIL 81 Philosophy and Literature, and are approved as substitutes for the five area requirements or PHIL 194 only in exceptional cases.
3. Courses offered in other departments may be counted toward requirements 3, 5 and 7, but such courses, including affiliated courses, do not generally count toward the other requirements. In particular, such courses may not satisfy requirement 4.
4. Units devoted to meeting the language requirement are not counted toward the 65-unit requirement.

## Honors Program

Students who wish to undertake a more intensive and extensive program of study, including seminars and independent work, are invited to apply for the honors program during Winter Quarter of the junior year. Admission is selective on the basis of demonstrated ability in philosophy, including an average grade of at least 'A-' in a substantial number of philosophy courses and progress towards satisfying the requirements of the major.

With their application, candidates should submit an intended plan of study for the remainder of the junior and the senior years. It should include at least 5 units of Senior Tutorial (PHIL 196 Tutorial, Senior Year) during Autumn and/or Winter Quarter(s) of the senior year. Students who are applying to Honors College may use the same application for philosophy honors. In the quarter preceding the tutorial, students should submit an essay proposal to the Philosophy undergraduate director and determine an adviser.

Students applying for honors should enroll in Junior Honors Seminar (PHIL 199 Seminar for Prospective Honors Students) during the Spring Quarter of the junior year.

The length of the honors essay may vary considerably depending on the problem and the approach; usually it falls somewhere between 7,500 and 12,500 words. This essay may use work in previous seminars and courses as a starting point, but it cannot be the same essay that has been used, or is being used, in some other class or seminar. It must be a substantially new and different piece of work reflecting work in the tutorials.

A completed draft of the essay is submitted to the adviser at the end of the Winter Quarter of the senior year. Any further revisions must be finished by the fifth full week of the Spring Quarter, when three copies of the essay are to be given to the undergraduate secretary. The honors essay is graded by the adviser together with a second reader, chosen by the adviser in consultation with the student. The student also provides an oral defense of the thesis at a meeting with the adviser and second reader. The essay must receive a grade of 'A-' or better for the student to receive honors.

Honors tutorials represent units in addition to the 55-unit requirement.

For further information, contact the Honors' Director.

## Joint Major in Philosophy and Religious Studies

The joint undergraduate major in Philosophy and Religious Studies consists of 60 units of course work with approximately one third each in the philosophy core, the religious studies core, and either the general major or the special concentration. Affiliated courses cannot be used to satisfy this requirement.

No courses in either the philosophy or religious studies core may be taken satisfactory/no credit or credit/no credit.

In general, transfer units cannot be used to satisfy the core requirements. Transfer units and substitutions must be approved by the director of undergraduate studies in the appropriate department.

### Core Requirements

1. Philosophy (PHIL) courses:

A. Required course:

	Units
B. PHIL 80 Mind, Matter, and Meaning ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	5

- C. 16 units, including at least one Philosophy course from each of the following areas:

	Units
i logic and philosophy of science:	
ii PHIL 50 Introductory Logic ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	4
PHIL 60 Introduction to Philosophy of Science ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	5
PHIL 61 Science, Religion, and the Birth of Modern Philosophy ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	5
PHIL 150 Basic Concepts in Mathematical Logic ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	4
PHIL 150E Logic in Action: A New Introduction to Logic ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	4

PHIL 150X	Basic Concepts in Mathematical Logic	2
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 151	First-Order Logic	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 152	Computability and Logic	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 154	Modal Logic	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 155	General Interest Topics in Mathematical Logic	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 160A	Newtonian Revolution	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 160B	Newtonian Revolution	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 162	Philosophy of Mathematics	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 163	Significant Figures in Philosophy of Science	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		

PHIL 165	Philosophy of Physics	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 166	Probability: Ten Great Ideas About Chance	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 167A	Philosophy of Biology	2-4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 167B	Philosophy, Biology, and Behavior	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
iii	ethics and value theory:	
iv		<b>Units</b>
PHIL 170	Ethical Theory	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 171	Justice	4-5
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 172	History of Modern Moral Philosophy	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 172B	Recent Ethical Theory	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		
PHIL 173A	Aesthetics: Metaphor across the Arts	4
(https://exploredegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy)		
PHIL 173B	Metaethics	4
(https://exploredegree.nextyear.stanford.schoolofhumanitiesandsciences/philosophy)		

v epistemology, metaphysics, and philosophy of language:



vi	<p>PHIL 1 Introduction to Philosophy 5 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 80 Mind, Matter, and Meaning 5 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 180 Metaphysics 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 180A Realism, Anti-Realism, Irrealism, Quasi-Realism 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 181 Philosophy of Language 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 181B Philosophy of Language: Contemporary Debates 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 182 Truth 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 184 Theory of Knowledge 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 185 Memory 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 186 Philosophy of Mind 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p>	<p>PHIL 187 Philosophy of Action 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 188 Personal Identity 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p> <p>PHIL 189 Examples of Free Will 4 (<a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a>)</p>
		vii history of philosophy:
		viii
		<b>Units</b>
		PHIL 100 Greek Philosophy 4 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )
		PHIL 101 Introduction to Medieval Philosophy 4 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )
		PHIL 102 Modern Philosophy, Descartes to Kant 4 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )
		PHIL 103 19th-Century Philosophy 4 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )
		2. Religious Studies (RELIGST) courses: 20 units, chosen in consultation with the student's advisor, including:
		A. RELIGST 290 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> ) Majors Seminar (5 units; Winter Quarter; recommended junior year; fulfills WIM requirement)
		B. at least one course in philosophy of religion, broadly construed:
		C.
		<b>Units</b>
		RELIGST The Roots of Right and Wrong in Christianity, Judaism, and Islam 4 54 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )

RELIGST 62 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Philosophy of Religion	4
RELIGST 101 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Who is Allah?	3
RELIGST 173 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	What is Enlightenment? Religion in the Age of Reason	4
RELIGST 174E ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Kierkegaard: Existentialism and Religion	4
RELIGST 183 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	The Death of God: Between Hegel and Marx	4
RELIGST 212 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Chuang Tzu	5
RELIGST 220 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Modern Islamic Thought: Philosophy, Politics, Society	5
RELIGST 226 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period	5
RELIGST 238 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Christian Neo-Platonism, East and West	3-5
RELIGST 245 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Religion, Reason, and Romanticism	5

RELIGST 271A ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Dante's Spiritual Vision	4-5
RELIGST 271B ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Dante's Spiritual Vision	4-5
RELIGST 273 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Historicism and Its Problems	3-5
RELIGST 274 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	From Kant to Kierkegaard	3-5
RELIGST 275 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Kierkegaard and Religious Existentialism	3-5
RELIGST 277 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	The Later Heidegger	3
RELIGST 278 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Heidegger: Confronting the Ultimate	3-5
RELIGST 279 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Heidegger and the Holy	4
RELIGST 279A ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanphilosophy</a> )	Heidegger on human being and God	4
RELIGST 280 ( <a href="https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy">https://exploreddegrees-nextyear.stanford.edu/schoolofhumanitiesandsciences/philosophy</a> )	Schleiermacher: Reconstructing Religion	3-5

D. diversity requirement: Students may not take all their religion courses in one religious tradition.

## General Major Requirements

Five additional courses (approximately 20 units) divided between the two departments. No more than five of these units may come from courses numbered under 99 in either department. Each student must also take at least one undergraduate seminar in religious studies and one undergraduate seminar in philosophy.

## Special Concentration

With the aid of an adviser, students pursue a specialized form of inquiry in which the combined departments have strength; for example, American philosophy and religious thought, philosophical and religious theories of human nature and action, philosophy of religion. Courses for this concentration must be approved in writing by the advisor.

## Directed Reading and Satisfactory/No Credit Units

Units of directed reading for fulfilling requirements of the joint major are allowed only with special permission. No more than 10 units of work with a grade of 'satisfactory' count toward the joint major.

## Honors Program

Students pursuing a joint major in Philosophy and Religious Studies may also apply for honors by following the procedure for honors in either of the departments.

## Minor in Philosophy

A minor in Philosophy consists of at least 30 units of Philosophy courses satisfying the following conditions:

- Students taking the Philosophy Thinking Matters course may count it as equivalent to a maximum of 4 units of Philosophy courses under 100. Students who took the Winter/Spring Philosophy Introduction to the Humanities (IHUM) track may count these courses as equivalent to a maximum of 5 units of Philosophy courses under 100. IHUM courses are no longer offered.
- At least 10 units must be from courses numbered 100 or above.
- The 30 units must include one of:
  - a history of philosophy course numbered 100 or above
  - one quarter of Philosophy Thinking Matters.
  - two quarters of IHUM (only 5 of the 10 units can count towards 30-unit requirement. IHUM courses are no longer offered.
- One course from any two of the following four areas (PHIL):
  - Philosophy of Science and Logic

		Units
PHIL 60	Introduction to Philosophy of Science	5
PHIL 61	Science, Religion, and the Birth of Modern Philosophy	5
PHIL 160A	Newtonian Revolution	4
PHIL 160B	Newtonian Revolution	4
PHIL 162	Philosophy of Mathematics	4
PHIL 163	Significant Figures in Philosophy of Science	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 165	Philosophy of Physics	4
PHIL 166	Probability: Ten Great Ideas About Chance	4

PHIL 167A	Philosophy of Biology	2-4
PHIL 167B	Philosophy, Biology, and Behavior	4
PHIL 50	Introductory Logic	4
PHIL 150	Basic Concepts in Mathematical Logic	4
PHIL 151	First-Order Logic	4
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4
PHIL 155	General Interest Topics in Mathematical Logic	4
PHIL 157	Topics in Philosophy of Logic	3

### B. Units

#### Moral and Political Philosophy

PHIL 2	Introduction to Moral Philosophy	5
PHIL 170	Ethical Theory	4
PHIL 171	Justice	4-5
PHIL 172	History of Modern Moral Philosophy	4
PHIL 173A	Aesthetics: Metaphor across the Arts	4
PHIL 173B	Metaethics	4
PHIL 174A	Moral Limits of the Market	4
PHIL 174	Freedom and the Practical Standpoint	4

### C. Units

#### Metaphysics and epistemology

PHIL 1	Introduction to Philosophy	5
PHIL 80	Mind, Matter, and Meaning	5
PHIL 180	Metaphysics	4
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 182	Truth	4
PHIL 184	Theory of Knowledge	4
PHIL 185	Memory	4
PHIL 189	Examples of Free Will	4

### D. Units

#### Language, mind and action

PHIL 181	Philosophy of Language	4
PHIL 181B	Philosophy of Language: Contemporary Debates	4
PHIL 186	Philosophy of Mind	4
PHIL 187	Philosophy of Action	4

- Units for tutorials, directed reading, and affiliated courses may not be counted.
- Transfer units must be approved in writing by the Director of Undergraduate Study at the time of declaring. The number of transfer units is generally limited to a maximum of 10.
- No more than 6 units completed with grades of 'satisfactory' or 'credit' count towards the 30-unit requirement.

Students must declare their intention to minor in Philosophy in a meeting with the Director of Undergraduate Study. This formal declaration must be made no later than the last day of the quarter two quarters before degree conferral. The Permission to Declare a Philosophy Minor (signed by the Director of Undergraduate Study) lists courses taken and to be taken to fulfill minor requirements. This permission is on file in the department office. Before graduation, a student's record is checked to see that requirements have been fulfilled, and the results are reported to the University Registrar.

# Master of Arts in Philosophy

University requirements for the M.A. are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

Three programs lead to the M.A. in Philosophy. One is a general program providing a grounding in all branches of the subject. The others provide special training in one branch.

## Coterminal Bachelor's and Master's Degrees in Philosophy

It is possible to earn an M.A. in Philosophy while earning a B.A. or B.S. This can usually be done by the end of the fifth undergraduate year, although a student whose degree is not in Philosophy may require an additional year. Standards for admission to, and completion of, this program are the same as for M.A. applicants who already have the bachelor's degree when matriculating. Applicants for the coterminal program are not, however, required to take the Graduate Record Exam.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Admissions

All prospective master's students, including those currently enrolled in other Stanford programs, must apply for admission to the program. No fellowships are available. Entering students must meet with the director of the master's program and have their advisor's approval, in writing, of program proposals. The master's program should not be considered a stepping stone to the doctoral program; these two programs are separate and distinct.

## Unit Requirements

Each program requires a minimum of 45 units in philosophy. Students in a special program may be allowed or required to replace up to 9 units of philosophy by 9 units in the field of specialization. Although the requirements for the M.A. are designed so that a student with the equivalent of a strong undergraduate philosophy major at Stanford might complete them in one year, most students need longer. Students should also keep in mind that although 45 units is the minimum required by the University, quite often more units are necessary to complete department requirements. Up to 6 units of directed reading in philosophy may be allowed. There is no thesis requirement, but an optional master's thesis or project, upon faculty approval, may count as the equivalent of up to 8 units. A special program may require knowledge of a foreign language. At least 45 units in courses numbered 100 or above must be completed with a grade of 'B-' or better at Stanford. Students are reminded of the University requirements for advanced degrees, and particularly of the fact that for the M.A., students must complete three full quarters as measured by tuition payment.

## General Program

The General Program requires a minimum of 45 units in Philosophy courses numbered above 99. These courses must be taken for a letter grade, and the student must receive at least a 'B-' in the course. Courses taken to satisfy the undergraduate core or affiliated courses may not be counted in the 45 units. The requirement has three parts:

## 1. Undergraduate Core

Students must have when they enter, or complete early in their program, the following undergraduate courses (students entering from other institutions should establish equivalent requirements with a master's adviser upon arrival or earlier):

### A. Logic:

Select one of the following:

		Units
PHIL 50	Introductory Logic	4
PHIL 150	Basic Concepts in Mathematical Logic	4
PHIL 150E	Logic in Action: A New Introduction to Logic	4
PHIL 151	First-Order Logic	4

### B. Philosophy of science:

Select any of the following:

		Units
PHIL 60	Introduction to Philosophy of Science	5
PHIL 61	Science, Religion, and the Birth of Modern Philosophy	5
PHIL 163	Significant Figures in Philosophy of Science	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 165	Philosophy of Physics	4
PHIL 166	Probability: Ten Great Ideas About Chance	4
PHIL 167A	Philosophy of Biology	2-4
PHIL 167B	Philosophy, Biology, and Behavior	4

### C. Moral and political philosophy:

Select one of the following:

		Units
PHIL 170	Ethical Theory	4
PHIL 171	Justice	4-5
PHIL 172	History of Modern Moral Philosophy	4
PHIL 172B	Recent Ethical Theory	4
PHIL 173A	Aesthetics: Metaphor across the Arts	4
PHIL 173B	Metaethics	4
PHIL 174	Freedom and the Practical Standpoint	4
PHIL 174A	Moral Limits of the Market	4

### D. Metaphysics and epistemology:

Select one of the following:

		Units
PHIL 80	Mind, Matter, and Meaning	5
PHIL 180	Metaphysics	4
PHIL 181	Philosophy of Language	4
PHIL 182	Truth	4
PHIL 184	Theory of Knowledge	4
PHIL 185	Memory	4
PHIL 186	Philosophy of Mind	4
PHIL 187	Philosophy of Action	4
PHIL 188	Personal Identity	4
PHIL 189	Examples of Free Will	4

### E. History of philosophy: two history of philosophy courses numbered 100 or above

## 2. Graduate Core

Students must take at least one course numbered over 105 from three of the following five areas (courses used to satisfy the undergraduate core cannot also be counted toward satisfaction of the graduate core). Crosslisted and other courses taught outside the Department of Philosophy do not count towards satisfaction of the core.

- A. Logic and semantics
- B. Philosophy of science and history of science
- C. Ethics, value theory, and moral and political philosophy
- D. Metaphysics, epistemology, and philosophy of language
- E. History of philosophy

3. Each master's candidate must take at least two courses numbered above 200; these cannot be graduate sections of undergraduate courses.

## 4. Specialization

Students must take at least three courses numbered over 105 in one of the five areas.

## Special Program in Symbolic Systems

Students should have the equivalent of the Stanford undergraduate major in Symbolic Systems. Students who have a strong major in one of the basic SSP disciplines (philosophy, psychology, linguistics, computer science) may be admitted, but are required to do a substantial part of the undergraduate SSP core in each of the other basic SSP fields. This must include the following three philosophy courses or their equivalents:

		Units
PHIL 80	Mind, Matter, and Meaning	5
PHIL 151	First-Order Logic	4
Select one of the following:		
PHIL 181	Philosophy of Language	4
PHIL 184	Theory of Knowledge	4
PHIL 186	Philosophy of Mind	4
PHIL 187	Philosophy of Action	4

This work does not count towards the 45-unit requirement.

## Course Requirements

- Four courses in philosophy at the graduate level (numbered 200 or above), including courses from three of the following five areas:
  - A. Philosophy of language
  - B. Logic
  - C. Philosophy of mind
  - D. Metaphysics and epistemology
  - E. Philosophy of science

At most two of the four courses may be graduate sections of undergraduate courses numbered 100 or higher.

- Three courses numbered 100 or higher from outside Philosophy, chosen in consultation with an advisor. These courses should be from two of the following four areas:
  - A. Psychology
  - B. Linguistics
  - C. Computer Science
  - D. Education

Remaining courses are chosen in consultation with and approved by an advisor.

## Special Program in the Philosophy of Language

Admission is limited to students with substantial preparation in philosophy or linguistics. Those whose primary preparation has been in linguistics may be required to satisfy all or part of the undergraduate core requirements as described in the "General Program" subsection above. Those whose preparation is primarily in philosophy may be required to take additional courses in linguistics.

## Course Requirements

- Philosophy of language: two approved courses in the philosophy of language numbered 180 or higher.

- Syntactic theory and generative grammar:

		Units
PHIL 384	Seminar in Metaphysics and Epistemology	4
LINGUIST 230A	Introduction to Semantics and Pragmatics	4

- Logic: at least two approved courses numbered PHIL 151 First-Order Logic or higher.
- An approved graduate-level course in mathematical linguistics or automata theory.

## Doctor of Philosophy in Philosophy

Prospective graduate students should see the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/philosophy/http://gradadmissions.stanford.edu>) web site for information and application materials. Applicants should take the Graduate Record Examination by October of the year the application is submitted.

The University's basic requirements for the Ph.D. degree including residence, dissertation, and examination are discussed in the "Graduate Degrees (p. 38)" section of this bulletin. The requirements detailed here are department requirements. These requirements are meant to balance structure and flexibility in allowing students, in consultation with their advisers, to take a path through the program that gives them a rigorous and broad philosophical education, with room to focus on areas of particular interest, and with an eye to completing the degree with an excellent dissertation and a solid preparation for a career in academic philosophy.

Courses used to satisfy any course requirement in Philosophy must be passed with a letter grade of 'B-' or better (no satisfactory/no credit), except in the case of a course/seminar used to satisfy the third-year course/seminar requirement and taken for only 2 units. Such a reduced-unit third-year course/seminar must be taken credit/no credit.

At the end of each year, the department reviews the progress of each student to determine whether the student is making satisfactory progress, and on that basis to make decisions about probationary status and termination from the program where appropriate.

Any student in one of the Ph.D. programs may apply for the M.A. when all University and department requirements have been met.

## Proficiency Requirements

- First-year Ph.D. Proseminar: a one quarter, topically focused seminar offered in Autumn Quarter, and required of all first-year students.

2. Distribution requirements during the first six quarters. Intended to ensure a broad and substantial exposure to major areas of philosophy while allowing for considerable freedom to explore.
  - A. six courses distributed across three areas as follows:
    - i two courses in value theory including ethics, aesthetics, political philosophy, social philosophy, philosophy of law. At least one of the courses satisfying this distribution requirement must be in ethics or political philosophy.
    - ii Two courses in language, mind, and action. One course satisfying this requirement must be drawn from the language related courses, and one from mind and action related courses.
    - iii two courses in metaphysics and epistemology (including metaphysics, epistemology, philosophy of science). At least one of the courses satisfying this requirement must be drawn from either metaphysics or epistemology.
    - iv Instructors indicate which courses may satisfy particular requirements. If a course potentially satisfies more than one requirement the student may use it for only one of those area requirements; no units may be double-counted. Students must develop broad competencies in all these areas. Those without strong backgrounds in these areas would normally satisfy these distribution requirements by taking more basic courses rather than highly specialized and focused courses. Students should consult with their adviser in making these course decisions, and be prepared to explain these decisions when reviewed for candidacy; see requirement 6 below.
  - B. Logic requirement: PHIL 150 Basic Concepts in Mathematical Logic or equivalent.
  - C. History/logic requirement. One approved course each in ancient and modern philosophy, plus either another approved history of philosophy course or PHIL 151 First-Order Logic.
  - D. Students should normally take at least 64 graduate level units at Stanford during their first six quarters (in many cases students would take more units than that) and of those total units, at least 49 units of course work are to be in the Philosophy department. These courses must be numbered above 110, but not including Teaching Methods (PHIL 239 Teaching Methods in Philosophy) or affiliated courses. Units of Individual Directed Reading are normally not to be counted toward this 49-unit requirement unless there is special permission from the student's adviser and the Director of Graduate Studies.
3. Writing requirement
 

A qualifying paper of professional quality and approximately 8000 words. Students must complete a version of the paper, which is itself likely to be a revision of a paper written during the first year of course work, by the beginning of their fourth quarter. The paper is read by a committee of two faculty who make suggestions for additional revision. The final version must be submitted by the first day of the sixth quarter, normally Spring Quarter of the second year.
4. Teaching Assistancy
 

A minimum of five quarters of teaching assistancy are required for the Ph.D. Normally one of these quarters is as a teaching assistant for the Philosophy Department's Writing in the Major course, PHIL 80 Mind, Matter, and Meaning. It is expected that students not teach in their first year and that they teach no more than two quarters in their second year. Students are required to take PHIL 239 Teaching Methods in Philosophy during Spring Quarter of their first year and during Autumn Quarter of their second year. Teaching is an important part of students' preparation to be professional philosophers.
5. Review at the End of the Second Year for Advancement to Candidacy
 

By the fourth week of the sixth quarter students must submit a one-page explanation of their first- and second-year course plan and their writing requirement paper. The faculty's review of each student includes a review of the student's record, an assessment of the qualifying paper, and an assessment of the student's preparation for work in her/his intended area of specialization, as well as recommendations of additional preparation, if necessary.
6. Candidacy
 

To continue in the Ph.D. program, each student must apply for candidacy during the sixth academic quarter, normally the Spring Quarter of the student's second year. Students may be approved for or denied candidacy by the end of that quarter by the department. In some cases, where there are only one or two outstanding deficiencies, the department may defer the candidacy decision and require the student to re-apply for candidacy in a subsequent quarter. In such cases, definite conditions for the candidacy re-application will be specified, and the student must work with his/her adviser and the DGS to meet those conditions in a timely fashion. A failure to maintain timely progress in satisfying the specified conditions will constitute grounds for a denial of advancement to candidacy.
7. Dissertation Development Seminar in the summer after the second year. This is the point at which students are expected to transition from spending much of their time on coursework to focusing on their thesis project. By the end of the summer, students are expected to have a plan for moving forward with the project in the third year; they should have formed advising relationships with faculty and should have made headway towards identifying a specific topic.
8. Upon completion of the summer dissertation development seminar, students will sign up for independent study credit, PHIL 240 Individual Work for Graduate Students, with their respective advisers each quarter. A plan at the beginning, and a report at the end of each quarter will be signed by both student and adviser and submitted to the Graduate Administrator for inclusion in the student's file. This will be the process every quarter up until the completion of the departmental oral.
9. In autumn and winter quarters of the third year, students will register in and satisfactorily complete PHIL 301 Dissertation Development Proseminar. Students meet to present their work in progress and discuss their thesis project. Participation in these seminars is required.
10. During the third and fourth years in the program, a student should complete at least three graduate-level courses/seminars, at least two of them in philosophy (a course outside philosophy can be approved by the adviser), and at least two of them in the third year. At most one can be taken credit/no-credit, and at most one can be taken for reduced (2) units (in which case it must be taken credit/no-credit); others must be passed with a B- or better. Courses required for candidacy are not counted toward satisfaction of this requirement. This light load of courses allows students to deepen their philosophical training while keeping time free for thesis research.
11. Dissertation Work and Defense
 

The third and following years are devoted to dissertation work. The few requirements in this segment of the program are milestones to encourage students and advisors to ensure that the project is on track.

  - A. Dissertation Proposal—By Spring Quarter of the third year, students should have selected a dissertation topic and committee. A proposal sketching the topic, status, and plan for the thesis project, as well as an annotated bibliography or literature review indicating familiarity with the relevant literature, must be received by the committee one week before the meeting on graduate student progress late in Spring Quarter. The dissertation proposal and the reading committee's report on it will constitute a substantial portion of the third year review.

- B. Departmental Oral—During Autumn Quarter of the fourth year, students take an oral examination based on at least 30 pages of written work, in addition to the proposal. The aim of the exam is to help the student arrive at an acceptable plan for the dissertation and to make sure that student, thesis topic, and advisors make a reasonable fit. It is an important chance for the student to clarify their goals and intentions with the entire committee present.
- C. Fourth-Year Colloquium—No later than Spring Quarter of the fourth year, students present a research paper in a 60-minute seminar open to the entire department. This paper should be on an aspect of the student’s dissertation research. This is an opportunity for the student to make their work known to the wider department, and to explain their ideas to a general philosophical audience.
- D. University Oral Exam—Ph.D. students must submit a completed draft of the dissertation to the reading committee at least one month before the student expects to defend the thesis in the University oral exam. If the student is given consent to go forward, the University oral can take place approximately two weeks later. A portion of the exam consists of a student presentation based on the dissertation and is open to the public. A closed question period follows. If the draft is ready by Autumn Quarter of the fourth year, the student may request that the University oral count as the department oral.

## Interdisciplinary Study

The department supports interdisciplinary study. Courses in Stanford’s other departments and programs may be counted towards the degree, and course requirements in Philosophy are designed to allow students considerable freedom in taking such courses. Dissertation committees may include members from other departments. Where special needs arise, the department is committed to making it possible for students to obtain a philosophical education and to meet their interdisciplinary goals. Students are advised to consult their advisers and the department’s student services office for assistance.

## Interdepartmental Programs Graduate Program in Cognitive Science

Philosophy participates with the departments of Computer Science, Linguistics, and Psychology in an interdisciplinary program in Cognitive Science. It is intended to provide an interdisciplinary education, as well as a deeper concentration in philosophy, and is open to doctoral students. Students who complete the requirements within Philosophy and the Cognitive Science requirements receive a special designation in Cognitive Science along with the Ph.D. in Philosophy. To receive this field designation, students must complete 30 units of approved courses, 18 of which must be taken in two disciplines outside of philosophy. The list of approved courses can be obtained from the Cognitive Science program located in the Department of Psychology.

## Special Track in Philosophy and Symbolic Systems

Students interested in interdisciplinary work relating philosophy to artificial intelligence, cognitive science, computer science, linguistics, or logic may pursue a degree in this program.

Prerequisites—Admitted students should have covered the equivalent of the core of the undergraduate Symbolic Systems Program requirements as described in the "Symbolic Systems (p. 561)" section of this bulletin, including courses in artificial intelligence (AI), cognitive science, linguistics, logic, and philosophy. The graduate program is designed with

this background in mind. Students missing part of this background may need additional course work. Aside from the required course work below, the Ph.D. requirements are the same as for the regular program, with the exception that one course in value theory and one course in history may be omitted.

*Courses of Study:* The program consists of three years of courses and two years of dissertation work. Students are required to take the following courses in the first two years:

- 1. Philosophy courses:
  - A. at least three graduate seminars in the general area of symbolic systems other than logic, such as philosophy of mind and philosophy of language.
  - B. two quarters of graduate logic courses from among:

		Units
PHIL 350A	Model Theory	3
PHIL 351A	Recursion Theory	3
PHIL 352A	Set Theory	3
PHIL 353A	Proof Theory	3

- 2. Five cognitive science and computer science courses:
  - A. at least two courses in cognitive psychology
  - B. two or three graduate courses in computer science, at least one in AI and one in theory
- 3. Three linguistics and computational linguistics courses:
  - A. graduate courses on natural language that focus on two of the following areas: phonetics and phonology, syntax, semantics, or pragmatics
  - B. one graduate course in computational linguistics, typically LINGUIST 288 Natural Language Understanding
- 4. At least two additional graduate seminars at a more advanced level, in the general area of the program, independent of department. These would typically be in the area of the student’s proposed dissertation project.

The requirements for the third year and subsequent years are the same as for other third-year graduate students in philosophy: The dissertation committee must include at least one member of the Department of Philosophy and one member of the Program in Symbolic Systems outside the Department of Philosophy.

## Joint Program in Ancient Philosophy

This program is jointly administered by the Departments of Classics and Philosophy and is overseen by a joint committee composed of members of both departments. It provides students with the training, specialist skills, and knowledge needed for research and teaching in ancient philosophy while producing scholars who are fully trained as either philosophers with a strong specialization in ancient languages and philology, or classicists with a concentration in philosophy.

Students are admitted to the program by either department. Graduate students admitted by the Philosophy department receive their Ph.D. from the Philosophy department; those admitted by the Classics department receive their Ph.D. from the Classics department. For Philosophy graduate students, this program provides training in classical languages, literature, culture, and history. For Classics graduate students, this program provides training in the history of philosophy and in contemporary philosophy.

Each student in the program is advised by a committee consisting of one professor in each department.

*Requirements for Philosophy Graduate Students:* These are the same as the proficiency requirements for the Ph.D. in Philosophy.

One year of Greek is a requirement for admission to the program. If students have had a year of Latin, they are required to take 3 courses in second- or third-year Greek or Latin, at least one of which must be in Latin. If they have not had a year of Latin, they are then required to complete a year of Latin, and take two courses in second- or third-year Greek or Latin.

Students are also required to take at least three courses in ancient philosophy at the 200 level or above, one of which must be in the Classics department and two of which must be in the Philosophy department.

## Ph.D. Subplan in History and Philosophy of Science

Graduate students in the Philosophy Ph.D. program may pursue a Ph.D. subplan in History and Philosophy of Science. The subplan is declared in Axxess and subplan designations appear on the official transcript, but are not printed on the diploma.

Students must fulfill Departmental degree requirements and the following requirements:

1. Attendance at the HPS colloquium series.
2. Philosophy of Science courses:

		Units
Select one of the following:		
PHIL 263	Significant Figures in Philosophy of Science	4
PHIL 264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 264A	Central Topics in Philosophy of Science: Causation	4
PHIL 266	Probability: Ten Great Ideas About Chance	4

3. One elective seminar in the history of science.
4. One elective seminar (in addition to the course satisfying requirement 2) in philosophy of science.

## Ph.D. Minor in Philosophy

To obtain a Ph.D. minor in Philosophy, students must follow these procedures:

1. Consult with the Director of Graduate Study to establish eligibility, and select a suitable adviser.
2. Give to the Graduate Administrator a signed copy of the program of study (designed with the adviser) which offers:
  - A. 30 units of courses in the Department of Philosophy with a letter grade of 'B-' or better in each course. No more than 3 units of directed reading may be counted in the 30-unit requirement.
  - B. At least one course or seminar numbered over 99 to be taken in each of these six areas:
    - i Logic
    - ii Philosophy of science
    - iii Ethics, value theory, and moral and political philosophy
    - iv Metaphysics and epistemology
    - v Language, mind and action
    - vi History of philosophy
  - C. Two additional courses numbered over 199 to be taken in one of those (b) six areas.
3. A faculty member from the Department of Philosophy (usually the student's adviser) serves on the student's doctoral oral examination committee and may request that up to one third of this examination be devoted to the minor subject.
4. Paperwork for the minor must be submitted to the department office before beginning the program.

*Emeriti (Professors):* Fred Dretske, Solomon Feferman, Dagfinn Føllesdal, Georg Kreisel, John Perry, David S. Nivison, Patrick Suppes, Allen Wood, Rega Wood, Denis Phillips (Courtesy Professor)

*Chair:* R. Lanier Anderson

*Director of Graduate Study:* Michael Bratman

*Director of Undergraduate Study:* Tamar Schapiro

*Honors Director and Undergraduate Outreach:* Nadeem Hussain

*Professors:* Chris Bobonich, Michael Bratman, Alan Code, Joshua Cohen, John Etchemendy, Michael Friedman, Helen Longino (on leave), Grigori Mints (on leave), Thomas Ryckman (Teaching), Debra Satz, Brian Skyrms (Spring), Kenneth Taylor, Johan van Benthem (Spring), Thomas Wasow

*Associate Professors:* R. Lanier Anderson, Mark Crimmins, Graciela De Pierris (on leave), David Hills (Teaching), Nadeem Hussain, Krista Lawlor, Tamar Schapiro

*Assistant Professors:* Alexis Burgess, Anna-Sara Malmgren

*Courtesy Professors:* Eamonn Callan, Reviel Netz, Josiah Ober, Thomas Sheehan

*Courtesy Associate Professor:* Rob Reich

*Courtesy Assistant Professor:* Kristi Olson

*Distinguished Visiting Professor:* George Smith

*Visiting Professors:* André Laks, Dana Scott

*Lecturers:* Will Beals, Luis Cheng-Guajardo, Jorah Dannenberg, Shane Duarte, Laura Maguire, Paul Skokowski, Richard Sommer

## Cognate Courses

The following courses have substantial philosophical content. However, in the absence of special permission these courses cannot generally be used to satisfy requirements for the Philosophy major or graduate degrees in Philosophy.

		Units
CLASSHIS 101	The Greeks	4-5
CLASSGRK 113	Advanced Greek: Scientific Writing	3-5
CLASSGEN 208B	Survey of Greek and Latin Literature: Classical Greek	3-5
MATH 161	Set Theory	3
RELIGST 278/378	Heidegger: Confronting the Ultimate	3-5

## Physics

Courses offered by the Department of Physics are listed under the subject code PHYSICS on the Stanford Bulletin's ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PHYSICS&filter-catalognumber-PHYSICS=on>).

## Mission of the Undergraduate Program in Physics

The mission of the undergraduate program in Physics is to provide students with a strong foundation in both classical and modern physics. The goal of the program is to develop both quantitative problem solving skills and the ability to conceive experiments and analyze and interpret data. These abilities are acquired through both course work and opportunities to conduct



independent research. The program prepares students for careers in fields that benefit from quantitative and analytical thinking, including physics, engineering, teaching, medicine, law, science writing, and science policy, in government or the private sector. In some cases, the path to this career will be through an advanced degree in physics or a professional program.

## Learning Outcomes (Undergraduate)

Students develop an understanding of the fundamental laws that govern the universe, and a strong foundation of mathematical, analytical, laboratory, and written communication skills. They will also be presented with opportunities for learning through research. Upon completion of the Physics degree, students should have acquired the following knowledge and skills:

1. a thorough quantitative and conceptual understanding of the core areas of physics, including mechanics, electricity and magnetism, thermodynamics, statistical physics, and quantum mechanics, at a level compatible with admission to graduate programs in physics at peer institutions.
2. the ability to analyze and interpret quantitative results, both in the core areas of physics and in complex problems that cross multiple core areas.
3. the ability to apply the principles of physics to solve new and unfamiliar problems. This ability is often described as "thinking like a physicist."
4. the ability to use contemporary experimental apparatus and analysis tools to acquire, analyze and interpret scientific data.
5. the ability to communicate scientific results effectively in written papers and presentations or posters.

## Course Work

Course work is designed to provide students with a sound foundation in both classical and modern physics. Students who wish to specialize in astronomy, astrophysics, or space science should also consult the "Astronomy Program (p. 291)" section of this bulletin.

Three introductory series of courses include labs in which undergraduates carry out individual experiments. The Intermediate and Advanced Physics Laboratories offer facilities for increasingly complex individual work, including the conception, design, and fabrication of laboratory equipment. Undergraduates are also encouraged to participate in research; most can do this through the senior thesis and/or the summer research program.

The study of physics is undertaken by three principal groups of undergraduates: those including physics as part of a general education; those preparing for careers in professional fields that require a knowledge of physics, such as medicine or engineering; and those preparing for careers in physics or related fields, including teaching and research in colleges and universities, research in federally funded laboratories and industry, and jobs in technical areas. Physics courses numbered below 100 are intended to serve all three of these groups. The courses numbered above 100 mainly meet the needs of the third group, but also of some students majoring in other branches of science and in engineering.

## Entry-Level Sequences in Physics

The Department of Physics offers three year-long, entry-level physics sequences, the PHYSICS 20, 40, and 60 series. The first of these (the 20 series) is non-calculus-based, and is intended primarily for those who are majoring in biology. Students with AP Physics credit, particularly those who are considering research careers, may wish to consider taking the PHYSICS 40 series, rather than using AP placement. These introductory courses provide a depth and emphasis on problem solving that has significant value in biological research, given today's considerable physics-based technology.

For those intending to major in engineering or the physical sciences, or simply wanting a stronger background in physics, the department offers the PHYSICS 40 and 60 series. Either of these satisfies the entry-level physics requirements of any Stanford major. The 60 series is intended for those who have already taken a Physics course at the level of the 40 series, or at least have a strong background in mechanics, some background in electricity and magnetism, and a strong background in calculus. The PHYSICS 40 series begins with mechanics in Winter Quarter, electricity and magnetism in Spring Quarter, and light and heat in Autumn Quarter. While it is recommended that most students begin the sequence with mechanics ( ) in Winter Quarter, those who have had strong physics preparation in high school (such as a score of at least 4 on the Physics Advanced Placement C exam) may start the sequence with PHYSICS 45 Light and Heat in Autumn Quarter.

Students who are planning to take either of the calculus-based sequences (PHYSICS 40 or 60 sequence) are advised to take the Physics Placement Test (<https://physics.stanford.edu/undergraduate-program/placement-test>) that is offered each year during New Student Orientation and on the evening of the first day of instruction in the Autumn quarter. Advice will be sent to each student with guidance on placement in the 40 or 60 sequence. See this page for details: <https://physics.stanford.edu/undergraduate-program/placement-test>

All courses for the Physics major must be taken for a letter grade, and a grade of 'C-' or better must be received for all units applied toward the major.

## Graduate Programs in Physics

Graduate students find opportunities for research in the fields of astrophysics, particle astrophysics, cosmology, experimental particle physics, particle theory, string theory, intermediate energy physics, low temperature physics, condensed matter physics, materials research, atomic physics, laser physics, quantum electronics, coherent optical radiation, novel imaging technologies, and biophysics. Faculty advisers are drawn from many departments, including Physics, Applied Physics, Materials Science and Engineering, Electrical Engineering, and Biology. Opportunities for research are also available with the faculty at SLAC in the areas of theoretical and experimental particle physics, particle astrophysics, cosmology, accelerator design, and photon science.

The number of graduate students admitted to the Department of Physics is strictly limited. Students should submit applications by Tuesday, December 18, 2012 for matriculation the following Autumn Quarter. Graduate students may normally enter the department only at the beginning of Autumn Quarter.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in physics and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis using the tools of Physics. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of physics and to interpret and present the results of such research.

## Fellowships and Assistantships

The Department of Physics makes an effort to support all its graduate students through fellowships, teaching assistantships, research

assistantships, or a combination of sources. More detailed information is provided with the offer of admission.

## Teaching Credentials

For information on teaching credentials, consult the "School of Education (p. 130)" section of this bulletin or visit the Stanford Teacher Education Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/physics/http://suse-step.stanford.edu>) web site. Also see the section on the Individually Designed Major program in Teaching Physical Science (<https://physics.stanford.edu/undergraduate-program/ba-teaching-physical-science>).

## Laboratories and Institutes

The Russell H. Varian Laboratory of Physics, the Physics and Astrophysics Building, the W. W. Hansen Experimental Physics Laboratory (HEPL), the E. L. Ginzton Laboratory, and the Geballe Laboratory for Advanced Materials (GLAM) together house a range of physics activities from general courses through advanced research. Ginzton Lab houses research on optical systems, including quantum electronics, metrology, optical communication and development of advanced lasers. GLAM houses research on novel and nanopatterned materials, from high-temperature superconductors and magnets to organic semiconductors, subwavelength photon waveguides, and quantum dots. GLAM also supports the materials community on campus with a range of characterization tools: it is the site for the Stanford Nanocharacterization Lab (SNL) and the NSF-sponsored Center for Probing the Nanoscale (CPN). The SLAC National Accelerator Laboratory is just a few miles from the Varian Laboratory. SLAC is a national laboratory funded by the Offices of Basic Energy Sciences and High Energy Physics of the Department of Energy. Scientists at SLAC conduct research in photon science, accelerator physics, particle physics, astrophysics and cosmology. The laboratory hosts a two-mile-long linear accelerator that can accelerate electrons and positrons. The Stanford Synchrotron Radiation Light Source (SSRL) uses intense x-ray beams produced with a storage ring on the SLAC site. The Linac Coherent Light Source (LCLS), completed in 2009, is the world's first x-ray free-electron laser and has opened new avenues of research in ultra-fast photon science.

The Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), formed jointly with the SLAC National Accelerator Laboratory, provides a focus for theoretical, computational, observational, and instrumental research programs. A wide range of research areas in particle astrophysics and cosmology are investigated by students, postdocs, research staff and faculty. The two major projects with which KIPAC is heavily involved are the Fermi Gamma-Ray Space Telescope (FGST) and the Large Synoptic Survey Telescope (LSST). KIPAC members also participate fully in the Cryogenic Dark Matter Search (CDMS), the Solar Dynamics Observatory (SDO), the EXO-200 double beta decay experiment, the Dark Energy Survey (DES), the NuSTAR and Astro-H X-ray satellites, the Cerenkov Telescope Array (CTA) and several cosmic microwave background experiments (BICEP, KECK, QUIET and POLAR-1).

The Ginzton Laboratory, HEPL, GLAM, KIPAC, SLAC, and SSRL are listed in the "Centers, Laboratories, and Institutes (p. 620)" section of this bulletin. Students may also be interested in research and facilities at two other independent labs: the Center for Integrated Systems, focused on electronics and nanofabrication; and the Clark Center, an interdisciplinary biology, medicine, and bioengineering laboratory.

The Stanford Institute for Theoretical Physics is devoted to the investigation of the basic structure of matter (particle theory, string theory, M-theory, quantum cosmology, condensed matter physics).

## Physics Course Catalog Numbering System

There are four series of beginning courses.

One course from the teen series is recommended for the humanities or social science student who wishes to become familiar with the methodology and content of modern physics:

		Units
PHYSICS 15	The Nature of the Universe	3
PHYSICS 16	Cosmic Horizons	3
PHYSICS 17	Black Holes	3
PHYSICS 19	How Things Work: An Introduction to Physics	3

The 20 series is recommended for general students and for students preparing for medicine or biology:

		Units
PHYSICS 21	Mechanics and Heat	3
PHYSICS 22	Mechanics and Heat Laboratory	1
PHYSICS 23	Electricity and Optics	3
PHYSICS 24	Electricity and Optics Laboratory	1
PHYSICS 25	Modern Physics	3
PHYSICS 26	Modern Physics Laboratory	1

The 40 series is for students majoring in engineering, chemistry, earth sciences, mathematics, or physics:

		Units
PHYSICS 41	Mechanics	4
PHYSICS 42	Classical Mechanics Laboratory	1
PHYSICS 43	Electricity and Magnetism	4
PHYSICS 44	Electricity and Magnetism Lab	1
PHYSICS 45	Light and Heat	4
PHYSICS 46	Light and Heat Laboratory	1

The advanced freshman series is for students who have had strong preparation in physics and calculus in high school. Students who have had appropriate background and wish to major in physics should take this introductory series:

		Units
PHYSICS 61	Mechanics and Special Relativity	4
PHYSICS 62	Classical Mechanics Laboratory	1
PHYSICS 63	Electricity, Magnetism, and Waves	4
PHYSICS 64	Electricity, Magnetism and Optics Laboratory	1
PHYSICS 65	Quantum and Thermal Physics	4
PHYSICS 67	Introduction to Laboratory Physics	2

The 20, 40, and 60 series consist of demonstration lectures on the fundamental principles of physics, problem work on application of these principles to actual cases, and lab experiments related to the lectures. Their objectives are not only to give information on particular subjects, but also to provide training in the use of the scientific method. The primary difference between the series of courses is that topics are discussed more thoroughly and treated with greater mathematical rigor in the 40 and 60 series.

Courses beyond 99 are numbered in accordance with a three-digit code. The first digit indicates the approximate level of the course:

Digit	Description
100	undergraduate courses
200	first-year graduate courses
300	more advanced courses
400	research, special, or current topics

The second digit indicates the general subject matter:

Digit	Description
00	laboratory
10,20,30	general courses

40	nuclear physics, nuclear energy, energy
50	elementary particle physics
60	astrophysics, cosmology, gravitation
70	condensed matter physics
80	optics and atomic physics
90	miscellaneous courses

## Bachelor of Science in Physics

To help in deciding which introductory sequence is most suitable, students considering a major in Physics may contact the undergraduate program coordinator (elva@stanford.edu) to arrange an advising appointment. Also see the Physics Placement Test webpage (<https://sites.stanford.edu/physics/undergraduate-program/placement-test>). Although it is possible to complete the Physics major in three years, students who contemplate starting the major during sophomore year should make an advising appointment to map out their schedule. Students who have had previous college-level courses (including EPGY) should make an advising appointment for placement and possible transfer credit. For advanced placement advice, see <http://studentaffairs.stanford.edu/registrar/students/ap>.

Undergraduates are offered help with physics problems in the Physics Tutoring Center in the Physics and Astrophysics Building, sub-basement, room S-17, which is staffed Monday through Friday. See schedule at <http://physicstutor.stanford.edu>.

Prospective Physics majors are advised to take PHYSICS 59 Current Research Topics Current Research Topics, in their freshman or sophomore year.

### Required Courses for Majors

For sample schedules illustrating how to complete the Physics major, see the Department of Physics (<https://sites.stanford.edu/physics/undergraduate-program/four-year-plans>) web site.

		Units
Introductory Sequence		16-20
Complete either the 40 Series or the 60 Series		
40 Series (19-20 units):		
PHYSICS 41	Mechanics	4
PHYSICS 42	Classical Mechanics Laboratory	1
PHYSICS 43	Electricity and Magnetism	4
PHYSICS 44	Electricity and Magnetism Lab	1-2
or PHYSICS 67	Introduction to Laboratory Physics	
PHYSICS 45	Light and Heat	4
PHYSICS 46	Light and Heat Laboratory	1
PHYSICS 70	Foundations of Modern Physics	4
60 Series (16 units):		
PHYSICS 61	Mechanics and Special Relativity	4
PHYSICS 62	Classical Mechanics Laboratory	1
PHYSICS 63	Electricity, Magnetism, and Waves	4
PHYSICS 64	Electricity, Magnetism and Optics Laboratory	1
PHYSICS 65	Quantum and Thermal Physics	4
PHYSICS 67	Introduction to Laboratory Physics	2
One advanced Physics elective (100 level or higher): required only for students who are not required to take PHYSICS 70		
Required Math Courses		
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5

or MATH 51H	Honors Multivariable Mathematics	
MATH 52	Integral Calculus of Several Variables	5
or MATH 52H	Honors Multivariable Mathematics	
MATH 53	Ordinary Differential Equations with Linear Algebra	5
or MATH 53H	Honors Multivariable Mathematics	
One advanced mathematics elective (3-5 units)		
Select one of the following:		
Any MATH (101 or higher)		
PHYSICS 112	Mathematical Methods of Physics	
STATS 116	Theory of Probability	
EE 261	The Fourier Transform and Its Applications	
Intermediate Sequence		
PHYSICS 105	Intermediate Physics Laboratory I: Analog Electronics	3
PHYSICS 107	Intermediate Physics Laboratory II: Experimental Techniques and Data Analysis	4
PHYSICS 108	Advanced Physics Laboratory: Project	4
PHYSICS 110	Advanced Mechanics	4
PHYSICS 112	Mathematical Methods of Physics (recommended) <sup>1</sup>	4
PHYSICS 113	Computational Physics (recommended) <sup>2</sup>	4
PHYSICS 120	Intermediate Electricity and Magnetism I	4
PHYSICS 121	Intermediate Electricity and Magnetism II	4
MATH 131P	Partial Differential Equations I	3
or math 173		
Advanced Sequence		
PHYSICS 130	Quantum Mechanics	4
PHYSICS 131	Quantum Mechanics II	4
PHYSICS 134	Advanced Topics in Quantum Mechanics <sup>2</sup>	4
PHYSICS 170	Thermodynamics, Kinetic Theory, and Statistical Mechanics I	4
PHYSICS 171	Thermodynamics, Kinetic Theory, and Statistical Mechanics II	4
Total Units		86-93

<sup>1</sup> Those wishing to pursue theoretical physics in graduate school may wish to take a collection of courses in the Department of Mathematics rather than or in addition to PHYSICS 112 Mathematical Methods of Physics.

<sup>2</sup> These courses are not required. PHYSICS 113 Computational Physics is recommended for students planning to work in technical fields. Both PHYSICS 113 Computational Physics and PHYSICS 134 Advanced Topics in Quantum Mechanics are recommended for students who intend to complete a Ph.D. in Physics.

### Concentrations in Physics

The primary purpose of concentrations in the Physics major is to provide consistent and more formal advising to students who want to concentrate in a particular area of physics during their undergraduate education, or prepare for future graduate studies in a particular area of physics. Physics majors are not required to choose a concentration and a concentration does not add any formal requirements to the Physics major. Upon graduation, students receive a certificate of completion of a concentration.

Students seeking further advice on a given concentration should contact the professor whose name appears next to the respective title of each section below. Within the chosen concentration below, complete at least four courses from the list or three courses plus a senior thesis. No more than one of the courses can be taken for CR/NC.

## A. Applied Physics (Hari Manoharan)

		Units
Solid State		
PHYSICS 172	Solid State Physics	3
APPPHYS 270	Magnetism and Long Range Order in Solids	3
MATSCI 195	Waves and Diffraction in Solids	3-4
Lasers		
EE 231	Introduction to Lasers	3
EE 232	Laser Dynamics	3
EE 268	Introduction to Modern Optics	3
Lab Methods		
APPPHYS 207	Laboratory Electronics	4
APPPHYS 304	Lasers Laboratory	4

## B. Astrophysics (Roger Romani, Sarah Church)

		Units
PHYSICS 100	Introduction to Observational and Laboratory Astronomy	3-4
PHYSICS 160	Introduction to Stellar and Galactic Astrophysics	3
PHYSICS 161	Introduction to Extragalactic Astrophysics and Cosmology	3
Select one of the following:		
PHYSICS 211	Continuum Mechanics	3
PHYSICS 260	Introduction to Astrophysics and Cosmology	3
PHYSICS 262	Introduction to Gravitation	3
PHYSICS 312	Basic Plasma Physics	3

## C. Biophysics (Seb Doniach)

		Units
BIOC 202	Biochemistry Bootcamp	1
BIOPHYS 228	Computational Structural Biology	3
BIO 141	Biostatistics	3-5
BIO 217	Neuronal Biophysics	4

It is recommended that Physics majors interested in pursuing a career in biophysics consider a minor in Biology.

## D. Geophysics (Simon Klemperer, Geophysics)

The following requirements apply to students matriculating 2010-11 or later:

		Units
GEOPHYS 110	Earth on the Edge: Introduction to Geophysics	3
GEOPHYS 120	Ice, Water, Fire	3-5
Select one of the following:		
GEOPHYS 130	Introductory Seismology	
GEOPHYS 170	Global Tectonics	
GEOPHYS 190	Near-Surface Geophysics	

Physics majors matriculating prior to 2010-11 who wish to complete a concentration in Geophysics should consult Prof. Klemperer.

## E. Theoretical Physics (Andrei Linde)

		Units
PHYSICS 152	Introduction to Particle Physics I	3
PHYSICS 260	Introduction to Astrophysics and Cosmology	3
PHYSICS 262	Introduction to Gravitation	3
PHYSICS 330	Quantum Field Theory I	3
PHYSICS 331	Quantum Field Theory II	3
PHYSICS 332	Quantum Field Theory III	3
PHYSICS 351	Standard Model of Particle Physics	3
PHYSICS 362	Advanced Extragalactic Astrophysics and Cosmology	3
PHYSICS 364	Advanced Gravitation	3

Notes to students taking this concentration:

1. Students should discuss the choice of courses with members of the Institute for Theoretical Physics and/or their major adviser.
2. Students may attend PHYSICS 330 Quantum Field Theory I after taking PHYSICS 130 Quantum Mechanics, PHYSICS 131 Quantum Mechanics II and PHYSICS 134 Advanced Topics in Quantum Mechanics. Prior study of special topics in quantum mechanics (PHYSICS 232, not offered this year) may be helpful.

## Individually Designed Major Program in Teaching Physical Science

This major, a joint effort of the Department of Physics and the Stanford Teacher Education Program (STEP), is designed for students to prepare themselves as high school teachers of physics and general science. The program awards a B.A. in Physical Science.

Students complete 47-49 units of Physics and related Mathematics courses, 40-43 units of course work in other sciences such as the life sciences, chemistry, and geosciences, and in general issues of science, and 9-15 units of concentration and depth courses. Total program units: 96-107. Students interested in this program should consult Professor Patricia Burchat (burchat@stanford.edu, 725-5771), and Professor Rachel Lotan, Director of the Stanford Teacher Education Program (STEP) in the School of Education (rlotan@stanford.edu).

## Core Physics Courses

		Units
<b>Mechanics (5)</b>		
Select one of the following:		5
PHYSICS 41 & PHYSICS 42	Mechanics and Classical Mechanics Laboratory	
PHYSICS 61 & PHYSICS 62	Mechanics and Special Relativity and Classical Mechanics Laboratory	
<b>Heat (5-6)</b>		
Select one of the following:		5-6
PHYSICS 45 & PHYSICS 46	Light and Heat and Light and Heat Laboratory	
PHYSICS 65 & PHYSICS 67	Quantum and Thermal Physics and Introduction to Laboratory Physics	

<b>Electricity and Magnetism (8-9)</b>		
Select one of the following:		5-6
PHYSICS 43 & PHYSICS 67	Electricity and Magnetism and Introduction to Laboratory Physics	
PHYSICS 63 & PHYSICS 64	Electricity, Magnetism, and Waves and Electricity, Magnetism and Optics Laboratory	
PHYSICS 105	Intermediate Physics Laboratory I: Analog Electronics	3
<b>Wave Motion (4)</b>		
PHYSICS 107	Intermediate Physics Laboratory II: Experimental Techniques and Data Analysis	4
<b>Modern Physics (for students who take 40 series) (4)</b>		
PHYSICS 70	Foundations of Modern Physics	4
<b>Applications (1)</b>		
PHYSICS 59	Current Research Topics	1
<b>Mathematics (Physics department requirement) (15)</b>		
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 52	Integral Calculus of Several Variables	5
MATH 53	Ordinary Differential Equations with Linear Algebra	5
<b>Statistics (5)</b>		
Select one of the following:		5
STATS 110	Statistical Methods in Engineering and the Physical Sciences	
STATS 116	Theory of Probability	
STATS 141	Biostatistics	
STATS 191	Introduction to Applied Statistics	
Total Units		47-49

## Additional Science Breadth Courses

	Units
Life Sciences	
Select one of the following Series:	15
Series A	
BIO 41	Genetics, Biochemistry, and Molecular Biology
BIO 42	Cell Biology and Animal Physiology
BIO 43	Plant Biology, Evolution, and Ecology
Series B	
HUMBIO 2A	Genetics, Evolution, and Ecology
HUMBIO 2B	Culture, Evolution, and Society
HUMBIO 3A	Cell and Developmental Biology
HUMBIO 3B	Behavior, Health, and Development
HUMBIO 4A	The Human Organism
HUMBIO 4B	Environmental and Health Policy Analysis
Chemistry	12
CHEM 31A & CHEM 31B or CHEM 31X	Chemical Principles I and Chemical Principles II or Chemical Principles
CHEM 33	Structure and Reactivity
Geoscience	8
EARTHSYS 10	Introduction to Earth Systems

Select one of the following:

PHYSICS 15	The Nature of the Universe	
PHYSICS 16	Cosmic Horizons	
PHYSICS 17	Black Holes	
General Issues of Science		4-18
EDUC 180	Directed Reading in Education	
ENGR 103	Public Speaking	
Concentration and Depth Courses		
3 courses (100 level or above) in a single area of concentration		9-15
Total Units		44-64

This individually designed major program in Physical Science includes all the elements of a Program of Subject Matter Preparation for Secondary Teachers of Physics and General Science that has been approved by the California Commission on Teacher Credentialing (CCTC). Students who complete the program are exempt from taking the C-BEST examination in Physics and General Science for admission to the Stanford Teacher Education Program (STEP) or any other accredited secondary teacher education program in California. Full details of the CCTC-approved program may be found at the School of Education (<http://ed.stanford.edu/suse/programs-degrees/program-coterminal-step.html>) web site.

Note: the Stanford individually designed major program in Physical Science requires course work beyond the CCTC-approved program, specifically 9-15 units of depth courses in a field of concentration: Physics, Astrophysics, Biology, Chemistry, Earth Sciences, Human Biology, or Computational Mathematics. See the adviser in the Physics department or the School of Education for more details.

## Senior Thesis

The department offers Physics majors the opportunity to complete a Senior Thesis. These are the guidelines:

1. Students must submit a Senior Thesis Application form once they identify a physics project, either theoretical or experimental, in consultation with individual faculty members. Proposal forms are available from the Undergraduate Coordinator and must be submitted by the week prior to the November Thanksgiving break of the academic year in which the student plans to graduate.
2. Credit for the project is assigned by the advisor within the framework of PHYSICS 205 Senior Thesis Research. A minimum of 3 units of PHYSICS 205 Senior Thesis Research must be completed for a letter grade during the senior year. Work completed in the Senior Thesis Program may not be used as a substitute for regular required courses for the Physics major.
3. A written report and a presentation of the work at its completion are required for the Senior Thesis. By mid-May, the Senior Thesis candidate is required to present the project at the department's Senior Thesis Presentation Program. This event is publicized and open to the general public. The expectation is that the student's advisor, second reader, and all other Senior Thesis candidates attend.

## Honors Program

Physics majors are granted a Bachelor of Science in Physics with Honors if they satisfy these three requirements beyond the general Physics major requirements:

1. The student files for entry into the honors program by completing an Honors Program Application (available from the Undergraduate Coordinator) by the same deadline as the Senior Thesis Application. Eligibility is confirmed by the department.
2. The student completes a Senior Thesis by meeting the deadlines and requirements described above.

- The student completes course work with an overall GPA of 3.30 or higher, and a GPA of 3.50 or higher in courses required for the Physics major.

## Minor in Physics or Astronomy

A minor is offered in either Physics or Astronomy. Students who take the PHYSICS 20, 40, or 60 series at Stanford in support of their major may count those units towards the minor. Those who have fulfilled Physics requirements at the 20 or 40 level by enrollment at another accredited university, or through advanced placement credits, may count credits towards / and /PHYSICS 24 Electricity and Optics Laboratory, or PHYSICS 41 Mechanics/PHYSICS 42 Classical Mechanics Laboratory and PHYSICS 43 Electricity and Magnetism/PHYSICS 44 Electricity and Magnetism Lab. PHYSICS 25 Modern Physics/PHYSICS 26 Modern Physics Laboratory, or PHYSICS 45 Light and Heat /PHYSICS 46 Light and Heat Laboratory for a minor in Physics or Technical minor in Astronomy, must be taken at Stanford even if similar material has been covered elsewhere. With the PHYSICS 21 Mechanics and Heat/PHYSICS 22 Mechanics and Heat Laboratory/PHYSICS 23 Electricity and Optics/PHYSICS 24 Electricity and Optics Laboratory or PHYSICS 41 Mechanics/PHYSICS 43 Electricity and Magnetism/PHYSICS 44 Electricity and Magnetism Lab exception noted above, all courses for the minor must be taken at Stanford University for a letter grade, and a grade of 'C-' or better must be received for all units applied toward the minor. The minor declaration deadline is three quarters before graduation, typically the beginning of Autumn Quarter if the student is graduating at the end of Spring Quarter.

## Minor in Physics

An undergraduate minor in Physics requires a minimum of 25 units with the following course work:

	Units
Select one of the following Series:	
Series A	
PHYSICS 41 Mechanics & PHYSICS 42 and Classical Mechanics Laboratory	5
PHYSICS 43 Electricity and Magnetism & PHYSICS 44 and Electricity and Magnetism Lab <sup>1</sup>	5
PHYSICS 45 Light and Heat & PHYSICS 46 and Light and Heat Laboratory	5
PHYSICS 70 Foundations of Modern Physics	4
Series B	
PHYSICS 61 Mechanics and Special Relativity & PHYSICS 62 and Classical Mechanics Laboratory	5
PHYSICS 63 Electricity, Magnetism, and Waves & PHYSICS 64 and Electricity, Magnetism and Optics Laboratory	5
PHYSICS 65 Quantum and Thermal Physics & PHYSICS 67 and Introduction to Laboratory Physics	6
At least three PHYSICS courses numbered 100 or above	9-12

<sup>1</sup> PHYSICS 67 Introduction to Laboratory Physics may be substituted for PHYSICS 44 Electricity and Magnetism Lab.

## Minor in Astronomy

Students wishing to pursue advanced work in astrophysical sciences should major in physics and concentrate in astrophysics. Students who take the 20, 40, or 60 series at Stanford in support of their major may count those units

towards the minor. However, students outside of physics with a general interest in astronomy may organize their studies by completing one of the following minor programs.

An undergraduate minor in astronomy requires the following courses:

## Non-Technical

For students whose majors do not require the PHYSICS 40 or 60 series:

	Units
PHYSICS 21 Mechanics and Heat	3
PHYSICS 23 Electricity and Optics	3
PHYSICS 25 Modern Physics & PHYSICS 26 and Modern Physics Laboratory	4
PHYSICS 50 Astronomy Laboratory and Observational Astronomy or PHYSICS 100 Introduction to Observational and Laboratory Astronomy	3-4
Select two of the following:	6
PHYSICS 15 The Nature of the Universe	
PHYSICS 16 Cosmic Horizons	
PHYSICS 17 Black Holes	
<b>Total Units</b>	<b>19-20</b>

## Technical

For students whose majors require the PHYSICS 40 or 60 series:

	Units
Select one of the following Series:	
Series A	
PHYSICS 41 Mechanics	4
PHYSICS 43 Electricity and Magnetism	4
PHYSICS 45 Light and Heat & PHYSICS 46 and Light and Heat Laboratory	5
PHYSICS 70 Foundations of Modern Physics	4
Series B	
PHYSICS 61 Mechanics and Special Relativity	4
PHYSICS 63 Electricity, Magnetism, and Waves	4
PHYSICS 65 Quantum and Thermal Physics	4
PHYSICS 67 Introduction to Laboratory Physics	2
And take the following three courses:	
PHYSICS 100 Introduction to Observational and Laboratory Astronomy	3-4
PHYSICS 160 Introduction to Stellar and Galactic Astrophysics	3
PHYSICS 161 Introduction to Extragalactic Astrophysics and Cosmology	3
<b>Total Units</b>	<b>24-27</b>

Students are also encouraged to take the electricity and magnetism/optics lab of the appropriate PHYSICS series PHYSICS 24, PHYSICS 44, and PHYSICS 64 for 1 additional unit.

## Master of Science

The department does not offer a coterminal degree program, or a separate program for the M.S. degree, but this degree may be awarded for a portion of the Ph.D. degree work.

University requirements for the master's degree, discussed in the "Graduate Degrees (p. 38)" section of this bulletin, include completion of 45 units of unduplicated course work after the bachelor's degree. Among the

department requirements are a grade point average (GPA) of at least 3.0 (B) for the following required courses (or their equivalents):

		Units
PHYSICS 220	Classical Electrodynamics	3
PHYSICS 271	Thermodynamics, Kinetic Theory, and Statistical Mechanics II	3-4
Plus one of the following courses:		
PHYSICS 230	Quantum Mechanics	3
PHYSICS 231	Quantum Mechanics	3
PHYSICS 234	Advanced Topics in Quantum Mechanics	3
PHYSICS 330	Quantum Field Theory I	3
PHYSICS 331	Quantum Field Theory II	3
PHYSICS 332	Quantum Field Theory III	3
Plus two 3 unit graduate level courses in Physics or Applied Physics.		

Up to 6 of these required units may be waived on petition if a thesis is submitted.

## Doctor of Philosophy in Physics

The University's basic requirements for the Ph.D. are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

The minimum department requirements for the Ph.D. degree in Physics consist of completing all courses listed below and at least one course from each of two subject areas outside the student's primary area of research (among biophysics, condensed matter, quantum optics and atomic physics, astrophysics and gravitation, and nuclear and particle physics). For this requirement students must choose from courses numbered above PHYSICS 234, excluding 270, 271, 290, and 294. For a full list of courses by concentration that satisfy the breadth requirement see the Physics Department (<https://sites.stanford.edu/physics>) website.

The requirements in the following list may be fulfilled by passing the course at Stanford or passing an equivalent course elsewhere:

		Units
PHYSICS 220	Classical Electrodynamics	3
PHYSICS 271	Thermodynamics, Kinetic Theory, and Statistical Mechanics II <sup>1</sup>	3-4
PHYSICS 290	Research Activities at Stanford	1-3
PHYSICS 294	Teaching of Physics Seminar	1
Plus one of the following courses:		
PHYSICS 230	Quantum Mechanics	3
PHYSICS 231	Quantum Mechanics	3
PHYSICS 234	Advanced Topics in Quantum Mechanics	3
PHYSICS 330	Quantum Field Theory I	3
PHYSICS 331	Quantum Field Theory II	3
PHYSICS 332	Quantum Field Theory III	3

<sup>1</sup> For students who have had a basic introduction to Thermal and Statistical Physics at the advanced undergraduate level. Students who have not had that level of preparation should additionally take PHYSICS 270 prior to taking PHYSICS 271.

A grade point average (GPA) of at least 3.0 (B) is required for courses taken toward the degree.

All Ph.D. candidates must have math proficiency equivalent to the following Stanford MATH courses:

		Units
MATH 106	Functions of a Complex Variable	3

MATH 113	Linear Algebra and Matrix Theory	3
MATH 116	Complex Analysis	3
MATH 132	Partial Differential Equations II	3

Prior to making an application for candidacy, each student is required to pass a comprehensive qualifying examination on undergraduate physics. This closed book exam is given in the month of January following the student's arrival at Stanford. This is a written examination held over two days, covering particle mechanics, electricity and magnetism, quantum mechanics, statistical mechanics, thermodynamics, special relativity, and general physics. A thesis proposal must be submitted during the third year. In order to assess the direction and progress toward a thesis, an oral report and evaluation are required during the fourth year. After completion of the dissertation, each student must take the University oral examination (defense of dissertation).

Three quarters of teaching (including a demonstrated ability to teach) are a requirement for obtaining the Ph.D. in Physics.

Students interested in applied physics and biophysics research should also take note of the Ph.D. granted independently by the Department of Applied Physics and by the Biophysics Program. Students interested in astronomy, astrophysics, or space science should also consult the "Astronomy Course Program (p. 291)" section of this bulletin.

## Ph.D. Minor in Physics

Doctoral students seeking a minor in Physics must take at least six courses from the following list: 210, 211, 216, 220, 230, 231, 234, 270, and 271 among the 20 required units. All prospective minors must obtain approval of their Physics course program from the Physics Graduate Study Committee at least one year before conferral of the Ph.D.

*Emeriti*: (Professors) Steven Chu, Alexander L. Fetter, Stanley S. Hanna, William A. Little, Douglas D. Osheroff\*, David M. Ritson, H. Alan Schwetman, Robert V. Wagoner, John Dirk Walecka, Stanley G. Wojcicki\*, Mason R. Yearian; (Professors, Research) John A. Lipa\*, Todd I. Smith\*, John P. Turneaure; (Professors, Courtesy) Peter A. Sturrock (Applied Physics), Richard Taylor (SLAC National Accelerator Laboratory)  
*Chair*: Steven M. Kahn

*Associate Chair*: Giorgio Gratta

*Professors*: Roger Blandford, Phil Bucksbaum, Patricia Burchat, Blas Cabrera, Sarah Church, Persis Drell (on leave), Savas G. Dimopoulos, Sebastian Doniach, Giorgio Gratta, Shamit Kachru, Steven Kahn, Renata E. Kallosh, Aharon Kapitulnik, Mark Kasevich, Steven A. Kivelson, Robert B. Laughlin, Andrei D. Linde, Kathryn Moler, Peter F. Michelson, Vahe Petrosian, Roger W. Romani, Zhi-Xun Shen, Stephen Shenker, Eva Silverstein, Leonard Susskind, Shoucheng Zhang

*Associate Professors*: Tom Abel, Steven Allen, David Goldhaber-Gordon, Hari Manoharan

*Assistant Professors*: Stefan Funk, Peter Graham, Sean Hartnoll, Chao-Lin Kuo, Xiao-liang Qi, Srinivas Raghu, Monica Schleier-Smith (on leave), Leonardo Senatore (on leave), Risa Wechsler

*Professors (Research)*: Leo Hollberg, Phillip H. Scherrer

*Courtesy Professors*: Rhiju Das, Benjamin Lev, Craig Levin, Stephen Quake, Richard N. Zare

*Lecturers*: Chaya Nanavati, Rick Pam

*Consulting Professors*: Ralph Devoe, Barbara Jones

\* Recalled to active duty.

# Political Science

Courses offered by the Department of Political Science are listed under the subject code POLISCI on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=POLISCI&filter-catalognumber-POLISCI=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=POLISCI&filter-catalognumber-POLISCI=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=POLISCI&filter-catalognumber-POLISCI=on>).

## Mission of the Undergraduate Program in Political Science

The mission of the undergraduate program in Political Science is to provide students with a solid grasp of the American political system and other political systems within the context of global forces, international conflicts, social movements, ideological systems and diversity. Courses in the major are designed to help students gain competency in the primary subfields of political science including American and comparative politics, international relations, and the theory/philosophy of politics; to introduce students to a variety of research methodologies and analytical frameworks; and to develop students' written and oral communication skills. Students in the program have excellent preparation for further study in graduate or professional schools as well as careers in government, business, and not-for-profit organizations.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of political science.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of Political Science.

## Graduate Programs in Political Science

Admission—Prospective graduate students should go to the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/politicalscience/http://gradadmissions.stanford.edu>) web site for application materials. Applicants are required to submit a recent sample of their writing (not to exceed 35 pages) and to take the General Test of the Graduate Record Examination (GRE). Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL). The TOEFL requirements are waived for applicants who have recently completed two or more years of study at a university where all instruction is provided in English. The application deadline is December 4, 2012. Admission is offered for the

Autumn Quarter only. The department expects all students to pursue a full-time program except for time devoted to teaching or research assistantships.

## Learning Outcomes (Graduate)

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Political Science. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Political Science and to interpret and present the results of such research.

Pursued in combination with a doctoral degree, the master's program furthers students' knowledge and skills in Political Science. This is achieved through completion of courses in three subfields, and experience with independent work and specialization.

## Bachelor of Arts in Political Science

To receive a B.A. in Political Science, a student must:

1. Submit a Political Science major proposal to the undergraduate administrator and declare on Axess. Forms are available in Encina Hall West, room 100, or at the Department of Political Science (<http://polisci.stanford.edu/bachelors>) web site. For additional information, come to the office or phone (650) 723-1608. Students must complete their major declaration no later than the end of Autumn Quarter of their junior year.
2. Complete 70 units including:
  - A. 45 Political Science course units in the primary and secondary concentration combined. Each major should declare a primary concentration in one subfield and take at least 30 units in this concentration, including the introductory course for that subfield. The secondary concentration must be completed with at least 15 units, including the introductory course for that subfield. Subfields include:

		Units
POLISCI 1	Introduction to International Relations	5
POLISCI 116	History of Nuclear Weapons	5
POLISCI 316	International History and International Relations Theory	5
POLISCI 110C	America and the World Economy (WIM)	5
POLISCI 110D	War and Peace in American Foreign Policy (Offered next year, WIM)	5
POLISCI 110Y	War and Peace in American Foreign Policy (Offered next year, non-WIM version of 110D)	5
POLISCI 211P	International Security in South Asia: Pakistan, India and the United States.	5
POLISCI 213S	A Post American Century? American Foreign Policy in a Multi-unipolar World	5
POLISCI 215	Explaining Ethnic Violence	5
POLISCI 215F	Nuclear Weapons and International Politics	5
POLISCI 216E	International History and International Relations Theory	5



POLISCI 218J	Japanese Politics and International Relations	5		
POLISCI 218T	Terrorism	5		
POLISCI 110X	America and the World Economy (non-WIM version of 110C)	5		
POLISCI 114D	Democracy, Development, and the Rule of Law	5		
POLISCI 114S	International Security in a Changing World	5		
POLISCI 118P	U.S. Relations in Iran	5		
• American Politics:				
			<b>Units</b>	
POLISCI 2	Introduction to American National Government and Politics	5		
POLISCI 122	Introduction to American Law	5		
POLISCI 123	Politics and Public Policy	5		
POLISCI 120B	Campaigns, Voting, Media, and Elections (Undergraduates should take this course for 5 units)	5		
POLISCI 120C	American Political Institutions: Congress, the Executive Branch, and the Courts (WIM)	5		
POLISCI 121L	Racial-Ethnic Politics in US	5		
POLISCI 124R	The Federal System: Judicial Politics and Constitutional Law (WIM)	5		
POLISCI 124S	Civil Liberties: Judicial Politics and Constitutional Law	5		
POLISCI 127P	Economic Inequality and Political Dysfunction	5		
POLISCI 224H	Heretics to Headscarves	5		
POLISCI 224L	The Psychology of Communication About Politics in America	4		
POLISCI 226	Race and Racism in American Politics	5		
• Political Theory:				
			<b>Units</b>	
POLISCI 236	Theories of Civil Society, Philanthropy, and the Nonprofit Sector (non-WIM version of 236S)	5		
POLISCI 131L	Modern Political Thought	5		
POLISCI 134P	Contemporary Moral Problems	5		
POLISCI 136S	Justice (Undergraduates should take this class for five units)	5		
POLISCI 230A	Classical Seminar: Origins of Political Thought	4-5		
POLISCI 231	High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests	4-5		
POLISCI 232T	The Dialogue of Democracy	4-5		
POLISCI 234P	Deliberative Democracy and its Critics	3-5		
POLISCI 235J	Creative Political Thinking: Three Cases	5		
POLISCI 236S	Theories of Civil Society, Philanthropy, and the Nonprofit Sector	5		
POLISCI 237M	Politics and Evil	5		
POLISCI 3P	Justice	5		
• Comparative Politics:				
			<b>Units</b>	
POLISCI 4	Introduction to Comparative Politics	5		
POLISCI 148	Chinese Politics: The Transformation and the Era of Reform (WIM)	5		
POLISCI 140L	China in World Politics	5		
POLISCI 142B	British Politics	5		
POLISCI 147	Comparative Democratic Development	5		
POLISCI 149S	Islam, Iran, and the West	5		
POLISCI 240C	The Comparative Political Economy of Post-Communist Transitions	3-4		
POLISCI 243L	Politics of Economic Reform	5		
POLISCI 245R	Politics in Modern Iran	5		
POLISCI 246P	The Dynamics of Change in Africa (Undergraduates should enroll in this class for 5 units.)	4-5		
POLISCI 247G	Governance and Poverty	5		
POLISCI 248L	Political-Economy of Crime and Violence in Latin America	5		
POLISCI 114D	Democracy, Development, and the Rule of Law	5		
• Methodology				
			<b>Units</b>	
POLISCI 152	Introduction to Game Theoretic Methods in Political Science	3-5		
POLISCI 352	Introduction to Game Theoretic Methods in Political Science	3-5		
POLISCI 155	Applied Quantitative Research in Political Science	5		
B. A 5-unit methods requirement satisfied by:				
C. <b>Units</b>				
Select one of the following:				5
STATS 60	Introduction to Statistical Methods: Precalculus			
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists			
POLISCI 155	Applied Quantitative Research in Political Science	5		
D. 20 additional Political Science units including no more than 5 units of directed reading. 10 units of ECON 1A Introductory Economics A and/or ECON 1B Introductory Economics B may substitute for two 5-unit POLISCI courses.				
E. No more than two 5-unit Stanford Introductory Seminar courses can be applied toward the 70-unit major requirement.				

3. *Introductory Courses:* each student must take two from the following Political Science courses, one of which must be in the primary concentration, the other in the secondary concentration. These courses should be completed by the end of sophomore year.

		<b>Units</b>
POLISCI 1	Introduction to International Relations	5
POLISCI 2	Introduction to American National Government and Politics	5
POLISCI 4	Introduction to Comparative Politics	5
POLISCI 3P	Justice	4-5

5. Demonstrate the capacity for sustained research and writing in the discipline. This requirement is satisfied by taking a Political Science course designated as a Writing in the Major (WIM) course and may be in any subfield of the major.

6. Take at least one 5-unit, 200 or 300-level undergraduate seminar in Political Science.

7. Students may petition a maximum of ten units towards the major. Transfer students are allowed to petition up to twenty units towards the major. A maximum of 15 units may be applied towards the concentrations and 5 towards other Political Science course units. All Stanford-in-Washington courses and transfer credit from outside of Stanford require petitions which must be reviewed and approved by the Director of Undergraduate Studies. Petitions must be submitted within one quarter of course completion, or within one quarter of declaring the major. Cognate courses do not require a petition.

8. Directed reading and Oxford tutorial units also require a petition and may only be applied towards related course work units. These units may not be used in the concentrations, and no more than 10 combined units of directed reading and Oxford tutorial units may count toward the required 70 Political Science units.

9. All courses for the major must be completed with a letter grade of 'C' or better.

POLISCI 2 Introduction to American National Government and Politics

POLISCI 4 Introduction to Comparative Politics

POLISCI 3P Justice

iii It is recommended that research honors track students enroll in one of the discussion sections designed for students interested in research.

C. 10 units of statistics, which can be completed by taking one of the following sequences:

		<b>Units</b>
Select one of the following:		8-9
STATS 60 & POLISCI 155	Introduction to Statistical Methods: Precalculus and Applied Quantitative Research in Political Science	10
STATS 60 & STATS 191	Introduction to Statistical Methods: Precalculus and Introduction to Applied Statistics	8-9
STATS 116 & STATS 200	Theory of Probability and Introduction to Statistical Inference	6-8
ECON 102A & POLISCI 155	Introduction to Statistical Methods (Postcalculus) for Social Scientists and Applied Quantitative Research in Political Science	10
ECON 102A & ECON 102B	Introduction to Statistical Methods (Postcalculus) for Social Scientists and Introduction to Econometrics	10

D. Students are also encouraged to complete one of the following calculus sequences:

		<b>Units</b>
Select one of the following Series:		15
<b>Series A</b>		
MATH 19	Calculus	
MATH 20	Calculus	
MATH 21	Calculus	
<b>Series B</b>		
MATH 41	Calculus	
MATH 42	Calculus	
MATH 51	Linear Algebra and Differential Calculus of Several Variables	

F. Three courses designed for the research honors track, to be taken during junior year:

		<b>Units</b>
POLISCI 291	Political Institutions	5
POLISCI 292	Political Behavior	5
POLISCI 293	Research Design	5

G. To accommodate students studying at overseas campuses during their junior year, these courses are offered during the Winter and Spring quarters.

H. Two 300-level or 400-level graduate elective courses during senior year.

I. Three 100-level or 200-level Stanford POLISCI courses that must be approved by the student's adviser. One of these courses must be a POLISCI Writing in the Major (WIM) course.

## Research Honors Track

The Research Honors Track in Political Science leads to a B.A.H. (Bachelor of Arts with Honors) in Political Science. This program is designed to provide its students with the analytical tools they need to write honors theses and collaborate with Stanford faculty and Ph.D. students. Professor Michael Tomz is the 2012-13 program director.

To receive a B.A.H. in Political Science, students must apply and be accepted to the Research Honors Track. Students must apply to the program in the Spring Quarter of the sophomore year or Autumn Quarter of the junior year. A complete application includes a transcript; a letter of recommendation from a member of the Stanford Political Science faculty or from a teaching assistant in a Political Science course; and an essay outlining the student's interest in the Research Honors Track.

To fulfill the research honors track major requirements, a student must:

1. Complete 70 units

A. All courses taken for the research honors track must receive a letter grade of 'C' or better. Junior research honors track courses (see 1d) must receive a 'B' or better to count toward the major. Students unable to meet these requirements may be removed from the track.

B. 10 units of introductory course work in Political Science.

i Students must complete at least two of the following courses, preferably by the end of Spring Quarter of sophomore year:

		<b>Units</b>
ii	Select two of the following:	10
	POLISCI 1 Introduction to International Relations	

J. 10 units of honors thesis writing. To satisfy this requirement, students must take POLISCI 299Q, during the Autumn of their senior year, and must complete the remaining units by taking POLISCI 299A Honors Thesis, POLISCI 299B Honors Thesis, and/or POLISCI 299C Honors Thesis with their thesis adviser.

2. Complete at least one intensive summer research experience by participating in the Political Science Department's Summer Research College (SRC) program, or by completing an independent project under the direction of a Political Science faculty member. Independent projects must be approved by the director of the research honors track.
3. Students may petition a maximum of 10 units to count for the major. Transfer students are allowed to petition a maximum of 20 units. All petitions and transfer courses require approval from the research honors track director.

## Minor in Political Science

Students must complete their declaration of the minor on Axess no later than the end of the junior year. They must submit the minor declaration form to the undergraduate administrator in Encina Hall West 100. This form can be found in Encina Hall West 100 or at <http://politicalscience.stanford.edu/minor.html>.

To receive a minor in Political Science, a student must complete a minimum of 30 unduplicated units. All units must be in Political Science courses or cognate courses. All courses for the minor must be taken for a letter grade. Students must receive a minimum letter grade of 'C' in all courses for the minor.

### Concentration

The student selects a primary subfield in which three courses are taken. One of these courses is the introductory course, the other two are at a more advanced level (numbered above 100). The concentration corresponds to one of the subfields the department already has in place, namely, American politics, comparative politics, international relations, and political theory.

### Distribution

Three courses must be in the primary concentration, as specified above, for 15 units. An additional 10 units of intermediate and advanced courses (100 level or above) must be in two additional subfields. The final 5 units may be in any related subfield. ECON 1A Introductory Economics A, ECON 1B Introductory Economics B, or any of the Political Science related courses may also be used to satisfy the last five units.

### Petitioned courses

Students may petition for a maximum of 5 units to count towards the minor. This includes directed readings and Stanford in Washington courses. Directed readings and Stanford in Washington courses may only count towards the last five related units for the minor. Transfer students can petition a maximum of 10 units towards the minor, while non-transfer students can petition a maximum of five units towards the major. All petitioned courses must be individually reviewed and approved by the Director of Undergraduate Studies. Students can download the petition form (<http://politicalscience.stanford.edu/PoliSciMajors/PoliticalSciencePetition.pdf>) or pick one up from Encina Hall West, room 100. Students must submit petitions to the undergraduate administrator in Encina Hall West, room 100.

## Master of Arts in Political Science

The Political Science department does not offer a terminal M.A. degree. An M.A. degree may only be pursued in combination with a doctoral degree from another department within the University or with an advanced degree from one of the University's professional schools. Students interested in pursuing the M.A. should discuss the application requirements with the graduate administrator in Political Science.

Students from within the department and from other degree programs who have applied to the M.A. program may elect to take the M.A. degree in Political Science when they have met the following requirements:

1. Completion of at least three quarters of residency as a graduate student with 45 units of credit of which at least 25 units must be taken in Political Science graduate seminars of 300 level and above. Not more than 25 units of the 45-unit requirement may be taken in a single field.
2. At least two graduate seminars in each of two fields and at least one graduate seminar in a third field.
3. The remaining 20 units must come from courses numbered above 100. Of those 20 units, not more than 10 units of work from related departments may be accepted in lieu of a portion of the work in Political Science. Not more than 10 units may be taken as directed reading.
4. A grade point average (GPA) of 2.7 (B-) or better must be attained for directed readings and all course work. No thesis is required.

The department does not offer a coterminal bachelor's and master's degree.

Political Science doctoral candidates may pursue master's degrees from other departments. Recent examples include but are not restricted to master's degrees in Statistics and Economics. Students interested in this option should consult the relevant sections of this Bulletin for both University and department requirements for master's degrees.

## Doctor of Philosophy in Political Science

The University's basic requirements for the Ph.D. degree are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

Programs of study leading to the Ph.D. degree are designed by the student, in consultation with advisers and the Director of Graduate Studies, to serve his or her particular interests as well as to achieve the general department requirements. A student is recommended to the University Committee on Graduate Studies to receive the Ph.D. degree in Political Science when the following program of study has been completed:

1. The candidate for the Ph.D. degree must take three of the following concentrations in political science: American politics, comparative politics, international relations, methodology, and political theory. Students concentrate on two of these areas by fulfilling, depending on the concentration, combinations of the following: written qualifying examinations, research papers, research design, or course work. The requirement for the third concentration may be satisfied by taking either a written examination in that area or by taking a minimum of 10 units with a grade point average (GPA) of 3.0 (B) or better in the third concentration from among the formal graduate-level courses in the five divisions of the department. The third concentration cannot be satisfied by courses taken as a requirement for a first or second concentration. A third concentration in theory requires two courses in addition to the five units necessary to fulfill the program requirement. A third concentration in methodology requires two

courses in addition to the 10 units necessary to fulfill the program requirement. Completion of special concentrations may require more than 10 units of course work.

2. The Ph.D. candidate is required to demonstrate competence in a language and/or skill that is likely to be relevant to the dissertation research. The level of competence needed for successful completion of the research is determined by the student's adviser. All candidates must complete at least 10 units of statistical methodology or its equivalent. Previous instruction can be counted towards this requirement only if approved by the Director of Graduate Studies.
3. Every Ph.D. candidate must complete at least five units of graduate-level instruction in political theory.
4. By the start of the fourth quarter in residence, each graduate student submits a statement of purpose to the student's adviser. This statement indicates the student's proposed major concentrations of study, the courses taken and those planned to be taken to cover those fields, the student's plan for meeting language and/or skill requirements, plans for scheduling of comprehensive examinations and/or research papers, and, where possible, dissertation ideas or plans. This statement is discussed with, and must be approved by, the student's adviser. In the Autumn Quarter following completion of their first year, students are reviewed at a regular meeting of the department faculty. The main purposes of this procedure are, in order of importance: to advise and assist the student to realize his or her educational goals; to provide an incentive for clarifying goals and for identifying ways to achieve them; and to facilitate assessment of progress toward the degree.
5. Students must take the comprehensive exams in two major fields by the end of their second year in the program. Students are expected to have passed these examinations and to have faculty approval of their research paper by the end of their second year.
6. The University and the department expect that students be advanced to candidacy by the completion of their sixth quarter as a full-time student. Each second-year student is reviewed and considered for admission to candidacy in a meeting of the faculty that is typically held during the tenth week of Spring Quarter. Since completion of two comprehensive exams and a research paper are prerequisites for admission to candidacy, students should plan their first- and second-year studies so that these requirements are satisfied by the time of the faculty review meeting. In particular, students should submit their research paper to the relevant faculty readers no later than the middle of Winter Quarter, since revisions of the paper are often required prior to obtaining faculty approval.
7. During the third year, a formal dissertation proposal must be submitted to and approved by the student's dissertation adviser and the Director of Graduate Studies. Dissertation proposals must be approved by the end of the third year.
8. A candidate for the Ph.D. in Political Science is required to serve as a teaching assistant (TA) in the department for a minimum of three quarters.
9. Doctoral candidates who apply for the M.A. degree are awarded that degree on completion of the requirements outlined in the description of the M.A. program.
10. The candidate must pass the University oral examination on the area of the dissertation at a time, after the passing of the written comprehensive examinations, suggested by the candidate's dissertation committee.
11. The candidate must complete a dissertation satisfactory to the dissertation reading committee.

## Ph.D. Minor in Political Science

Candidates in other departments which accept a minor in Political Science select two concentrations in political science in consultation with the Director of Graduate Studies and submit to her or him a program of study for approval. Written approval for the program must be obtained from the Director of Graduate Studies before application for doctoral candidacy. Students are required to complete at least 20 units in Political Science courses. Courses must be 300 level and above. Grades must be a GPA of 3.0 (B) or better. Candidates may be examined in their concentrations in the general oral examination by a member of the Department of Political Science, chosen in consultation with the Director of Graduate Studies.

*Emeriti:* (Professors) David B. Abernethy, Lucius J. Barker, Richard A. Brody, David Danielski, Charles Drekmeyer, Richard R. Fagen, John A. Ferejohn, John W. Lewis, John Manley, James March, Hubert R. Marshall, Daniel Okimoto, Robert A. Packenham, Philippe Schmitter, Hans N. Weiler

*Chair:* Josiah Ober

*Professors:* David W. Brady, Bruce E. Cain (on leave), Joshua Cohen, Gary W. Cox, James D. Fearon, Morris P. Fiorina, Judith L. Goldstein, Stephen H. Haber, David J. Holloway, Shanto Iyengar, Simon D. Jackman, Terry L. Karl, Stephen D. Krasner, Jon A. Krosnick, David D. Laitin, Michael A. McFaul (on leave), Terry M. Moe, Josiah Ober, Jean C. Oi, Jack N. Rakove, Condoleezza Rice, Douglas Rivers, Jonathan A. Rodden, Scott D. Sagan, Kenneth F. Scheve Jr., Kenneth A. Schultz, Gary M. Segura, Paul M. Sniderman, Michael R. Tomz, Barry R. Weingast

*Associate Professors:* Beatriz Magaloni, Rob Reich, Jeremy M. Weinstein

*Assistant Professors:* Lisa Blaydes, Adam Bonica, Lauren Davenport, Justin Grimmer, Karen L. Jusko, Phillip Y. Lipsky, Alison McQueen, Clayton Nall, Kristi Olson, Jonathan Wand

*Lecturers:* Roberto Blancarte, Tammy Frisby, Thomas Hegghammer, Syed Rifaat Hussain, Josef Joffe, Abbas Milani, Alice Miller, Vidal Romero, Andrew R. Rutten, James P. Steyer, Kathryn Stoner-Weiss, Amy Zegart

*Courtesy Professors:* David P. Baron, Jonathan B. Bendor, Coit D. Blacker, Gerhard Casper, Martha Crenshaw, Mariano Florentino-Cuellar, Larry Diamond, Jean-Pierre Dupuy, James Fishkin, Lawrence Friedman, Keith Krehbiel, Debra M. Satz, Stephen J. Stedman

*Acting Instructors:* Robert Barlow, Rachel Brule

*Courtesy Associate Professors:* Neil Malhotra, Ken Shotts

*Courtesy Assistant Professor:* Saumitra Jha

## Cognate Courses

		Units
AFRICAST 112	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
AFRICAST 212	AIDS, Literacy, and Land: Foreign Aid and Development in Africa	5
ECON 1A	Introductory Economics A	5
ECON 1B	Introductory Economics B	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
IPS 219	Intelligence and National Security	3-4
MS&E 193	Technology and National Security	3
OSPBER 15	Shifting Alliances? The European Union and the U.S.	4-5
OSPBER 115X	The German Economy: Past and Present	4-5

OSPBER 126X	A People's Union? Money, Markets, and Identity in the EU	4-5
OSPFLOR 78	An Extraordinary Experiment: Politics and Policies of the New European Union	5
OSPKYOTO 12	Governing Japan: A Comparative Perspective	4-5
OSPKYOTO 14	The Japanese Education System: A Model for the U.S.?	4-5
OSPKYOTO 215X	The Political Economy of Japan	4-5
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5
OSPOXFRD 18	Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics	4-5
OSPOXFRD 24	British and American Constitutional Systems in Comparative Perspective	4-5
OSPOXFRD 35	Modern UK and European Government and Politics	4-5
OSPPARIS 122X	Challenges of Integration in the European Union	4-5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 129X	Latin America in the International System	4-5
REES 320	State and Nation Building in Central Asia	5
STATS 60	Introduction to Statistical Methods: Precalculus	5

## Overseas Studies Courses in Political Science

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/politicalscience/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/politicalscience/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/politicalscience/http://bosp.stanford.edu>).

		Units
OSPBER 15	Shifting Alliances? The European Union and the U.S.	4-5
OSPBER 115X	The German Economy: Past and Present	4-5
OSPBER 126X	A People's Union? Money, Markets, and Identity in the EU	4-5
OSPCPTWN 31	Theory and Politics of Foreign Aid	3
OSPFLOR 51	Italian Foreign Policy and the Global Players	5
OSPFLOR 78	An Extraordinary Experiment: Politics and Policies of the New European Union	5
OSPKYOTO 12	Governing Japan: A Comparative Perspective	4-5
OSPKYOTO 14	The Japanese Education System: A Model for the U.S.?	4-5
OSPKYOTO 215X	The Political Economy of Japan	4-5

OSPMADR 27	The Political and Economic Geography of Cities: Madrid in Comparative Perspective	4
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5
OSPOXFRD 18	Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics	4-5
OSPOXFRD 24	British and American Constitutional Systems in Comparative Perspective	4-5
OSPOXFRD 35	Modern UK and European Government and Politics	4-5
OSPPARIS 32	Understanding French Politics	4-5
OSPPARIS 122X	Challenges of Integration in the European Union	4-5
OSPSANTG 116X	Modernization and its Discontents: Chilean Politics at the Turn of the Century	5
OSPSANTG 129X	Latin America in the International System	4-5

## Psychology

Courses offered by the Department of Psychology are listed under the subject code PSYCH on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PSYCH&filter-catalognumber-PSYCH=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PSYCH&filter-catalognumber-PSYCH=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PSYCH&filter-catalognumber-PSYCH=on>).

The department, housed in Jordan Hall, maintains many computer-equipped laboratories and the Stanford Center for Cognitive and Neurobiological Imaging (CNI). Bing Nursery School, located on campus at 850 Escondido Road, provides a laboratory for child observation, training in nursery school teaching, and research. It was constructed with funding from the National Science Foundation and a special grant from Mrs. Anna Bing Arnold and Dr. Peter Bing.

The department provides

- courses designed for the general student
- a major program leading to the degree of Bachelor of Arts, including options for honors and a specialization in one of four content area tracks
- an undergraduate minor program
- a coterminal master's degree program leading to the degree of Master of Arts
- programs of graduate study and research leading to the degree of Doctor of Philosophy
- a Ph.D. minor

Applications are not accepted for the master's degree except as noted below.

## Mission of the Undergraduate Program in Psychology

The mission of the undergraduate program in Psychology is to introduce students to the theories and empirical studies of human behavior. This includes the study of aging, achievement, child development, cognitive processes, conflict, culture, decision making, emotion, group behavior, health, identity, infancy, language, learning and memory, morality, motivation, personality, psychopathology, race, self, social perception,

visual perception, and other related topics. The major provides students with knowledge and skills relevant to professional careers in technology, business, counseling, education, public policy, law, and medicine, as well as graduate studies in Psychology.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of psychology including relevant theory and research.
2. the ability to analyze a problem correctly using discipline specific methodology.
3. the ability to draw sound inferences and conclusions from data.
4. the ability to write and communicate ideas clearly.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Psychology and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Psychology. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Psychology and to disseminate this knowledge.

## Bachelor of Arts in Psychology

### Major Requirements

Students declaring a major in Psychology must complete a minimum of 70 units of course work in Psychology, 60 of which must be taken in the Psychology department. The remaining 10 units can be taken outside of the Psychology department but must be pre-approved by the student services office or faculty adviser. These courses should represent a coherent thematic focus. One way to achieve this focus is through a field of study. Courses taken to satisfy the 70-unit requirement must be taken for a grade of C- or better (except for courses offered only on a satisfactory/no credit basis). Majors must take PSYCH 1 Introduction to Psychology, and PSYCH 10 Introduction to Statistical Methods: Precalculus. Advanced placement (AP) credit may no longer be used toward the Psychology major requirements. Beyond these two required courses, students must complete at least five of the following eleven core Psychology courses, with a minimum of two from each area A and B:

Area A (21)		Units
BIO 20	Introduction to Brain and Behavior	3
PSYCH 30	Introduction to Perception	3
PSYCH 35	Introduction to Cognitive and Information Sciences	4
PSYCH 45	Introduction to Learning and Memory	3

PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 55	Introduction to Cognition and the Brain	4
<b>Area B (21)</b>		
PSYCH 60	Introduction to Developmental Psychology	3
PSYCH 70	Introduction to Social Psychology	4
PSYCH 75	Introduction to Cultural Psychology	5
PSYCH 80	Introduction to Personality and Affective Science	3
PSYCH 90	Introduction to Clinical Psychology	3
PSYCH 95	Introduction to Abnormal Psychology	3

Students who declared a major in Psychology prior to the 2005-06 academic year may choose to adhere to the 55-unit major requirement, taking PSYCH 1 Introduction to Psychology and PSYCH 10 Introduction to Statistical Methods: Precalculus, five core courses, and elective courses, totaling 55 units.

Students must take one Writing in the Major (WIM) course in Psychology, and should check the Stanford Bulletin yearly as these courses may change. The department also strongly recommends that all majors take at least one advanced seminar.

Students may count up to 10 units of research, independent study, and practica (including but not limited to PSYCH 194 Reading and Special Work, PSYCH 195 Special Laboratory Projects, PSYCH 281 Practicum in Teaching) toward the Psychology major. Students who are teaching assistants for a Psychology course or are enrolled in the senior honors program are allowed up to 15 units in independent study and research. Any units beyond the limit of 10 or 15 may be counted toward the 180 units required for graduation.

Students who are double majoring or completing a minor degree in another department may not overlap (double-count) courses, unless the overlapping courses constitute introductory skill requirements, such as PSYCH 10 Introduction to Statistical Methods: Precalculus. In this instance, while the course requirement would be satisfied, the units for the course can only be applied to one program of study, not both. Consult the student services office for further clarification.

Summer Quarter Psychology courses are not equivalent to courses given during the regular academic year and, while applicable toward the 70 units needed for the major, may not be used to fulfill core course requirements. Additionally, a course taken during the Summer Quarter cannot be used to replace the grade of a non-Summer Quarter course, even if the title and units of the two courses are the same.

### Beyond the Minimal Requirements

The following recommendations may be helpful to students who wish to plan a program that goes beyond the minimal requirements listed above:

1. Within the general major, the student may take advanced undergraduate or graduate courses (although some require the consent of the instructor), including seminars. The student may also take advantage of widespread opportunities for directed research, working closely with individual faculty and graduate students.
2. The student may apply to the senior honors program, described below.
3. The student may elect to pursue one of four specialization tracks of study: Cognitive Sciences; Health and Development; Mind, Culture, and Society; or Neuroscience, described below.

The training obtained from the pursuit of any of these options is valuable not only for students considering graduate work in Psychology, but also for those thinking of professional careers outside of Psychology in fields such as technology, business, counseling, education, law, public policy or medicine.

## Credit from Outside the Department

Psychology majors must complete at least 60 units of course work toward their major at Stanford within the Psychology department. Psychology minors may count no more than a total of 10 units credit from outside the department toward the minor. Both majors and minors, under extenuating circumstances, may use one course from outside the department to fulfill core course requirements. Additional courses may be used to fulfill the 70-unit major requirement, but may not be counted as core courses. Please see the student services office for further clarification.

Petition for transfer of credit is rarely granted. In cases where petitioning is necessary, there are two types of credit from outside the department: external transfer credit for courses taken at institutions other than Stanford and credit for courses in other Stanford departments. A student must have already declared Psychology as a major or minor in order to submit a petition for transfer credit. Stanford credit for courses completed at other institutions must have been granted by the External Credit Evaluation section of the Registrar's Office; those units may be applied toward the 180 units required for graduation. To have credit from outside the department evaluated to fulfill requirements toward the Psychology major or minor, students must complete an Undergraduate Petition form, available from the student services office, and submit it with a course syllabus. Students requesting external transfer credit must also submit a copy of the signed transcript from the External Credit Evaluation section of the Registrar's Office showing the number of Stanford units granted for the course. The Psychology department then evaluates external credit courses and courses from other Stanford departments to determine if they can be applied toward Psychology major or minor requirements.

## Specialization Tracks

Students in the major program, including those in the senior honors program, may elect to specialize in one of four specialization tracks:

- Cognitive Sciences
- Health and Development
- Mind, Culture, and Society
- Neuroscience

These tracks consist of a coherent set of courses leading to advanced undergraduate or even graduate-level courses in an area. In the ideal case, the student who specializes would acquire an understanding of a range of psychological processes, as well as an appreciation of the significance of these processes in the chosen area of application. Specialization in one of the tracks can facilitate preparation for a professional career as well as for graduate work in Psychology.

Participation in a specialization track is optional, although students who do not wish to complete all the requirements for a track may still want to use the track as a guideline for an integrated program in Psychology. Students who choose to complete a specialization track must meet the requirements for the major plus the additional requirements designated for the track. Typically, the courses required for a track include one or two required courses, four to six recommended courses in Psychology, one or two advanced seminars, and three or four courses in related disciplines. Psychology courses completed for the track count toward satisfying the major requirements. Courses from other departments listed for the track may count toward the 10 outside units for the major requirement, but must be pre-approved by the student services office or faculty adviser.

These specialization tracks are declared on Axxess upon approval of faculty adviser. They appear on the transcript but not on the diploma.

## Honors Program

The senior honors program is designed for exceptionally able Psychology majors who wish to pursue a year of intensive supervised independent

research. Admission to the program is made at the end of the student's junior year on the basis of:

- excellent academic performance
- previous research experience
- two letters of recommendation by faculty and/or graduate students

Applications are available in April and are to be submitted to the department's student services office with a current transcript and recommendations prior to the student's senior year.

Students interested in the program should involve themselves in research as early as possible and should acquire a broad general background in Psychology, including statistics, and a deep background in their chosen area. Typically, students work in their honor thesis adviser's lab for at least one quarter. The honors program is particularly appropriate for students planning to go to graduate school in Psychology or in other social sciences, as well as in computer science, business, counseling education, law, public policy and medicine.

During Autumn Quarter of their senior year, honors program students participate in a weekly seminar and meet with their advisers to develop their experimental program and begin data collection. Winter and Spring Quarters are devoted to completing the research, analyzing the data, and writing the thesis, which is submitted mid-May. Students give oral presentations of their projects at the annual Honors Convention. This convention is attended by undergraduates, graduate students, and faculty.

## Minor in Psychology

### Declaration

Students who wish to declare a minor field of concentration in Psychology must do so no later than the deadline for their application to graduate.

### Degree Requirements

Completion of a minimum of 35 units in Psychology is required for the minor, including PSYCH 1 Introduction to Psychology and PSYCH 10 Introduction to Statistical Methods: Precalculus, or a comparable statistics course. Advanced placement (AP) credit may no longer be used towards the Psychology minor.

The minor must include three of eleven core courses with a minimum of one from each of two areas and elective Psychology courses of at least three units each, totaling 35 units:

**Units**

Area A	
Select a minimum of one of the following:	
BIO 20	Introduction to Brain and Behavior
PSYCH 30	Introduction to Perception
PSYCH 35	Introduction to Cognitive and Information Sciences
PSYCH 45	Introduction to Learning and Memory
PSYCH 50	Introduction to Cognitive Neuroscience
PSYCH 55	Introduction to Cognition and the Brain
Area B	
Select a minimum of one of the following:	
PSYCH 60	Introduction to Developmental Psychology
PSYCH 70	Introduction to Social Psychology
PSYCH 75	Introduction to Cultural Psychology
PSYCH 80	Introduction to Personality and Affective Science
PSYCH 90	Introduction to Clinical Psychology
PSYCH 95	Introduction to Abnormal Psychology
Elective Psychology Courses	

Students who declared a Psychology minor prior to the 2002-03 academic year may choose any three of the eleven core courses.

Students who declared a Psychology minor prior to the 2005-06 academic year may choose to complete seven total courses:

	Units
PSYCH 1 Introduction to Psychology	5
PSYCH 10 Introduction to Statistical Methods: Precalculus	5
Three core courses	
Two elective courses	

Independent study, research, and practica cannot be counted toward the minor. Summer Quarter Psychology courses are not applicable toward the 35 units needed for the minor.

All courses used to fulfill the requirements of the minor must be passed with a grade of C- or better, except for courses offered only on a satisfactory/no credit basis. No more than 10 units of transfer credit may be counted toward the Psychology minor.

## Master of Arts in Psychology

The Department of Psychology offers a Master of Arts degree only to students concurrently enrolled in other Stanford programs.

A Master of Arts degree is available to students enrolled in the Department's Ph.D. program. For such students, the requirements of the M.A. degree are listed in the "Doctoral" tab of this section.

A separate program called the Coterminal Master's Program (described below) is available to Stanford undergraduates.

In exceptional cases, students concurrently enrolled in another doctoral or professional program at Stanford may also apply for the M.A. degree. In such cases, the applicable admissions and degree requirements are determined on a case by case basis. Such applicants should consult with the student services office in the Department of Psychology.

All applicants must satisfy University residency requirements for the degree and are responsible for consulting with their primary departments or the Financial Aid Office about the effects of the proposed program on their current funding. General University requirements for the master's degree are described in the "Graduate Degrees (p. 38)" section of this bulletin.

## Coterminal Master's Program

Stanford undergraduates who would like advanced training in Psychology may apply for a coterminal M.A. degree in Psychology. To do so, students should consult with the student services office. Along with a coterminal program application, applicants must submit:

1. a statement of purpose
2. a preliminary program plan specifying the courses in which they intend to enroll to fulfill degree requirements
3. at least two letters of recommendation from Stanford faculty members familiar with their academic work
4. a current Stanford undergraduate transcript
5. a written nomination by a member of the Psychology faculty who has agreed to serve as the student's master's degree adviser

This program is limited in size and admission is selective. Applicants must have earned a minimum of 120 units towards graduation as shown on the undergraduate transcript. The department's deadline for the submission of an application to the coterminal program is January 31, 2013.

Coterminal students cannot defer admission. Students must start the quarter for which they apply.

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. )" section of this bulletin. For University coterminal degree program rules and University application forms, see <http://studentaffairs.stanford.edu/registrar/publications#Coterm>.

Students in the Coterminal program may be terminated if they no longer have an adviser, or if they are not making satisfactory progress in course work or research.

## Degree Requirements for a Coterminal Master's Degree

*Course work:* For the coterminal master's degree, students must complete at least 45 units of Psychology courses, none of which may duplicate courses taken for the undergraduate degree, and none of which may be courses taken in the Summer Quarter. Courses to be counted toward the master's degree must be passed with a grade of B- or better, unless the course is offered only on a satisfactory/no credit basis.

Of these 45 required units, at least 27 must be in Psychology courses numbered 200 or above. Units from research, teaching, practica, independent study, and lab courses may not be counted toward these 27 units, but may be counted as part of the remaining 18 required units. Examples of such course that may not be counted toward these 27 units include:

	Units
PSYCH 246 Cognitive and Neuroscience Friday Seminar	1
PSYCH 258 Graduate Seminar in Social Psychology Research	1-3
PSYCH 269 Graduate Seminar in Affective Science	1
PSYCH 275 Graduate Research	1-15
PSYCH 281 Practicum in Teaching	1-5
PSYCH 282 Practicum in Teaching PSYCH 1	1-2
PSYCH 297 Seminar for Coterminal Master of Arts	1-2

Included in the 27 units of graduate-level courses must be at least one 3-unit course from each of Area A (cognitive science and neuroscience) and Area B (affective, developmental, and social psychology), and at least one upper division statistics course that has been approved by the student's adviser. Further, all coterminal students are encouraged to enroll in PSYCH 196 Contemporary Psychology: Overview of Theory, Research, Applications. The specific courses in Area A and Area B available to coterminal master students vary from year to year, and prospective students should consult with the department's Student Services Office for up-to-date information on courses available and their assignment to Area A and Area B.

*Research:* Demonstration of competence in the design and execution of psychological research is also required for receipt of the master's degree. This demonstration entails completion of a master's thesis containing original research. If the student is currently writing a senior honors thesis, this honors thesis may be accepted as proof of research competence provided the honors thesis is judged to be master's level research by the student's adviser and the department's graduate program committee. If the student has completed an honors thesis in Psychology in the prior year, the student would be expected to continue independent research during the coterminal year and to submit this research in a written report that, together with the completed honors thesis, would constitute the master's thesis. All students are required to make an oral presentation of their research during the Spring Quarter, and to present their thesis or written report at the end of that Quarter.



# Doctor of Philosophy in Psychology

There are no specific course requirements for admission to the doctoral program. However, an applicant should have research experience as an undergraduate, as well as the equivalent of an undergraduate major in Psychology. The major focus of the doctoral program is on research training, and admission is highly selective.

Applicants for admission must submit their scores on the general Graduate Record Examination as part of the application. GRE subject scores are recommended.

General University requirements for the Ph.D. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

In addition to fulfilling Stanford University requirements for the degree, the following departmental requirements are stipulated.

## First-Year Course Requirements

During the first year of graduate study, the student must take PSYCH 207 Professional Seminar for First-Year Ph.D. Graduate Students, at least one approved graduate statistics course, and at least two core courses from the following list:

		Units
PSYCH 202	Cognitive Neuroscience	3
PSYCH 205	Foundations of Cognition	1-3
PSYCH 211	Developmental Psychology	1-3
PSYCH 212	Social Psychology	1-3
or PSYCH 215	Mind, Culture, and Society	
PSYCH 213	Affective Science	3

Students in each area may be required to take up to two additional non-core graduate courses in their area of specialization.

The student is expected to spend at least half of the time in research from the beginning of the first year of graduate study to the completion of the Ph.D., taking no more than 10 units of course work each quarter. At the end of the first year of graduate study, the student must file with the department a written report of the first-year research activities.

## Second-Year Course Requirements

By the end of the second year of graduate study, the student should complete the core courses listed above and take a second approved graduate course in statistics.

*Optional Application for Conferral of the M. A. Degree:* Graduate students, who have complete (a) the first-year and second-year course requirements, and (b) at least 45 units of Psychology courses, may apply for conferral of the M.A. degree. This application should be discussed with the Student Services office in the Department of Psychology.

## Third-Year and Beyond

Students are expected to form a research committee, which must include the dissertation reading committee, before the initiation of the dissertation research. The research committee includes the dissertation adviser and consists of at least three faculty members, at least two of whom should have primary appointments in the Psychology department. For University guidelines for the composition of the dissertation reading committee, see the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

The research committee should meet no later than the last day of classes of Spring Quarter of the third year, and determines the timeline for further

development of the dissertation research project. Subsequent meetings are triggered by the completion of one of two documents: a dissertation proposal (DP) or a conceptual analysis of the dissertation area (CADA). The timing and sequencing of the DP and CADA are developed by the student in consultation with the committee. As a general guide, one of the two preliminary elements (CADA or DP) should be completed by the end of the third Summer Quarter and the second should be completed by the end of the fourth Spring Quarter. Students are free to alter the membership of the committee at any time during the process, subject to consultation with the adviser.

The DP should be a description of the proposed research. The CADA provides a framework for the research topic of the dissertation, addresses the central issues within the specialty area, and reviews the pertinent literature.

## Advanced Course or Minor Requirements

The candidate must complete 12 units of advanced graduate course work or a Ph.D. minor in another department. If a student waives the minor requirement in favor of the 12 advanced units, the student must fulfill the advanced course requirement by taking (a) non-core graduate courses required by a particular area, or (b) graduate-level courses in other departments comparable in quality to Psychology's graduate courses. If there is any question about comparability, the student should consult the adviser, student services, and, in some cases, the graduate program committee chair before taking the course.

## Orals

The candidate must pass the University oral examination, which also serves as a dissertation defense. A committee is formed to review the oral examination, including the dissertation reading committee, an additional faculty member, and one oral examination committee chair from outside the Psychology department. The oral examination consists of a 40-45-minute presentation to the department of the completed dissertation research. Parents and friends are welcome to attend. Following the presentation, the student and the committee convene for a discussion of the dissertation and the presentation.

## Dissertation Requirements

The candidate must complete a dissertation satisfactory to the dissertation reading committee prior to the oral examination. Minor revisions to formatting may be made after the oral examination.

Ph.D. candidacy expires five years after admission to candidacy at the end of the second year of study. Reapplication requires department reexamination.

## Student Evaluations

*First-Year Evaluation:* It is the department's policy to evaluate the progress of each graduate student at the end of the first year of graduate study. As part of the procedure, each student is required to file with the department a report of the first-year research activities.

Students should discuss this report and the evaluation procedures with their adviser as early as possible in their first year. If the student fulfills the academic promise displayed upon entrance, he or she is invited to continue working towards the doctorate.

The first-year evaluation is primarily based on three factors:

1. quality of research carried out in the first year
2. performance in courses (especially required courses)
3. recommendations of the adviser (including a commitment on the part of that adviser to continue in that role).

*Second-Year and Beyond Evaluation:* A similar evaluation is conducted at the end of each year of graduate training involving the same criteria

as the first year; however, the student is not required to submit a paper. Students who are not making satisfactory progress may be dropped from the program.

## The Doctoral Training Program

As indicated by the requirements described above, a student concentrates in any one of several areas within Psychology. Regardless of area, however, the training program places emphasis on the development of research competence, and students are encouraged to develop those skills and attitudes that are appropriate to a career of continuing research productivity. Two kinds of experience are necessary for this purpose. One is the learning of substantial amounts of technical information. A number of courses and seminars are provided to assist in this learning, and a student is expected to work out a program, with his or her adviser, to attain this knowledge in the most stimulating and economical fashion.

A second aspect of training is one that cannot be gained from the courses or seminars. This is firsthand knowledge of, and practical experience with, the methods of psychological investigation and study. These methods include ways of behaving with the subjects being studied. Students are provided with whatever opportunities they need to reach those levels of competence representative of doctoral standing. Continuing research programs, sponsored by members of the faculty, offer direct opportunities for experience in fields represented by the faculty's many research interests.

Each student achieves competence in unique ways and at different rates. Each student and adviser share in planning a program leading to the objectives discussed. The student is expected to spend half of his or her time on research and takes no more than 10 units of course work per quarter. For further information please contact the student services office and the department graduate guide.

## Teaching Requirement

The department views experience in supervised teaching as an integral part of its graduate program. Regardless of the source of financial support, all students serve as teaching assistants for at least five Psychology courses during their graduate study. Of the courses, two must be:

		Units
PSYCH 1	Introduction to Psychology	5
or PSYCH 10	Introduction to Statistical Methods: Precalculus	
PSYCH 252	Statistical Methods for Behavioral and Social Sciences	1-6
or PSYCH 253	Statistical Theory, Models, and Methodology	

Students are discouraged from participating in teaching during the first year of graduate study. Students typically progress from closely supervised teaching to more independent work. Some students may be invited to offer a supervised, but essentially independent, seminar during their final year of graduate study.

## Psychology Colloquium

The Psychology Colloquium meets on most Wednesday afternoons at 3:45 p.m. Speakers from Stanford and other institutions present topics of current interest. Graduate students are expected to attend. Additional announcements may be found at the Colloquium Schedule (<http://www.stanford.edu/dept/psychology/colloquium>) web site.

## Ph.D. Minor in Psychology

Candidates for the Ph.D. degree in other departments may elect a minor in Psychology. To obtain a minor, the student must complete 20 units of course work at the graduate level in the Department of Psychology, excluding PSYCH 275 Graduate Research. Crosslisted graduate courses can be used to satisfy this requirement. All courses counting toward the Ph.D.

minor must be passed with a grade of 'B-' or better, unless the course is offered only on a credit/no credit basis.

*Emeriti: (Professors)* Albert Bandura, Gordon H. Bower, John H. Flavell, Leonard M. Horowitz, Roger N. Shepard, Claude Steele, Barbara Tversky, Philip G. Zimbardo

*Chair:* Ian Gotlib

*Professors:* Nalini Ambady, Laura L. Carstensen, Herbert H. Clark, Geoffrey Cohen, Carol Dweck, Ian H. Gotlib, James J. Gross, Stephen Kosslyn, John D. Krumboltz, Mark R. Lepper, Ellen M. Markman, Hazel R. Markus, James L. McClelland, Dale Miller, Benoit Monin, Lee D. Ross, Ewart A. C. Thomas, Anthony Wagner, Brian Wandell, Jeffrey J. Wine

*Professor (Research):* Anthony Norcia

*Associate Professors:* Jennifer L. Eberhardt, Anne Fernald, Kalanit Grill-Spector, Brian Knutson, Jeanne L. Tsai

*Associate Professor (Teaching):* Catherine Heaney

*Assistant Professors:* Michael Frank, Noah Goodman, Samuel M. McClure, Gregory M. Walton, Jamil Zaki

*Assistant Professor (Research):* Lera Boroditsky

*Lecturers:* Amie Haas, Beverley Hartman, Jennifer Winters

*Courtesy Professors:* William C. Dement, Gary H. Glover, Jon Krosnick, Tanya Luhmann, William T. Newsome, Anne C. Petersen

## Public Policy

Courses offered by the Public Policy Program are listed under the subject code PUBLPOL on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PUBLPOL&filter-catalognumber-PUBLPOL=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PUBLPOL&filter-catalognumber-PUBLPOL=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PUBLPOL&filter-catalognumber-PUBLPOL=on>).

## Mission of the Undergraduate Program in Public Policy

The mission of the undergraduate program in Public Policy is to expose students to the concepts and tools used in evaluating public policy options and outcomes, and to prepare students for entry-level positions in organizations concerned with such analysis. The focus is chiefly on domestic policy issues, applicable anywhere in the world.

Courses in the major provide students with background in economics and quantitative methods, political science, law, philosophy, ethics, organizational behavior, and social psychology. Economics and quantitative analyses are central to but not sufficient for modern public policy analysis; political science, law, philosophy, organizational behavior, and psychology are among other necessary disciplinary perspectives. Political philosophy and ethics form the foundations of public policy. Political science offers insights to the decision making process and information needs of a democracy. Organizational behavior focuses on the decisions made outside the market environment in hierarchies, bureaucracies, and teams. Nearly all public policy is formulated as law, and economic analysis of legal rules and institutions is key to effective implementation of policy decisions.

Seniors have a research capstone requirement consisting either of an honors thesis or participation in a team practicum project, conducting applied

policy research for an outside client, typically a nonprofit or government agency. Students majoring in Public Policy are prepared for careers in elective or appointed public office, business, law, and governmental agencies, or for further study in graduate programs.

The Public Policy Program offers a Bachelor of Arts, an honors program, and a minor for undergraduates, as well as a coterminal M.A. in Public Policy.

## Learning Outcomes (Undergraduate)

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Public Policy. Students are expected to:

1. Demonstrate knowledge and understanding of Public Policy analytical tools.
2. Communicate ideas clearly and persuasively in written and oral forms.
3. Evaluate applied theoretical and empirical work in the discipline.
4. Apply skills and knowledge acquired in the curriculum to analyze policy issues and make policy recommendations.
5. Demonstrate mastery of the above outcomes in senior capstone project.

## Mission of Graduate Program in Public Policy

The mission of the graduate program in Public Policy is to offer advanced skills necessary to assess the performance of alternative approaches to policy making and implementation, evaluate program effectiveness, understand the political constraints faced by policy makers, and appreciate the conflicts in fundamental human values that often animate policy debate. After completing the graduate core curriculum, students apply these skills by focusing their studies in a two quarter, 10-unit practicum for the M.P.P., or a 5-unit master's thesis for the M.A. Students in the M.P.P. program also complete at least one concentration tailored to the student's primary degree program or the student's interests and skills.

The Graduate Program in Public Policy offers two master's degrees to graduating seniors, all graduate students and recent alumni:

- Master of Public Policy (M.P.P.), a two-year program leading to a professional degree; available to current Stanford students and recent Stanford alumni
- Master of Arts (M.A.), a one-year program not intended as a professional degree; available to current Stanford students

The following joint degree programs, permitting students to complete requirements for two degrees with a reduced number of total residency units, are also offered:

- Juris Doctor with a Master of Public Policy (J.D./M.P.P.)
- Juris Doctor with an M.A. in Public Policy (J.D./M.A.)
- Doctor of Medicine with a Master of Public Policy (M.D./M.P.P.)
- Doctor of Philosophy in Economics, Education, Management Science and Engineering, Psychology, or Sociology with a Master of Public Policy (Ph.D./M.P.P.)
- Master of Business Administration with a Master of Public Policy (M.B.A./M.P.P.)
- Master of Arts in International Policy Studies with a Master of Public Policy (M.A./M.P.P.)

- Master of Science in Management Science and Engineering with a Master of Public Policy (M.S./M.P.P.)

Requirements for the joint degrees differ from completing the two degrees separately. See the "Master's Degrees in Public Policy (<http://www.stanford.edu/dept/registrar/bulletin/69277.htm>)" section for more details.

University requirements for the master's degree are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this Bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Public Policy and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The M.P.P. or M.A. degree is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Public Policy. Through completion of advanced course work and rigorous skills training, the graduate program prepares students to make original contributions to the knowledge of Public Policy and to interpret and present the results of such research.

## Bachelor of Arts in Public Policy

The Public Policy undergraduate major develops the skills necessary for understanding the political constraints faced by policy makers, assessing the performance of alternative approaches to policy implementation, evaluating the effectiveness of policies, and appreciating the sharp conflicts in fundamental human values that often animate the policy debate.

There are four course elements to the major: preparatory, core, concentration, and senior capstone. Freshman and sophomore years are generally devoted to completing preparatory courses offered in Economics, Math, and Psychology. After completing core courses during the junior year, students apply these skills by focusing their studies in one of several areas of concentration. The areas of concentration address a specific field of public policy, types of institutions, or a deeper development of the tools of policy analysis. Seniors may complete the senior capstone either by participating in a Practicum, a team policy research project for an outside client, or by writing an honors thesis.

Completion of the Bachelor of Arts degree in Public Policy requires a minimum of 84 units of course work.

Students must complete the Public Policy core, concentration, and the senior capstone requirement with an overall grade point average of 2.3 (C+) or higher.

The Public Policy Program encourages students to attend the Bing Stanford in Washington Program (<http://bsiw.stanford.edu>) and to participate in appropriate Stanford internship programs, especially those available through the Haas Center for Public Service (<http://haas.stanford.edu>) and Stanford in Government (<http://sig.stanford.edu>).

### 1. Preparatory courses (39 units)

		Units	
2.	ECON 1A	Introductory Economics A	5
	ECON 1B	Introductory Economics B	5
	ECON 50	Economic Analysis I (must be taken for a letter grade)	5

ECON 51	Economic Analysis II (must be taken for a letter grade)	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
ECON 102B	Introduction to Econometrics	5
MATH 51	Linear Algebra and Differential Calculus of Several Variables (must be taken for a letter grade)	5

Select one of the following:

MS&E 180	Organizations: Theory and Management
PSYCH 70	Introduction to Social Psychology
PSYCH 138	Wise Interventions

A maximum of 10 units, with the exception of MATH 51 Linear Algebra and Differential Calculus of Several Variables, ECON 50 Economic Analysis I and ECON 51 Economic Analysis II, may be taken as credit/no credit.

### 3. Core courses (25 units)

4. All core courses must be completed for a letter grade.

		Units
PUBLPOL 101	Politics and Public Policy	5
PUBLPOL 102	Organizations and Public Policy	5
PUBLPOL 103C	Justice	5
PUBLPOL 104	Economic Policy Analysis	5
PUBLPOL 106	Law and Economics	5

### 5. Concentration

• Majors must complete at least 15 units of course work in an area of concentration. This post-core course work must be approved by a faculty adviser and the director. Concentration courses must be completed for a letter grade. Recent areas of concentration include, but are not limited to:

- Advanced Methods of Policy Analysis
- Design of Public Institutions
- Development and Growth Policies
- Education
- Environment, Resources, and Population
- Health Care
- International Policies
- Law and the Legal System
- Science and Technology Policy
- Social Policy: Discrimination, Crime, Poverty

### 6. Capstone research requirement

7. Seniors are required to demonstrate competency in applied policy research. This requirement is fulfilled either by an honors thesis or by participation in a research project (Practicum) in which small student teams analyze real world policy problems faced by Bay Area agencies and produce a report for use by the client. A seminar for honors students is offered Autumn Quarter (PUBLPOL 200H Senior Honors Seminar, 3 units). The Practicum is offered Autumn, Winter and Spring quarters (PUBLPOL 200A Senior Seminar: Conducting Policy Analysis for Local Agencies, PUBLPOL 200B Senior Seminar: Conducting Policy Analysis for Local Agencies and

PUBLPOL 200C Senior Seminar: Conducting Policy Analysis for Local Agencies, 5 units). The capstone research requirement must be completed for a letter grade.

## Honors Program

The Public Policy Program offers students the opportunity to pursue honors work during the senior year. To graduate with honors in Public Policy, a student must:

1. Apply for admission to the honors program no later than the end of Spring Quarter of junior year.
2. Students are encouraged to complete the applied econometrics course by the end of Spring Quarter of the junior year and take PUBLPOL 200H Senior Honors Seminar during Autumn Quarter. Courses not taken at Stanford are not included in calculating the GPA.
3. Complete the requirements for the B.A. in Public Policy and achieve an overall grade point average (GPA) of 3.5 in the following courses:

	Units
Public Policy core courses	25
Concentration	15
PUBLPOL 200H Senior Honors Seminar	3
PUBLPOL 199 Senior Research	8-15
Select one of the following applied econometrics courses:	
ECON 102C Advanced Topics in Econometrics	
STATS 202 Data Mining and Analysis	
PUBLPOL 303B Political Methodology II	
PUBLPOL 303C Bayesian Statistics and Econometrics	

4. During senior year, enroll in at least 8 but no more than 15 units of PUBLPOL 199 Senior Research, with the thesis adviser. Students need to contact the program office to have their thesis adviser listed as a 199 instructor. An 'N' grade will be given by the adviser in quarters prior to Spring, when the thesis is completed and presented. All PUBLPOL 199 Senior Research units must receive a final grade of at least a 'B+'. The honors thesis must demonstrate mastery of relevant analytical tools and address a policy issue.
5. The honors thesis must be submitted to both the thesis adviser and the Public Policy Program office. In order to be considered for University and department awards, the final thesis must be submitted to the program office no later than the third Wednesday in May in both printed and electronic forms. All other theses must be submitted by the last Friday in May in both printed and electronic forms.

Students who intend to pursue honors work should plan their academic schedules so that most of the core courses are completed before the beginning of the senior year, and all of the core and concentration courses are completed by the end of Winter Quarter of senior year. This scheduling gives students both the time and the necessary course background to complete their honors thesis during Spring Quarter. In addition, prospective honors students are encouraged to enroll in PUBLPOL 197 Junior Honors Seminar during Winter or Spring Quarter. This course focuses on developing a research plan and the research skills necessary to complete an honors thesis.

To apply for honors, a student must submit a completed application to the Public Policy Program office with a brief description of the thesis. Applications are found online (<https://publicpolicy.stanford.edu/honors>) or in the program office. The student must obtain the sponsorship of a faculty member who approves the thesis description and agrees to serve as a thesis adviser. Students intending to write a thesis involving more than one discipline may wish to have two advisers, at least one of whom is affiliated with the Public Policy Program.

Graduation with honors requires that the thesis be approved by both the adviser and the program director. The role of the director is to assure that the thesis deals with an issue of public policy and satisfies the standards of excellence of the program. However, the grade for the honors thesis (PUBLPOL 199 Senior Research units) is determined solely by the adviser.

Members of staff, executive committee, lecturers, and affiliated faculty in Public Policy are available to provide assistance in selecting a thesis topic and adviser.

## Minors in Public Policy

The Public Policy Program offers a minor that is intended to provide bachelor's students with interdisciplinary training in applied social sciences. Students who pursue the minor are required to take the courses listed below for a total of 35 units in Public Policy and its supporting disciplinary departments. Because University rules prohibit double-counting courses, the requirements for a minor differ according to the student's major requirements. Courses for the minor must be completed for a letter grade, with the exception of PUBLPOL 311 Public Policy Colloquium.

For students whose major department or program requires no courses in economics and political science, the requirements for a Public Policy minor are:

		Units
ECON 1A	Introductory Economics A	5
ECON 1B	Introductory Economics B	5
ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
PUBLPOL 101	Politics and Public Policy	5
PUBLPOL 104	Economic Policy Analysis	5

For Political Science majors, the requirements for a Public Policy minor are:

		Units
ECON 1A	Introductory Economics A	5
ECON 1B	Introductory Economics B	5
ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
PUBLPOL 104	Economic Policy Analysis	5
PUBLPOL 106	Law and Economics	5

For students who major in another interdepartmental program such as International Relations and who satisfy major requirements by taking ECON 50 Economic Analysis I and an introductory course in statistics such as ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists or STATS 60 Introduction to Statistical Methods: Precalculus, the requirements for a Public Policy minor are:

		Units
ECON 51	Economic Analysis II	5
ECON 102B	Introduction to Econometrics	5
PUBLPOL 101	Politics and Public Policy	5
PUBLPOL 102	Organizations and Public Policy	5
PUBLPOL 103C	Justice	5
PUBLPOL 104	Economic Policy Analysis	5
PUBLPOL 106	Law and Economics	5

## Coterminal M.A. in Public Policy

The coterminal M.A. in Public Policy is a program designed to impart the basic analytical tools of public policy analysis, or to permit public policy majors to specialize in an applied field of policy analysis. Most students complete their M.A. in a fifth year at Stanford; occasionally students may be able to complete their B.A. and coterminal M.A. in the fourth year.

The coterminal M.A. is also a gateway to the M.P.P. degree program. Stanford undergraduates may apply for the coterminal M.A. in Public Policy and then, after one quarter, apply to the M.P.P. program, using the Graduate Program Authorization Petition. The same is true for coterminal master's students in any other degree program. Students accepted to the M.P.P. program withdraw from the M.A. degree program and complete the requirements for the 90-unit M.P.P. degree. This does not reduce the total number of units required for the bachelor's or master's degrees. Earning the B.A. and M.P.P. typically takes at least five years. Students considering this option should be familiar with the University's coterminal degree policies and procedures and should consult the director of the Public Policy program early in their planning.

### Application and Admission

There are three coterminal degree application deadlines for the 2012-13 academic year: November 16, 2012; February 22, 2013; and April 26, 2013. Seniors wishing to apply to the coterminal program must apply during the November or February application cycles.

To apply for admission to the Public Policy coterminal M.A. program, students should submit the following materials directly to the Public Policy office:

1. the coterminal application (<http://studentaffairs.stanford.edu/sites/default/files/registrar/files/CotermApplic.pdf>)
2. 1-2 page statement of purpose
3. one-page resume
4. GRE Scores
5. a preliminary program proposal ([http://publicpolicy.stanford.edu/system/files/Sample%20Preliminary%20Program%20Proposal\\_PP%20Coterm%2C%20Track%20B%20Coterm%20Course%20Plan.pdf](http://publicpolicy.stanford.edu/system/files/Sample%20Preliminary%20Program%20Proposal_PP%20Coterm%2C%20Track%20B%20Coterm%20Course%20Plan.pdf))
6. a current unofficial undergraduate transcript
7. two confidential letters of recommendation from Stanford faculty members familiar with the student's academic work.

Applicants will be contacted for an interview.

University regulations govern both the coterminal M.A. degree application process and the requirements for the degree. Undergraduates with strong academic records may apply for admission upon completion of 120 units, but no later than the quarter prior to the expected completion of the undergraduate degree. The University requires that units for a given course may not be counted to meet the requirements of more than one degree; that is, no units may be double-counted. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit University minimum requirement for the master's degree.

The University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this Bulletin. For University coterminal degree rules and forms, also see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

# Degree Requirements

All applicants should have completed, or be currently enrolled in, required preparatory course work prior to application. These courses do not count towards the 45 unit M.A. requirement.

		Units
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
ECON 1A	Introductory Economics A	5
ECON 1B	Introductory Economics B	5
ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
ECON 52	Economic Analysis III	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
ECON 102B	Introduction to Econometrics	5

To graduate with a coterminal M.A. in Public Policy, students must:

1. Take all courses applied to the coterminal master's degree for a letter grade (with the exception of PUBLPOL 311 Public Policy Colloquium, which is only offered C/NC). For courses with variable units, coterminal students in their graduate career should enroll in the course for 4 units. No units are counted for courses in which a student earns a grade less than 'B-'. Courses offered only for C/NC or other non-letter grade system may be applied upon approval of a petition to the program director.
2. Achieve a cumulative grade point average (GPA) of 3.0 (B) or better for all courses taken towards the M.A.
3. Comply with all relevant University and program deadlines and policies.
4. Follow one of two tracks (A or B) through the program, as described below.
5. Coterminal M.A. students who are admitted to the M.P.P. program must transfer all applicable M.A. units to the M.P.P. program.

## Track A

Public Policy majors will complete Track A, which consists of at least 45 units of course work:

1. 26 or more units in an area of concentration. Current concentrations (<http://publicpolicy.stanford.edu/coterm.concentrations>) include:
  - Health Policy
  - Education Policy
  - International Policy
  - Regulatory Policy
  - Environmental Policy
  - Science and Technology Policy
  - Self-designed (requires detailed statement of study goals, relationship of each proposed course to those goals, and commitment by a supervising faculty member)

Each concentration includes a set of required core courses and a variety of electives. Students must present a coherent written study plan to support concentration course choices, designed in consultation with a faculty adviser and approved by the program director.

2. Select one of the following applied econometrics courses:

		Units
ECON 102C	Advanced Topics in Econometrics	5
STATS 202	Data Mining and Analysis	3
PUBLPOL 303C	Bayesian Statistics and Econometrics	5

3. Completion of PUBLPOL 302A Introduction to American Law and ECON 52 Economic Analysis III (units from ECON 52 do not count towards the 45 M.A. units needed).
4. All Public Policy graduate students are required to attend and enroll in three quarters of PUBLPOL 311 Public Policy Colloquium. Attendance and participation are mandatory.
5. Completion of PUBLPOL 309 Practicum or a faculty-supervised internship or thesis.
6. All 45 units must be taken in upper division (100-level) courses, and at least 25 of those units must be at the graduate level (200-level and above).
7. Track A students who are accepted into the M.P.P. program take advanced courses in those subjects where the standard M.P.P. curriculum would duplicate undergraduate major requirements.

## Track B

Students who will not have completed the Public Policy core curriculum follow Track B, which consists of at least 45 units of core subjects in the analysis of public policy.

1. The following core courses are required and count toward the required 45 units:

		Units
PUBLPOL 201 or PUBLPOL 304A	Politics and Public Policy Collective Action: Ethics and Policy	4
PUBLPOL 301A	Microeconomics	4
PUBLPOL 301B or PUBLPOL 204	Cost-Benefit Analysis and Evaluation Economic Policy Analysis	4-5
PUBLPOL 302A	Introduction to American Law	3-5
PUBLPOL 305A or PUBLPOL 305B	Judgment and Decision Making Public Policy and Social Psychology: Implications and Applications	4
PUBLPOL 206 or PUBLPOL 302B	Law and Economics Economic Analysis of Law	4-5
PUBLPOL 307	Justice	4-5

Select one of the following organization courses:

MS&E 180	Organizations: Theory and Management	
PUBLPOL 202	Organizations and Public Policy	
PUBLPOL 317	Comparing Institutional Forms: Public, Private, and Nonprofit	

Select one of the following applied econometrics courses:

ECON 102C	Advanced Topics in Econometrics	
STATS 202	Data Mining and Analysis	
PUBLPOL 303B	Political Methodology II	
PUBLPOL 303C	Bayesian Statistics and Econometrics	

2. All Public Policy graduate students are required to attend and enroll in three quarters of PUBLPOL 311 Public Policy Colloquium. Attendance and participation are mandatory.

- Students must petition to count additional advanced policy skills courses needed to meet the 45-unit degree requirement. All 45 units must be taken in upper division (100+ level) courses and at least 25 of those units must be taken at the graduate level (200-level and above).

Coterminal M.A. students must meet with their faculty adviser upon acceptance to the program. For Track A students, advisers must confirm that the courses proposed are likely to be taught during the applicable period, or that appropriate substitute courses are available. Public Policy student services will verify scheduling of courses.

## Financial Aid

The Public Policy Program does not provide financial assistance to coterminal students. For information on student loans and other sources of support, please consult the Stanford Financial Aid Office. Students who enter public service employment with local, state, or federal agencies, schools, or certain not-for-profit organizations may obtain forgiveness for educational loans, based on years of public service employment.

## Master's Degrees in Public Policy

The program offers two master's programs in Public Policy. The Master of Public Policy (M.P.P.) is a two-year professional degree and the Master of Arts in Public Policy (M.A.) is a one-year non-professional degree.

At this time, eligibility for admission to the M.P.P. and M.A. programs is restricted to current Stanford undergraduate and graduate students and recent (Class of 2009-2012) Stanford alumni. If you do not meet these criteria, you are not eligible for admission to the M.A. or the M.P.P. degree programs.

All Public Policy master's programs, with the exception of the J.D./M.A., require at least one year of study at Stanford beyond the requirements for the other joint or dual degree.

- Public Policy Joint Degrees. Students enrolled in or applying to certain degree programs in the Schools of Business, Education, Engineering, Humanities and Sciences, and Law are eligible to apply for Public Policy joint degrees. For further information, see the "Joint Degree Programs (<http://www.stanford.edu/dept/registrar/bulletin/7376.htm>)" section of this bulletin and the University Registrar's site (<http://studentaffairs.stanford.edu/registrar/students/jdp-information>).
  - Juris Doctor and Master of Public Policy (J.D./M.P.P.)
  - Juris Doctor and Master of Arts of Public Policy (J.D./M.A.)
  - Doctor of Medicine with a Master of Public Policy (M.D./M.P.P.)
  - Doctor of Philosophy in Education and Master of Public Policy (Ph.D./M.P.P.)
  - Doctor of Philosophy in Economics and Master of Public Policy (Ph.D./M.P.P.)
  - Doctor of Philosophy in Management Science & Engineering and Master of Public Policy (Ph.D./M.P.P.)
  - Doctor of Philosophy in Psychology and Master of Public Policy (Ph.D./M.P.P.)
  - Doctor of Philosophy in Sociology and Master of Public Policy (Ph.D./M.P.P.)
  - Master of Business Administration and Master of Public Policy (M.B.A./M.P.P.)
  - Master of Arts in International Policy Studies and Master of Public Policy (M.A./M.P.P.)
  - Master of Science in Management Science & Engineering and Master of Public Policy (M.S./M.P.P.)

- Dual Degrees. Any other Stanford graduate student (i.e., not covered in '1' above), undergraduate student or recent alumni/ae is eligible to apply for a Public Policy dual degree. A dual degree student may subsequently withdraw from the original degree program.
  - Master of Public Policy (M.P.P.)
  - Master of Arts in Public Policy (M.A.)

## Prerequisites

Graduate students in Public Policy are expected to be literate in mathematics and microeconomics at a level equivalent to MATH 51 Linear Algebra and Differential Calculus of Several Variables and ECON 50 Economic Analysis I before beginning the curriculum. A no-credit refresher course in mathematics and economics is offered in the two weeks preceding the start of Autumn Quarter.

## Application and Admissions

Applications for graduate study in Public Policy are only accepted from 1) students currently enrolled in any Stanford graduate or undergraduate degree program, 2) from external applicants seeking a joint degree or 3) from recent Stanford alumni (2009-current). To be considered for matriculation beginning in the Autumn Quarter 2013-14, all application materials must be submitted no later than April 2, 2013.

External applicants for joint degrees must apply to the department or school offering the other graduate degree (i.e., Ph.D., M.A., M.S., M.B.A., or J.D.), indicating an interest in the joint degree program; applicants admitted to the other degree program are then evaluated for admission to the M.P.P. or M.A. program.

## Stanford Alumni and current Stanford seniors

Visit the Stanford Office of Graduate Admissions (<http://studentaffairs.stanford.edu/gradadmissions>). The online application for the M.P.P. will be available beginning Friday, February 1, 2013. The fee for all applicants is \$125. We are unable to refund your application fee, so please refer to eligibility requirements before submitting your application.

Only complete applications will be reviewed. A complete application includes the following:

- Application;
- Official Transcripts. Copies of your transcripts must bear the official seal of the institution and the signature of the registrar. Transcripts must be uploaded to the online application and two (2) hard copies must be sent directly to the Public Policy Program:  
Attn: Graduate Admissions  
366 Galvez Street  
SIEPR Gunn Bldg, Room 106  
Stanford, CA 94305-6050;
- GRE Scores;
- Letters of Recommendation: Three letters of recommendation from a Stanford faculty member or an employer should be submitted electronically via the online application. Please see the Stanford Office of Graduate Admissions website regarding letters of recommendation (<http://studentaffairs.stanford.edu/gradadmissions/applying/recommendations>);
- Statement of purpose (upload to the online application);
- Academic Writing Sample (upload to the online application): This can be on any topic and may be either something you have previously written or something written specifically for the application. It should be 6-10 pages (double-spaced) and should showcase your academic writing ability;
- Resume or Curriculum Vitae (upload to the online application);

## Stanford current graduate students (including coterminal degree students)

- application form (<http://publicpolicy.stanford.edu/graduate>);
- two confidential letters of recommendation from an employer or a Stanford faculty member familiar with applicant's academic work;
- undergraduate and graduate transcripts;
- GRE, GMAT, LSAT or MCAT test scores;
- Statement of purpose;
- resume;
- preliminary program proposal;
- transcripts and course descriptions demonstrating completion of required prerequisite course work in multivariate calculus and intermediate microeconomics

Applicants will be interviewed. If admitted, students will submit a Graduate Authorization Petition (<http://studentaffairs.stanford.edu/registrar/students/grad-auth-pet>) through Axes.

## Degree Requirements

### 1. Core Curriculum—

All core courses must be taken for a letter grade and must be completed with an overall grade point average (GPA) of 3.0 or better.

		Units
PUBLPOL 301A	Microeconomics	4
PUBLPOL 301B	Cost-Benefit Analysis and Evaluation	4
PUBLPOL 302A	Introduction to American Law	3
PUBLPOL 302B	Economic Analysis of Law	4
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
or PUBLPOL 303A	Political Methodology I	
PUBLPOL 303B	Political Methodology II	5
PUBLPOL 304A	Collective Action: Ethics and Policy	4
PUBLPOL 305A	Judgment and Decision Making	4
PUBLPOL 305B	Public Policy and Social Psychology: Implications and Applications	4
PUBLPOL 306	Writing and Rhetoric for Policy Audiences	4
PUBLPOL 307	Justice	4
PUBLPOL 317	Comparing Institutional Forms: Public, Private, and Nonprofit	4

2. Colloquium—All Public Policy graduate students are required to attend and enroll in three quarters of PUBLPOL 311 Public Policy Colloquium. Attendance and participation are mandatory.
3. Practicum (M.P.P. and Track A Coterminal M.A. students)—Completion of the two quarter practicum course, PUBLPOL 309 Practicum (10 units, Autumn and Winter Quarters), and presentation of a report in which interdisciplinary student teams analyze real world policy issues for outside clients.

4. Concentration (M.P.P. students only)—Advanced course work in a specialized field, chosen from the approved list of concentration courses with the prior approval of the student's faculty adviser and the program director.
5. Master's Thesis (M.A. students only)—All M.A. students must submit a 5-unit master's thesis, written under the guidance of an adviser who is a member of the Public Policy affiliated faculty on a topic approved in advance by the program director. Students give the program office the name of their thesis adviser during Autumn Quarter and enroll in PUBLPOL 310 during a quarter of their choosing. The 5 units may be spread over multiple quarters, and an 'N' (continuing course) grade is given during any quarters prior to Spring. The thesis must be submitted to the Public Policy Program office in both electronic and printed form no later than the last Friday in May. The final grade for PUBLPOL 310 Master of Arts Thesis is determined solely by the thesis adviser.

## M.P.P. and M.A. Degree Requirements

1. All graduate degree candidates must submit a Master's Degree Program Proposal to the Public Policy office by the end of Autumn Quarter and must amend this proposal formally if plans for meeting the degree requirements change.
2. Public Policy students are never required to repeat a course which duplicates material they have already mastered. Students may, by petition, substitute a different course for a core requirement whose material would be duplicative. This flexibility does not reduce the unit requirements for any degree.
3. M.P.P. degree students are not permitted to enroll in PUBLPOL 309 Practicum, without having completed the following Core Courses: PUBLPOL 301A Microeconomics, PUBLPOL 301B Cost-Benefit Analysis and Evaluation, PUBLPOL 303A Political Methodology I or ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists, PUBLPOL 303B Political Methodology II, and PUBLPOL 306 Writing and Rhetoric for Policy Audiences.

## Public Policy Joint Degree Requirements

1. A joint degree is regarded by the University as distinct from either of its component degrees, and requirements for the joint degree generally differ from the sum of the requirements for the individual degrees.
2. Up to a maximum of 45 units, or one year, of the University residency requirement can be credited toward both graduate degree programs (i.e., the joint degree requirements may contain up to 45 units less than the sum of the individual degree unit requirements). For example, a J.D./M.P.P. has a four-year residency requirement, one year less than the sum of the requirements for the separate degrees. This recognizes that there is a subject matter overlap between the fields comprising the joint degree.
3. The Public Policy Program strives to encourage an intellectual, professional, and social community among its students. For this reason, joint degree students are expected to devote one year of full-time study at Stanford (usually the second) entirely to the Public Policy Program, rather than spacing Public Policy courses throughout their graduate careers. Unavoidable scheduling conflicts involving joint degree students may be mitigated by substitution of equivalent courses approved in advance by petition.



4. Joint degree students are expected to have and to consult regularly with an academic adviser. The adviser is generally a member of the faculty of both degree programs. The program director is available to make adviser recommendations.
5. In order to take advantage of the reduced residency requirement, joint M.P.P. students must define their area of concentration from among courses offered in their non-Public Policy program. Students wishing to concentrate in another field should apply for a dual, rather than a joint, M.P.P. degree.

*Director:* Bruce M. Owen (Stanford Institute for Economic Policy Research)

*Deputy Director:* Gregory L. Rosston (Stanford Institute for Economic Policy Research)

*Associate Director and Senior Lecturer:* Geoffrey Rothwell (Economics, Public Policy)

*Director of Undergraduate Capstone Program and Senior Lecturer:* Mary Sprague (Public Policy)

*Director of Graduate Practicum Program and Professor of the Practice of Public Policy:* Joe Nation (Public Policy)

*Executive Committee:* Laurence Baker (Medicine), Jonathan Bendor (Graduate School of Business), David Brady (Political Science, Hoover Institution, Graduate School of Business, SIEPR), Samuel Chiu (Management Science and Engineering), Joshua Cohen (Political Science, Philosophy, Law), Morris Fiorina (Political Science, Hoover Institution), David Kennedy (History, emeritus), David Grusky (Sociology), Eric Hanushek (Hoover Institution, SIEPR), Deborah Hensler (Law), Jonathan Levin (Economics), Roger Noll (Economics, emeritus, SIEPR), Bruce Owen (SIEPR), Madhav Rajan (Graduate School of Business), Sean Reardon (Education), Lee Ross (Psychology), Gregory Rosston (SIEPR), Debra Satz (Philosophy), John Shoven (SIEPR, Economics), Kathryn Stoner-Weiss (Freeman Spogli Institute for International Studies)

*Affiliated Faculty:* William Abrams (Human Biology), Jonathan Bendor (Graduate School of Business), Eric Bettinger (Education), Jayanta Bhattacharya (Medicine), Coit Blacker (Freeman Spogli Institute for International Studies), Lisa Blaydes (Political Science), Adam Bonica (Political Science), Michael J. Boskin (Economics, Hoover Institution), Milana Boukham (Medicine), Paul Brest (Law, emeritus), Jeremy Bulow (Graduate School of Business), M. Kate Bundorf (Medicine), Eamonn Callan (Education), Martin Carnoy (Education), John Cogan (Hoover Institution), Geoffrey Cohen (Psychology), Joshua Cohen (Political Science, Philosophy, Law), Gary Cox (Political Science), Larry Diamond (Freeman Spogli Institute for International Studies, Hoover Institution), Walter Falcon (Freeman Spogli Institute for International Studies, emeritus), Lawrence Friedman (Law), Lawrence Goulder (Economics, Freeman Spogli Institute for International Studies), Stephen Haber (Political Science, Hoover Institution), Deborah Hensler (Law), Pamela Hinds (Management Science and Engineering), Daniel Ho (Law), Nicholas Hope (Stanford Center for International Development), Caroline Hoxby (Economics, Hoover Institution, SIEPR), Jakub Kastl (Economics), Daniel Kessler (Law, Hoover Institution, Graduate School of Business), Pete Klenow (Economics), Stephen Krasner (Political Science, Freeman Spogli Institute for International Studies, Hoover Institution), Jon A. Krosnick (Communication), Mark Lemley (Law), Thomas MacCurdy (Economics, Hoover Institution), Robert McGinn (Management Science and Engineering; Science, Technology and Society), Milbrey McLaughlin (Education), Terry Moe (Political Science, Hoover Institution), Petra Moser (Economics), Joan Petersilia (Law), James Phills (Graduate School of Business), A. Mitchell Polinsky (Law), Walter Powell (Education), Robert Reich (Political Science), Lee Ross (Psychology), Ken Shotts (Graduate School of Business), Stephan Stedman (Freeman Spogli Institute for International Studies), Jeff Strnad (Law), Barton Thompson (Law, Woods Institute, Freeman Spogli Institute for International Studies), Michael Tomz (Political Science, SIEPR), Michael Wald (Law), Greg Walton

(Psychology), Jonathan Wand (Political Science), Barry Weingast (Political Science, Hoover Institution), Robert M. White (Materials Science and Engineering), Frank Wolak (Economics, Freeman Spogli Institute for International Studies)

*Lecturers:* Laura Arrillaga-Andreessen (Graduate School of Business), Tanya Beder (Law), Frank Benest (Public Policy), David Crane (Public Policy), Tammy Frisby (Hoover Institution, Political Science), Dennis Gale (Urban Studies), Jonathan D. Greenberg (Law), Russell Hancock (Public Policy), Adrienne Jamieson (Bing Stanford in Washington), Anjini Kochar (SIEPR), Eva Meyersson Milgrom (SIEPR, Sociology), Alyssa O'Brien (Program in Writing and Rhetoric), Mark Tendall (Economics)

## Overseas Studies Courses in Public Policy

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/publicpolicy/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/publicpolicy/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/publicpolicy/http://bosp.stanford.edu>).

		Units
OSPCTWN 31	Theory and Politics of Foreign Aid	3
OSPFLOR 78	An Extraordinary Experiment: Politics and Policies of the New European Union	5
OSPFLOR 85	Bioethics: Between Human Rights, Responsibility, and Care Ethics	4
OSPFLOR 87	International Comparison of Health Care Systems: The Italian Profile	4
OSPMOSC 68	From Science to Market: Technical Innovation Policy in Post-Soviet Russia	5
OSPOXFRD 18	Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics	4-5
OSPPARIS 74	Climate Change Challenges in France and Europe: from Project to Policy	4
OSPPARIS 124X	Building the European Economy: Economic Policies and Challenges Ahead	5
OSPPARIS 153X	Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time	5
OSPSANTG 71	Santiago: Urban Planning, Public Policy, and the Built Environment	4-5
OSPSANTG 119X	The Chilean Economy: History, International Relations, and Development Strategies	5

## Religious Studies

Courses offered by the Department of Religious Studies are listed under the subject code RELIGST on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RELIGST&filter=>

catalognumber-RELIGST=on) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RELIGST&filter-catalognumber-RELIGST=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RELIGST&filter-catalognumber-RELIGST=on>).

## Mission of the Department

The field of Religious Studies brings a variety of disciplinary perspectives to bear on the phenomena of religion for the purpose of understanding and interpreting the history, literature, thought, social structures, and practices of the religious traditions of the world. Comprised of a dozen regular faculty with particular strengths in the study of Buddhism, Christianity, Islam, and Judaism, it enrolls about thirty graduate students (mostly doctoral) and roughly as many undergraduate majors, minors, and joint majors.

Religious Studies works closely with several related programs at Stanford: the Department of Philosophy, with which it offers a joint undergraduate major; the Ho Center for Buddhist Studies; the Taube Center for Jewish Studies; the Abbasi Program in Islamic Studies; the McCoy Center for Ethics in Society; and the Center for Medieval and Early Modern Studies.

While some undergraduates continue their study of religion in a graduate or professional program, most pursue meaningful and successful careers in business, government, the nonprofit sector, and medicine. In this respect, Religious Studies is an ideal interdisciplinary major in the liberal arts. Graduates of the department's doctoral program generally pursue academic careers and are routinely placed in the best universities and colleges in the country.

## Undergraduate Programs in Religious Studies

The department offers a Bachelor of Arts major, minor, and honors program in Religious Studies, and a joint major with the Philosophy Department in Religious Studies and Philosophy. Undergraduate courses in Religious Studies are designed to engage students existentially and to assist them in thinking about intellectual, ethical, and sociopolitical issues in the world's religions. The department's faculty seek to provide tools for understanding the complex encounters among religious ideas, practices, and communities, and the past and present cultures that have shaped and been shaped by religion. Courses therefore expose students to: leading concepts in the field of religious studies such as god(s), sacrifice, ritual, scripture, prophecy, and priesthood; approaches developed over the past century, including the anthropological, historical, psychological, philosophical, and phenomenological, that open religion to closer inspection and analysis; and major questions, themes, developments, features, and figures in the world's religious traditions. The department encourages and supports the acquisition of languages needed for engagement with sacred texts and interpretive traditions as well as study abroad at Stanford's overseas centers where religions can be observed and experienced in the culture of their origin.

## Major in Religious Studies and Philosophy

The departments of Religious Studies and Philosophy jointly nominate for the B.A. in Religious Studies and Philosophy those students who have completed a major in the two disciplines. See a description of this joint major in the "Philosophy (p. )" section of this bulletin, or in the guidelines available from the undergraduate director of either department.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. understanding of the subject matter of and methods used in the study of religion.
2. skill in reading and interpreting religious texts critically.
3. ability to conduct and present research within the discipline.

## Graduate Programs in Religious Studies

The graduate mission of the department is to provide students with an interdisciplinary setting of study within which to focus on their respective areas of specialization. The department offers an M.A. and a Ph.D. degree in Religious Studies.

## Learning Outcomes (Graduate)

**Master's Program:** The purpose of the Master's program is to develop knowledge and skills in Religious Studies. For some students this will serve as preparation for applications to Ph.D. programs. For others it will serve as a further capstone experience for their undergraduate program of study. The goals are achieved through the completion of courses, in the primary field as well as related areas, and experience with independent work and specialization. For some it will involve an optional Master's thesis.

**Doctoral Program:** The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Religious Studies. Through completion of advanced coursework and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Religious Studies and to interpret and present the results of such research through teaching and publication.

## Bachelor of Arts in Religious Studies

### Suggested Preparation for the Major

There is no prescribed route or prerequisite to the major; students typically find themselves majoring after taking courses in the department and becoming acquainted with department faculty. Students contemplating the major or joint major are invited to consult with the Director of Undergraduate Studies. The undergraduate student services associate in Building 70 can also field questions regarding the declaration procedure within the department.

### Degree Requirements

The curriculum for majors is designed to move students sequentially from foundational courses, through deeper investigations, culminating in integrative research courses. Thus, the introductory sequence is designed to lead to courses which build on this foundation with topics including:

particular traditions such as Judaism or Buddhism; comparative studies such as nonviolence in Hinduism and Buddhism, or Muslim and Christian interpretations of scripture; specific topics such as mysticism, gender and religion, or theodicy; and distinctive approaches such as the philosophy of religion or ritual studies. Majors complete their careers with integrative courses that afford opportunity for research and consolidation of the knowledge and skills gained earlier.

A Bachelor of Arts in Religious Studies requires 60 units of course work. At least 44 units are to be taken in courses numbered above 100. Ten units out of the 60 may be taken for the grade of CR/NC.

## Required Courses

- At least 8 of the 60 units must be courses at the introductory level. Students may satisfy this requirement from any courses in the following categories:
  - Religious Studies Thinking Matters courses.
  - Prior IHUM courses (Winter/Spring sequence) in Religious Studies, e.g., IHUM 73A,B: Ultimate Meanings. IHUM courses are no longer offered.
  - Introduction to religious traditions (courses numbered 11-50).
  - Introductory topics in the study of religion (courses numbered 51-99).
  - Introductory Seminars in Religious Studies.
- At least 29 units are to be taken in intermediate lecture and seminar courses numbered 100-289. Of these, at least two seminars are required from courses numbered above 200. With approval of the Undergraduate Director, language courses related to the student's program of study (such as Arabic, Biblical Hebrew, New Testament Greek, Chinese, or Japanese), but not counted towards the University language requirement, may be counted among these 29 units.
- 15 units in integrative courses:

Units

### Majors' Seminar (5)

RELIGST 290	Majors Seminar (Winter Quarter of junior year; fulfills WIM requirement; letter grade only)	5
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### Senior Essay or Honors Thesis Research (3-5)

RELIGST 297	Senior Essay/Honors Essay Research (minimum 5 units; up to 10 units over two quarters; graded 'N' until completion of essay or thesis)	3-5
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### Senior Majors' Colloquium (5)

RELIGST 298	Senior Colloquium (Spring Quarter; grading option S/NC)	5
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### Completion of either a senior essay or honors thesis. (0)

See below concerning the difference between these options.

- Each student, in consultation with his/her adviser, works out a focus of study centering either on a particular religious tradition or on a theme or problem that cuts across traditions such as ritual, ethics, scripture, or gender.
- Students focusing on one religious tradition must take at least 8 units in one or more religious traditions outside their concentration.

## Senior Essay

A 25-30 page essay on a topic chosen by the student and approved by the adviser upon receipt of a student's proposal by the end of the third quarter prior to expected graduation. The character and content of the essay, which is meant to allow the student to call into play knowledge and skills learned in the course of the major, may take several forms. For example, a student may return to a subject studied earlier but now pursued in more depth or from a new perspective, research a recent or new topic of interest in the field, or offer a carefully framed critical assessment of what has been

learned in the major based on review of influential sources, theories, and methods of studying religion. The senior essay is read and graded by the student's adviser and one other member of the Religious Studies faculty.

## Honors Thesis

A 40-80 page research paper on a topic chosen by the student and approved by the adviser upon receipt of a proposal in the fourth quarter prior to expected graduation. The paper, supported by mastery of primary and secondary scholarship, advances a well-reasoned, supportable thesis. Writers of honors theses must have a grade point average (GPA) of 3.5 in Religious Studies courses, and at least 3.2 overall, and are expected to have already demonstrated success in writing research papers. The honors thesis is read and graded by the student's adviser and one other member of the Religious Studies faculty. Theses earning a grade of 'B+' or above receive honors.

## Minor in Religious Studies

A Religious Studies minor is a complement to many majors throughout the University. Students contemplating the minor are invited to consult with the Director of Undergraduate Studies. The undergraduate student services associate in Bldg. 70 can also field questions regarding the declaration procedure within the department.

## Degree Requirements

A minor in Religious Studies requires a minimum of 30 graded units. Students are encouraged to focus their program of study either in a religious tradition or in a theme that cuts across traditions. In consultation with their advisors, students may design the minor in Religious Studies to complement their major. The minor must be declared no later than the last day of the quarter, two quarters before degree conferral.

## Required Courses for the Minor

- Two introductory courses. Students may satisfy this requirement from any courses in the following categories:
  - Religious Studies Thinking Matters courses.
  - Prior IHUM courses (Winter/Spring sequence) in Religious Studies, e.g. 73A,B: Ultimate Meanings. IHUM courses are no longer offered.
  - Introduction to religious traditions (courses numbered 11-50).
  - Introductory topics in the study of religion (courses numbered 51-99).
  - Introductory Seminars in Religious Studies.
- At least 22 units in courses at the intermediate and advanced level (above 100), including at least one 200-level seminar.
- Diversity requirement: Students may not take all courses in one religious tradition.
- One course in directed reading (RELIGST 199 Individual Work) may count towards the minor.
- With approval of the Undergraduate Director, one language course related to the student's program of study (such as Arabic, Biblical Hebrew, New Testament Greek, Chinese, or Japanese), but not counted towards the University language requirement, may be counted toward the minor.
- Courses from other departments may not count towards the minor. (Exception: language courses covered by point 5.)

# Master of Arts in Religious Studies

University requirements for the M.A. are described in the "Graduate Degrees (p. 38)" section of this bulletin. The department offers a one-year terminal M.A. program. Students can also earn their M.A. degree as part of their coterminial degree program. The M.A. program serves two groups of students: a) those who wish to prepare for a doctoral program in religious studies and b) those who wish to further deepen their knowledge in an area in which they have acquired some expertise during their undergraduate work.

## Degree Requirements

The following requirements are in addition to the University's basic requirements.

The student completes at least 45 units of graduate work at Stanford beyond the B.A. degree, including:

	Units
Select one of the following:	
RELIGST 290 Majors Seminar	
RELIGST 304A Theories and Methods (with consent of instructor)	
RELIGST 304B Theories and Methods (with consent of instructor)	

Residence may be completed by three quarters of full-time work or the equivalent.

The student's plan of courses is subject to approval by the Graduate Director. No field of specialization is expected, but students may focus work in particular areas. Advanced and graduate courses in other departments may be taken (see below). No thesis is required; a thesis, if elected, may count for as many as 9 units.

Each student demonstrates reading knowledge of at least one foreign language.

## Doctor of Philosophy in Religious Studies

University requirements for the Ph.D. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin. The Ph.D. in Religious Studies signifies special knowledge of an interdisciplinary field of study and potential mastery of an area of specialization within it. The faculty of the department have established certain fields of study in which the department's strengths and those of other Stanford departments cohere. They are: Buddhist studies, Islamic studies, Jewish studies, and modern religious thought, ethics, and philosophy. Students who wish to specialize in other fields must obtain early approval by the faculty. Each of these areas of specialization follows a shared structure of study.

## Degree Requirements

The following requirements are in addition to the University's basic requirements.

### 1. Residence

Each student completes three years (nine quarters) of full-time study, or the equivalent, in graduate work beyond the B.A. degree, and a minimum of 135 units of graduate course work (excluding the dissertation).

### 2. Required Courses

The 135 units of graduate course work must include the following:

		Units
A.		
RELIGST 304A	Theories and Methods	4
RELIGST 304B	Theories and Methods	4
RELIGST 391	Teaching Religious Studies	3
RELIGST 399	Recent Works in Religious Studies	1-2
B.	Two courses in an area outside the student's field.	
C.	The remainder of the course work is individually designed, in consultation with the advisor.	

### 3. Languages

Each student demonstrates a reading knowledge of two foreign languages, including French or German. One of those language requirements should be fulfilled by the time of advancing to candidacy at the end of the second year. Competence in the second language must be demonstrated at the time of the qualifying examination. Each student also demonstrates reading knowledge of other ancient or modern languages necessary for the field of study, area of specialization, and dissertation topic.

### 4. Candidacy

At the end of each academic year, the department's faculty recommend second-year students for candidacy on the basis of all relevant information, and especially on the student's candidacy dossier that includes the approved declaration of an area of specialization, certification for one foreign language, and two substantial papers written for courses during the previous two years. Students are required to take RELIGST 391 Teaching Religious Studies and RELIGST 399 Recent Works in Religious Studies prior to candidacy.

### 5. Paper-in-Field

During the third year, under the supervision of their advisors, students prepare a paper suitable for submission to an academic journal in their field. The paper is read and approved by at least two faculty members in the department. Students are encouraged to register for RELIGST 392 Paper in the Field while working on the paper.

### 6. Teaching Internship

At least one teaching internship under the supervision of faculty members is undertaken at a time negotiated with the Graduate Director. Students receive academic credit for the required internship, which is a part of academic training and not of employment.

### 7. Qualifying Examination

To qualify for writing a dissertation, the student must pass a comprehensive examination in the chosen field and the area of specialization, typically during the first quarter of their fourth year. The student must complete the second language requirement before taking the qualifying examination. The qualifying examination is normally conducted by a committee of at least three Academic Council members of the department, one of whom is the advisor. One faculty member may be from outside the department with permission of the Director of Graduate Studies.

## 8. Dissertation

The dissertation contributes to the humanistic study of religion and is written under the direction of the candidate's dissertation advisor and at least two other members of the Academic Council. The University Oral examination is a defense of a completed draft of the dissertation.

- A. Dissertation Committee—The dissertation committee is formed after successful completion of the qualifying examinations. It is normally composed of the dissertation advisor and at least two Academic Council members of the Religious Studies department. One non-departmental faculty member may serve as a reader when approved by the Director of Graduate Studies.
- B. Dissertation Proposal—Candidates submit their dissertation proposal in consultation with their advisors. It is read and approved by the three members of the dissertation committee.

## 9. University Oral Examination

This examination, required by the University of Ph.D. students, is a defense of a completed draft of the dissertation. The composition of the examination committee is set by University regulation: five or more faculty, normally all of whom are members of the Academic Council, one of whom must be outside the department to serve as chair of the committee. Normally, the examining committee includes all members of the dissertation committee.

## Ph.D. Minor in Religious Studies

Candidates for the Ph.D. in other departments may select a Ph.D. minor in Religious Studies.

### Degree Requirements

The minor requires at least 24 units in Religious Studies at the 200 level or above. Four of the 24 units should be in:

	Units
RELIGST 304A Theories and Methods	4
RELIGST 304B Theories and Methods	4

### Optional Courses for the Minor

The student should choose any of the courses offered in the department at the 200 level or above, for the equivalent of at least 24 units. Other courses can be chosen in consultation with the Graduate Director.

*Emeriti: (Professors)* Arnold Eisen, Bernard Faure, Edwin M. Good, Robert C. Gregg, Van Harvey, David S. Nivison, René Girard (Courtesy Professor)

*Chair:* Hester G. Gelber

*Director of Graduate Study:* Shahzad Bashir

*Director of Undergraduate Study:* Steven Weitzman

*Professors:* Carl W. Bielefeldt, Shahzad Bashir, Hester G. Gelber, Paul Harrison, John Kieschnick, Thomas Sheehan, Steven Weitzman, Lee Yearley

*Associate Professors:* Charlotte Fonrobert, Brent Sockness (on leave)

*Assistant Professors:* Kathryn Gin Lum, Behnam Sadeghi

*Senior Lecturers:* Linda Hess, Barbara Pitkin

*Lecturers:* Kirsti Copeland, Ozgen Felek, Irene Lin, Bulbul Tiwari, Yuhua S.-D. Vevaina

*Visiting Professors:* Paul Crowley, Luis Gomez

*Courtesy Associate Professor:* Ari Y. Kelman

*Affiliated Faculty:* Vincent Barletta (Iberian and Latin American Cultures), Jean-Pierre Dupuy (French and Italian)

## Cognate Courses

The following courses in other departments/programs have been approved by the Chair as fulfilling requirement 2 (<http://exploreddegrees.stanford.edu/religiousstudies/#bachelorstext-bachartsrelistud-degreq>) for the bachelor's degree.

	Units
CLASSGEN 18 Greek Mythology	3-5
POLISCI 149S Islam, Iran, and the West	5

## Overseas Studies Courses in Religious Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/religiousstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/religiousstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/religiousstudies/http://bosp.stanford.edu>).

	Units
OSPKYOTO Religion and Japanese Culture 17R	4-5
OSPMADRD 74 Islam in Spain and Europe: 1300 Years of Contact	5
OSPMADRD 75 Sefarad: The Jewish Community in Spain	5

## Russian, East European and Eurasian Studies

Courses offered by the Center for Russian, East European and Eurasian Studies are listed under the subject code REES on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=REES&filter-catalognumber-REES=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=REES&filter-catalognumber-REES=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=REES&filter-catalognumber-REES=on>).

The Center for Russian, East European and Eurasian Studies (CREES) coordinates the University's teaching, research, and extracurricular activities related to Russia, Eastern Europe, Central Asia, and the Caucasus and administers a one-year interdisciplinary M.A. graduate degree program. Information on the center's degree programs and other activities is available at the CREES (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/russianeasteuropeanandeurasianstudies/>).

<http://CREEES.stanford.edu>) web site. CREEES and its degree programs are directed by the CREEES Steering Committee, composed of faculty members associated with the Center. The program draws on the strengths of nationally recognized area faculty and research affiliates and significant library and archival collections at Stanford. The Center is a U.S. Department of Education Title VI National Resource Center for Russia, East Europe, and Eurasia.

## Undergraduate Programs in Russian, East European and Eurasian Studies

Students interested in a minor should consult the Director of Undergraduate Studies in the Department of Slavic Languages and Literatures which offers the following relevant minors:

- Russian, East European and Eurasian Studies
- Russian Language
- Russian Language, Literature and Culture
- Russian Culture

## Slavic Theme House

Slavianskii Dom (SlavDom), at 650 Mayfield Avenue, is an undergraduate residence which houses 50 students and offers a wide variety of opportunities to expand knowledge, understanding and appreciation of Russia and the nations of East Europe, the Caucasus and Central Asia.

## Overseas Studies Programs

Undergraduates interested in the study of languages, history, culture and social organization of the countries of Russia, Eurasia and East Europe may apply to study at the Stanford centers in Moscow and Berlin. Information about these programs is available at the Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/russianeasteuropeanandeurasianstudies/http://bosp.stanford.edu>) at web site.

## Graduate Programs in Russian, East European and Eurasian Studies

The center offers an M.A. in Russian, East European and Eurasian Studies. The center also offers a coterminal M.A. in Russian, East European and Eurasian Studies.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Russian, East European and Eurasian Studies and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

## Financial Aid

Subject to funding, CREEES may have a limited number of Foreign Language and Area Studies (FLAS) fellowships for U.S. citizens or permanent residents. Additional financial aid may also be available from CREEES. Applicants to the M.A. program have priority in the annual FLAS competition; in recent years CREEES has also awarded FLAS fellowships to students enrolled in the School of Education and the School of Law.

Consult the CREEES associate director for further information about the application and award process. Applications for FLAS fellowships can be obtained at the CREEES (<http://CREEES.stanford.edu/grants>) web site.

## Doctoral Programs

Since the University does not offer a Ph.D. in Russian, East European and Eurasian Studies, students wishing to pursue a REEES-related doctoral program must apply to one of the departments offering a Ph.D. with an emphasis on Russia, Eurasia, or Eastern Europe, such as the departments of History, Anthropology, Political Science, or Slavic Languages and Literatures.

## Undergraduate Minor in Russian, East European, and Eurasian Studies

The Center for Russian, East European and Eurasian Studies no longer offers an undergraduate minor.

Students interested in a minor should consult the "Minors in Slavic Languages and Literatures (p. 546)" section of this bulletin which describes the following relevant minors:

- Russian, East European, and Eurasian Studies
- Russian Language
- Russian Language, Literature, and Culture
- Russian Culture

## Master of Arts in Russian, East European and Eurasian Studies

CREEES offers a one-year interdisciplinary master's degree program in Russian, East European and Eurasian Studies for students with a strong prior language and area studies background. The program structure allows students the flexibility to pursue their particular academic interests, while providing intellectual cohesion through a required core curriculum that addresses historical and contemporary processes of change in the Russian Federation, Eastern Europe, the Caucasus, and Central Asia. This core curriculum consists of three core courses (one each quarter) and the REES 200 core seminar series (autumn and spring only). The program may be taken separately or coterminal with a B.A. degree program. The interdisciplinary M.A. program typically serves four types of students:

1. Those who intend to pursue careers and/or advanced degrees in such fields as business, education, government, journalism, medicine, or law, and who wish to establish competence in Russian, East European and Eurasian studies.
2. Those who are mid-career and wish to gain competence in Russian, East European and Eurasian studies.
3. Those who intend to apply to a Ph.D. program involving Russian, East European and Eurasian studies and who need to enhance their academic skills and credentials.
4. Those who are as yet undecided on a career but who wish to continue an interest in Russian, East European and Eurasian studies.

## Advising

The advising structure is two-tiered: each M.A. candidate works with the CREEES associate director who advises on the program of course work and

monitors the student's progress toward completing the degree. Candidates are also assigned a faculty adviser from the Academic Council faculty, who provides intellectual and academic guidance.

## Admission

Applicants apply electronically; see the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/russianeasteuropeanandeurasianstudies/http://gradadmissions.stanford.edu>) web site for a link to the electronic application and general information regarding graduate admission. In addition, prospective applicants may consult with the CREES associate director regarding the application process.

To qualify for admission to the program, the following apply:

1. Applicants must have earned a B.A. or B.S. degree, or the equivalent.
2. At least three years of college-level language study in Russian, an East European or Central Asian language is preferred. Candidates with fewer years of area language study will be considered.
3. Applicants must send official transcripts from all post-secondary institutions attended to Graduate Admissions, Office of the University Registrar.
4. All applicants must take the General Test of the Graduate Record Examination (GRE) and have the results sent to Graduate Admissions, Office of the University Registrar.
5. Applicants whose native language is not English and do not possess a U.S. bachelor's degree are expected to take the Test of English as a Foreign Language (TOEFL) and have the results sent to Graduate Admissions, Office of the University Registrar.
6. A one-page statement of purpose that explains how the program would advance the applicant's academic or career goals.
7. Applicants must include the following additional materials in their online application: a writing sample of 20 pages or less in English on an academic topic in Russian, East European, or Eurasian studies and a resume of college-level courses taken that are relevant to Russian, East European & Eurasian Studies, including language courses, with self-reported final grades. These additional materials may be uploaded as "Additional Materials" in a single file along with the application.

The deadline for submission of applications for admission and for financial aid is January 15, 2013. Admission is normally granted for Autumn Quarter, but requests for exceptions are considered.

The successful applicant generally demonstrates the following strengths: requisite foreign language study, significant course work in Russian, East European and Eurasian studies in multiple disciplines, outstanding grades in previous academic work, strong analytical writing skills, high GRE scores (particularly verbal and analytical writing), study or work experience in the region, strong letters of recommendation from faculty members in the Russian, East European, and Eurasian Studies field (one letter may be from a language instructor), and a persuasive statement of purpose explaining how the program would advance the applicant's academic and career goals.

## Degree Requirements

Candidates for the M.A. degree must meet University requirements for an M.A. degree as described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

The M.A. program in REEES can ordinarily be completed in one academic year by a well-prepared student; longer periods of study are permitted.

Requirements to complete the interdisciplinary M.A. degree are principally ones of distribution, with the exception of three required core courses and a core seminar, as described below. Each student, with the advice of the CREES associate director, selects courses according to the student's interests, needs, and goals.

All students in the M.A. REEES program must complete a minimum of 48 academic credit units within the following guidelines.

1. *Core courses:* Students must complete the following core courses in 2012-13.

		Units
REES 301	An Introduction to Russian, East European and Eurasian Studies	5
REES 320	State and Nation Building in Central Asia	5
SLAVIC 394	Russia: Literature, Film, Identity, Alterity	3-5
Total Units		13-15

2. *Core seminar series:* REES 200 is required of all students in the M.A. program in the autumn and spring quarters. (Students may attend but not enroll in REES 200 if they are taking 18 units or greater in a given academic quarter). The goal of this seminar series is to survey current methodological and substantive issues in Russian, East European and Eurasian studies, acquaint students with Stanford resources and faculty, and present professional development and career options.
3. *Interdisciplinary course work:* all courses (other than language courses and approved activity courses) must be taken on the graduate level (200-level or higher). Courses in Russian, East European and Eurasian studies must be completed and distributed among at least three disciplines. All course work applied to the 48-unit minimum must deal primarily with Russian, Eurasian, or East European studies.
4. *Language study:* students in the program are encouraged to study Russian or a language of Eastern Europe, Central Asia or the Caucasus. Credit towards the 48-unit minimum (maximum 4 units per quarter, 12 units total) is allowed for advanced language work.
5. Course work qualifying for the 48-unit minimum must have a letter grade of 'B' or higher. ('B-' does not count for degree credit, nor does 'CR'). Students may apply a maximum of three units of course work with a final grade of "S" to the 48-unit minimum from among the following courses only: REES 23, REES 35, REES 200 and/or HISTORY 299X.
6. All courses counting towards the 48-unit minimum must be approved by the CREES associate director, who ensures that planned course work satisfies requirements towards the degree. The CREES director and steering committee determine the requirements. Consult the CREES web site or the associate director for the complete and updated list of courses which may be taken toward the degree.
7. *Capstone requirement:* students must complete a capstone activity (research paper and/or research presentation) in consultation with the director, associate director, and/or affiliated faculty member.

## Pre-approved courses for 2012-13

		Units
Choose from among the following:		
ARTHIST 208	Hagia Sophia	5
ARTHIST 209	Art and Religious Experience in Byzantium and Islam	5
ARTHIST 405	Art, Ekphrasis, and Music in Byzantium and Islam	5
FILMSTUD 345	Politics and Aesthetics in East European Cinema	4
HISTORY 221B	The Woman Question in Modern Russia	5
HISTORY 266C	The Cold War: An International History	5
HISTORY 299X	Preparing for International Field Work: Public Service or Research	1
HISTORY 307E	Totalitarianism	4-5
HISTORY 320G	Demons, Witches, and Priests: Religion and Popular Culture in Russia	4-5
HISTORY 322	Early Modern Russia in European Context	4-5

HISTORY 324C	Genocide and Humanitarian Intervention	3
HISTORY 327	East European Women and War in the 20th Century	4-5
HISTORY 328	Circles of Hell: Poland in World War II	5
HISTORY 382E	Jews, Christians and Muslims in the Ottoman World	4-5
HISTORY 384	The Ottoman Empire, 1300-1923	4-5
HISTORY 386C	Jews and the Russian Revolution	5
HISTORY 424A	The Soviet Civilization	4-5
HISTORY 424B	The Soviet Civilization, Part 2	4-5
POLISCI 215F	Nuclear Weapons and International Politics	5
POLISCI 243L	Politics of Economic Reform	5
REES 23	Issues in Global Health: Russia and Eastern Europe	1-2
REES 35	Films of Central Asia	1-2
REES 200	Current Issues in Russian, East European, and Eurasian Studies	1
REES 219	The Russian Economy	4-5
REES 247A	Folklore, Mythology, and Islam in Central Asia	3-5
SLAVIC 200	Proseminar in Literary Theory and Study of Russian Literature	3-5
SLAVIC 225	Readings in Russian Realism	3-5
SLAVIC 229	Poetry as System: Introduction to Theory and Practice of Russian Verse	3-4
SLAVIC 236	The Russian Long Take	3-5
SLAVIC 270	Pushkin's Golden Age	3-5
SLAVIC 311	Introduction to Old Church Slavic	2-4
SLAVIC 315	Isaac Babel and His Worlds	3-4
SLAVIC 327	Boris Pasternak and the Poetry of the Russian Avant Garde	4
SLAVIC 340	Russia's Castaway Classic: Andrei Platonov	3-5
SLAVIC 346	The Great Russian Novel: Theories of Time and Action	3-5
SLAVIC 347	Modern Russian Literature and Culture: The Age of War and Revolution	3-4
SLAVIC 379	Literature from Old Rus' and Medieval Russia	2-4
SLAVIC 387	Russian Poetry of the 18th and 19th Centuries	3-4
SLAVIC 395	Russian and East European Theater	3-5

## Additional courses which may be counted for the M.A. degree (with approval) in 2012-13

		Units
ANTHRO 336A	The Posthumanistic Subject	3-5
ANTHRO 341	The Archaeology of Religious Crusading in Medieval Europe	5
ARTHIST 205A	Islamic Painting: Landscape, Body, Power	5
ARTHIST 347	The Visual Culture of Modernism and its Discontents	4
COMPLIT 222A	German Literature and Thought from 1900 to the Present: Wrestling with Modernity	3-5
COMPLIT 241B	Earthly and Heavenly Intoxication: Wine Imagery in Medieval Persian Poetry and Prose	3-5
COMPLIT 342	Alla Turca Love: Tales of Romance in Turkish Literature	3-5
FILMSTUD 300A	History of World Cinema I, 1895-1929	4
FILMSTUD 316	International Documentary	4
HISTORY 302E	The Great War	4-5

HISTORY 304G	War and Society	5
HISTORY 307B	Environment, Technology and Revolution in World History	4-5
HISTORY 307C	The Global Early Modern	4-5
HISTORY 308D	Pre-Modern Warfare	3-5
HISTORY 330K	Left, Right, and the Intellectual Life: Politics and Intellectuals in the Short Twentieth Century	5
HISTORY 333E	European Intellectual History: The Age of Grand Ideologies	4-5
HISTORY 391E	Maps, Borders, and Conflict in East Asia	4-5
IPS 210	The Politics of International Humanitarian Action	3-5
IPS 211	The Transition from War to Peace: Peacebuilding Strategies	3-5
IPS 213	International Mediation and Civil Wars	3-5
IPS 219	Intelligence and National Security	3-4
IPS 230	Democracy, Development, and the Rule of Law	5
IPS 241	International Security in a Changing World	5
IPS 250	International Conflict: Management and Resolution	3
IPS 264	Behind the Headlines: An Introduction to Contemporary South Asia	3-5
IPS 270	The Geopolitics of Energy	3-5
IPS 280	Transitional Justice, International Criminal Tribunals, and the International Criminal Court	3-5
IPS 314S	Decision Making in U.S. Foreign Policy	5
POLISCI 213S	A Post American Century? American Foreign Policy in a Multi-unipolar World	5
POLISCI 214G	International Political Economy and International Organizations: Theory and Practice	3-5
POLISCI 216E	International History and International Relations Theory	5
POLISCI 218S	Political Economy of International Trade and Investment	5
POLISCI 218T	Terrorism	5
SOC 309	Nations and Nationalism	4-5
SOMGEN 205	Human Trafficking: Historical, Legal, and Medical Perspectives	3

Other courses may be counted towards the M.A. by special arrangement with the instructor and the CREEES associate director.

A description of the M.A. program is also available on the web at the CREEES (<http://CREEES.stanford.edu/academic/graduate-masters.html>) web site and by request from the Center for Russian, East European and Eurasian Studies.

## Coterminal Master's Program in Russian, East European, and Eurasian Studies

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

To qualify for a coterminal M.A. degree in Russian, East European, and Eurasian Studies, besides completing University requirements for the B.A. degree, a student must:



1. Submit a coterminal application for admission to the program no later than the quarter prior to the expected completion of the undergraduate degree, normally Winter Quarter prior to Spring Quarter graduation. Students with advanced placement and transfer credit must apply at least four quarters before the expected master's degree conferral date. The deadline for all coterminal applications to the M.A. program in Russian, East European, and Eurasian Studies is January 15, 2013.
2. Include in the application a program which outlines, by quarter, the schedule of courses the student plans to complete toward the M.A. degree. The student should seek the advice of the CREEES associate director in drafting this schedule. The application also should include:
  - A. a current Stanford transcript
  - B. a one-page statement of purpose
  - C. three letters of recommendation from Stanford faculty (one may be from a language instructor)
  - D. a writing sample of 20 pages or less in English on an academic topic in Russian, East European, or Eurasian Studies
3. Applicants must have a grade point average (GPA) of at least 3.0 (B). Coterminal applicants must take the general test of the Graduate Record Examination and have the results sent to Graduate Admissions, Office of the University Registrar.
4. Complete 15 full-time quarters or the equivalent, or three quarters in full-time residence after completing 180 units; and complete, in addition to the 180 units required for the bachelor's degree, a minimum of 48 units for the master's degree.

The same courses may not be counted to meet both undergraduate and graduate requirements, and no courses taken before the junior year may be used to meet the course requirements for the master's degree.

*Director of the Center:* Robert Crews

*Associate Director:* Robert Wessling

*Lecturers:* Jack Kollmann, Boris Kuznetsov

## Affiliated Faculty and Staff:

*Anthropology:* Ewa Domanska, Alma Kunanbaeva

*Art and Art History:* Bissera Pentcheva, Pavle Levi (Film Studies)

*Bing Overseas Studies:* Alexander Abashkin

*Biology:* Dmitri Petrov

*Comparative Literature:* Dominic Parviz Brookshaw, Burcu Karahan

*Economics:* Geoffrey Rothwell

*Education, School of:* Martin Carnoy, Mitchell Stevens

*Engineering, School of:* Margaret Brandeau, Siegfried Hecker, William Perry (emeritus)

*English:* Nancy Ruttenburg

*Freeman Spogli Institute for International Studies:* Coit Blacker, Chaim Braun, Christophe Crombez, Gail Lapidus (emerita), Kathryn Stoner-Weiss

*Graduate School of Business:* Iya Strebulaev

*History:* Robert Crews, Arie Dubnov, Terence Emmons (emeritus), David Holloway, Katherine Jolluck, Nancy Kollmann, Norman Naimark, Aron Rodrigue, Edith Sheffer, Amir Weiner, Ali Yaycioglu, Steven Zipperstein

*Hoover Institute:* Michael Bernstam, Robert Conquest (emeritus), Elena Danielson (emerita), John Dunlop (emeritus), Timothy Garton Ash, Paul Gregory, Kenneth Jowitt, Bertrand Patenaude, Robert Service, Anatol Shmelev, Maciej Siekierski

*International Policy Studies:* Eric Morris, Christine Jojarth

*International Relations:* Jasmina Bojic

*Language Center:* Taulant Bacaj, Jara Dusatko, Shahla Fahimi, Rima Greenhill, Lessia Jarboe, Eugenia Khassina, Suzan Negip Schatt, Bisera Rakicevic, Eva Soos Szoke, Gerardina Malgorzata Szudelski

*Law, School of:* Allen Weiner

*Linguistics:* Vera Gribanova, Asya Pereltsvaig

*Medicine, School of:* Jayanta Bhattacharya, Grant Miller, Douglas Owens

*Political Science:* David Holloway, David Laitin, Michael McFaul (on leave), Condoleezza Rice, Patricia Young

*Psychology:* Lera Boroditsky

*Religious Studies:* Shahzad Bashir, Azim Nanji

*Slavic Languages and Literatures:* Lazar Fleishman, Joseph Frank (emeritus), Gregory Freidin, Monika Greenleaf, Gabriella Safran, Richard Schupbach (emeritus), Nariman Skakov

*Sociology:* Nancy Tuma (emerita), Xueguang Zhou

*Stanford Humanities Center:* Oksana Bulgakova, Harriet Murav

*Stanford Libraries:* Zachary Baker, John Eilts, Karen Rondestvedt, Wojciech Zalewski (emeritus)

*Theater and Performance Studies:* Branislav Jakovljevic

# Science, Technology, and Society

Courses offered by the Program in Science, Technology, and Society are listed under the subject code STS on the (<https://explorecourses.stanford.edu/search?q=STS&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-STS=on&filter-catalognumber-STS=on>) ExploreCourses web site (<https://explorecourses.stanford.edu/search?q=STS&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-STS=on&filter-catalognumber-STS=on>).

## Mission of the Undergraduate Program in Science, Technology, and Society

The Program in Science, Technology, and Society (STS) aims to provide students with an interdisciplinary framework through which to understand the complex interactions of science, technology and the social world. After working through a common core of courses drawn from the social sciences, the humanities, the natural and physical sciences and engineering, students pursue coursework in one of five specialized areas:

- Information Technology, Media and Society
- Innovation, Technology and Organizations
- Environment and Sustainability
- Life Sciences and Biotechnology
- Policy, Security and Technology

Students may also undertake research in affiliated laboratories and through the honors program. All students complete a capstone project, either by taking the senior capstone seminar (STS 200A, STS 200B, or STS 200C) or by applying for and completing an honors thesis. Students must demonstrate mastery in at least one field from within the humanities or social sciences and at least one field from within the sciences or engineering. Majors may declare either a B.A. or a B.S. degree (see the specific requirements for each degree).

The Program's affiliated faculty represent over a dozen departments, including Anthropology, Communication, Computer Science, Education, Electrical Engineering, History, Law, Management Science and Engineering, Political Science and Sociology. By learning to bring such a rich collection of disciplinary approaches to bear on questions of science and technology, students graduate uniquely equipped to succeed in professions that demand fluency with both technical and social frameworks. Recent graduates of STS have entered top-ranked Ph.D. and MBA programs and forged successful careers in a variety of fields, including business, engineering, law, public service, medicine and academia.

## Learning Outcomes (Undergraduate)

The Program expects undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Science, Technology, and Society. Students are expected to demonstrate:

1. a knowledge of core theories and methods in the interdisciplinary field of STS.
2. an ability to deploy these theories and methods to analyze interactions between science, technology and society in particular historical and cultural contexts.
3. an ability to critically evaluate empirical evidence and theoretical claims in STS-related debates.
4. an ability to communicate clearly and persuasively about STS issues to a general audience in multiple media including oral presentation and writing.

## Advising and Course Selection

The Program in Science, Technology, and Society offers an advising process that includes faculty, staff and peer advisers. Prospective majors must first meet with a peer adviser and then with the Program's Student Services Officer to determine which degree they will pursue (the B.A. or B.S.) and how they will fulfill the Program's basic requirements. Majors are then assigned to a faculty adviser who helps them identify the core questions driving their interest in the field and to draw together a set of courses from the Program's list of offerings that help them pursue those questions most effectively. The Program also sponsors a wide variety of events designed to help students meet their colleagues and Program alumni, discover research and internship opportunities, and make their way toward the career of their choice.

## STS Core

The program offers a Bachelor of Arts and Bachelor of Science in Science, Technology, and Society. Both degree programs require that the student complete the STS Core.

### Units

Complete 8 courses satisfying the following requirements:

#### A. Interdisciplinary Foundational Course (5)<sup>1</sup>

STS 1	The Public Life of Science and Technology	5
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#### B. Disciplinary Analyses: six courses, with two in each area, and at least one of these courses must be a WIM course. (22-30)<sup>2</sup>

1. Social Scientific Perspectives <sup>3</sup>		8-10
COMM 120W	Digital Media in Society	
ANTHRO 90C	Theory of Ecological and Environmental Anthropology	
COMM 1A	Media Technologies, People, and Society	
COMM 1B	Media, Culture, and Society	
COMM 120W	Digital Media in Society	
POLISCI 110Y	War and Peace in American Foreign Policy	
SOC 114	Economic Sociology	
SOC 126	Introduction to Social Networks	
2. Cultural and Historical Perspectives <sup>4</sup>		8-10
ANTHRO 180	Science, Technology, and Gender	
HISTORY 140	World History of Science	
HISTORY 140A	The Scientific Revolution	
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering	
STS 112	Ten Things: An Archaeology of Design	
3. Scientific and Engineering Perspectives		6-10
CS 106A	Programming Methodology	
CS 181W	Computers, Ethics and Public Policy	
ME 214	Good Products, Bad Products	
MS&E 189	Social Networks - Theory, Methods, and Applications	
MS&E 193W	Technology and National Security	
STS 110	Ethics and Public Policy	
STS 115	Ethical Issues in Engineering	
<b>C. Senior Requirements (5-10)</b>		5-10
STS 200A	STS Senior Capstone	
or STS 200B	STS Senior Capstone	
or STS 200C	STS Senior Capstone	
STS 299	Advanced Individual Work	
Total Units		32-45

<sup>1</sup>Students may use STS 101 or STS 101Q to fulfill this requirement if completed in 2011-12 or prior

<sup>2</sup> WIM courses: ANTHRO 90C, COMM 120W, HISTORY 140A, STS 110, CS 181, or MS&E 193

<sup>3</sup>EDUC 120X may be used to fulfill this requirement, but is not offered this year

<sup>4</sup>HISTORY 131 may be used to fulfill this requirement, but is not offered this year

## Concentration

Minimum of 50 units, at least twelve courses, from among those designated on the appropriate concentration area course list (available in the Related Courses tab (p. 539) and on the STS website). All courses must be taken for a letter grade where offered and may not be double-counted with core coursework. Students may petition only one course outside the list of approved courses to count toward their STS degree plan. Thematic concentrations are organized around an STS-related problem or area:

1. Information Technology, Media, and Society

2. Innovation, Technology, and Organizations
3. Environment and Sustainability
4. Life Sciences and Biotechnology
5. Policy, Security, and Technology
6. Self-Designed Concentration

A student pursuing a Bachelor of Arts degree must take at least eight classes from the social science and/or humanities course menus and at least four classes must be from the science and engineering course menus in a single thematic concentration area. The science and engineering courses chosen should include at least two advanced courses.

A student pursuing a Bachelor of Science degree must take at least eight classes from the science and engineering course menus and at least four classes must be from the social science and/or humanities course menus in a single thematic concentration area. The science and engineering courses should include 2-3 sequences of courses that build on one another.

Alternatively, subject to program approval, a student may choose to design a self-designed concentration. Students interested in this option must submit a 5-page proposal in which they describe their self-designed concentration in detail, compare their proposed area to similar majors at Stanford and explain the rationale for why a self-designed concentration is the optimal way to pursue their academic interests. Students also need to identify a faculty mentor who will approve and oversee the self-designed concentration.

Each concentration, certified or self-designed, requires the signature of the STS Associate Director before it is approved.

## Honors Program

The Stanford Program in Science, Technology, and Society (STS) invites STS majors to apply for admission to its Honors Program. The innovative research projects carried out by STS honors students since the program was launched in 1978 represent meaningful achievements for their authors and academic advisers. Honors projects have also served students well after graduation, providing a springboard for graduate studies and for careers in fields such as information technology, entrepreneurship, finance, public policy, media, education, law, medicine, and the nonprofit sector. Not only do honors students become experts in a specialized field of interest, but the honors designation signifies intellectual rigor and a demonstrated ability to pursue original research. These skills are broadly marketable even outside of the specific area of expertise, and serve individuals well upon graduating from college. An STS honors thesis tackles a significant problem or question related to a particular area of STS. To develop the thesis, students develop research methods drawn from one or more of the disciplines that shape STS, such as history, sociology, communication, anthropology, environmental science, computer programming/modeling, engineering, economics, political science, and art history. Past honors projects are on file in the STS office library.

## Honors Program Eligibility and Admission Criteria

To be eligible to apply for the honors program at the end of junior year, students must meet the following criteria:

1. Find an honors faculty adviser and develop a research methodology and research plan
2. Be a current junior or rising senior and have declared STS as a major in Axess
3. Attend at least one of the STS workshops offered for prospective honors students

4. Finish all STS core course work by the end of Spring Quarter, junior year (not including STS 299 Advanced Individual Work)
5. Submit a complete honors program application and research proposal by the last day of classes, Spring quarter, junior year

For application and proposal parameters, see the document STS Honors Program, available on the STS web site.

## Honors Degree Requirements

To graduate with honors, seniors in the honors program must meet the following criteria:

1. Develop an original and complete thesis in consultation with honors faculty adviser
2. Submit a first draft of thesis to honors adviser no later than April 1
3. Submit the final thesis to honors adviser by May 1
4. Earn at least a grade of 'B' on final thesis
5. Maintain an overall Stanford GPA of 3.4
6. Attend required quarterly workshops for STS honors students

STS is no longer admitting non-majors to the honors program. Non-majors currently enrolled should consult the Stanford Bulletin 2011-12 for degree requirements.

## Minor in Science, Technology, and Society

The program no longer offers a minor. Students currently enrolled in the minor should consult the Stanford Bulletin 2011-12 (<http://www.stanford.edu/dept/registrar/bulletin1112/6074.htm>) for degree requirements.

## STS Affiliated Faculty

*Director and Associate Professor of Communication:* Fred Turner

*Associate Director:* Kyoko Sato

*Program Committee:* Stephen Barley (Management Science and Engineering), Paula Findlen (History), Duana Fullwiley (Anthropology), Mark Granovetter (Sociology), Hank Greely (Law), Sarah Lochlann Jain (Anthropology), Robert McGinn (Management Science and Engineering), Brad Osgood (Electrical Engineering), Eric Roberts (Computer Science), Scott Sagan (Political Science), Fred Turner (Communication), John Willinsky (Education)

*Affiliated Faculty and Staff:* Jeremy Bailenson (Communication), Stephen Barley (Management Science and Engineering), Scott Bukatman (Art and Art History), Thomas Byers (Management Science and Engineering), Jean-Pierre Dupuy (French), Paula Findlen (History), Duana Fullwiley (Anthropology), Mark Granovetter, (Sociology), Hank Greely (Law), Martin Hellman (Electrical Engineering, Emeritus), Miyako Inoue (Anthropology), Sandra Soo-Jin Lee (Biomedical Ethics), Sarah Lochlann Jain (Anthropology), Pamela Lee (Art and Art History), Helen Longino (Philosophy), Henry Lowood (Stanford University Libraries), Robert McGinn (Management Science and Engineering), Thomas Mullaney (History), Clifford Nass (Communication), Brad Osgood (Electrical Engineering), Walter Powell (Education), Robert Proctor (History), Jessica Riskin (History), Eric Roberts (Computer Science), Scott Sagan (Political Science), Londa Schiebinger (History), Michael Shanks (Classics, Anthropology), Kyoko Sato (STS), Fred Turner (Communication), John Willinsky (Education), Gavin Wright (Economics)

*Emeriti:* James Adams (Management Science and Engineering, Mechanical Engineering), Barton Bernstein (History), Walter Vincenti (Aeronautics and Astronautics)

# Thematic Concentrations Course Lists

## Information Technology, Media, and Society

Thematic concentration in Information Technology, Media, and Society:

Units

### Social Science Course Menu (0)

COMM 106	Communication Research Methods
COMM 108	Media Processes and Effects
COMM 117	Digital Journalism
COMM 120W	Digital Media in Society
COMM 131	Media Ethics and Responsibility
COMM 137W	The Dialogue of Democracy
COMM 140	Digital Media Entrepreneurship
COMM 166	Virtual People
COMM 168	Experimental Research in Advanced User Interfaces
COMM 169	Computers and Interfaces
COMM 172	Media Psychology
COMM 182	Virtual Communities and Social Media
ECON 153	Economics of the Internet
EDUC 358X	Learning, Sharing, Publishing, and Intellectual Property
MS&E 180	Organizations: Theory and Management
MS&E 181	Issues in Technology and Work for a Postindustrial Economy
PSYCH 30	Introduction to Perception
PSYCH 142S	The Psychology of Social Media

### Humanities Course Menu (0)

ARTHIST 173	Issues in Contemporary Art
ARTSTUDI 160	Design I : Fundamental Visual Language
ARTSTUDI 177	Video Art I
ARTSTUDI 260	Design II: The Bridge
ENGLISH 202	History of the Book
FILMSTUD 6	Introduction to Digital Media
FILMSTUD 140	Film Aesthetics: Editing
FILMSTUD 251	Media in Transition
GERMAN 184	Technology, Innovation, and the History of the Book
HISTORY 205A	The History of Information
MUSIC 220A	Fundamentals of Computer-Generated Sound
MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music

### Science and Engineering Course Menu (0)

CEE 112A	Industry Applications of Virtual Design & Construction
CME 108	Introduction to Scientific Computing
CS 105	Introduction to Computers
CS 106A	Programming Methodology
CS 106B	Programming Abstractions
CS 106X	Programming Abstractions (Accelerated)
CS 107	Computer Organization and Systems
CS 110	Principles of Computer Systems
CS 144	Introduction to Computer Networking
CS 147	Introduction to Human-Computer Interaction Design
CS 148	Introduction to Computer Graphics and Imaging
CS 178	Digital Photography
CS 181	Computers, Ethics, and Public Policy
CS 247	Human-Computer Interaction Design Studio
CS 255	Introduction to Cryptography
CS 378	Phenomenological Foundations of Cognition, Language, and Computation
ENGR 110	Perspectives in Assistive Technology
ENGR 145	Technology Entrepreneurship
MS&E 107	Interactive Management Science
MS&E 111	Introduction to Optimization
MS&E 120	Probabilistic Analysis
MS&E 130	Information Networks and Services
MS&E 134	Organization Change and Information Systems
MS&E 189	Social Networks - Theory, Methods, and Applications
STS 115	Ethical Issues in Engineering

## Innovation, Technology, and Organizations

Thematic concentration in Innovation, Technology, and Organizations:

Units

### Social Science Course Menu (0)

ARTHIST 147	The Visual Culture of Modernism and its Discontents
COMM 140	Digital Media Entrepreneurship
ECON 1A	Introductory Economics A
ECON 1B	Introductory Economics B
ECON 50	Economic Analysis I
ECON 51	Economic Analysis II
ECON 52	Economic Analysis III
ECON 102B	Introduction to Econometrics
ECON 113	Economics of Innovation
ECON 116	American Economic History
ECON 118	Development Economics
ECON 145	Labor Economics
ECON 153	Economics of the Internet
ECON 158	Regulatory Economics
EDUC 224A	Social Entrepreneurship and Social Innovation
HUMBIO 173	Science, Innovation and the Law
ME 297	Forecasting for Innovators:Technology, Tools & Social Change
MS&E 175	Innovation, Creativity, and Change

MS&E 180	Organizations: Theory and Management	
MS&E 181	Issues in Technology and Work for a Postindustrial Economy	
MS&E 185	Global Work	
MS&E 271	Global Entrepreneurial Marketing	
MS&E 277	Creativity and Innovation	
OSPMOSC 68	From Science to Market: Technical Innovation Policy in Post-Soviet Russia	
POLISCI 218S	Political Economy of International Trade and Investment	
PUBLPOL 102	Organizations and Public Policy	
PUBLPOL 183	Philanthropy and Social Innovation	
SOC 114	Economic Sociology	
SOC 161	The Social Science of Entrepreneurship	
STS 140	Science, Technology and Politics	
STS 190	Issues in Technology and the Environment	
<b>Humanities Course Menu (0)</b>		
ARTSTUDI 11AX	Digital Art and Design in Practice	
ARTSTUDI 160	Design I : Fundamental Visual Language	
ARTSTUDI 260	Design II: The Bridge	
BIO 182	Modeling Cultural Evolution	
GERMAN 184	Technology, Innovation, and the History of the Book	
MUSIC 220A	Fundamentals of Computer-Generated Sound	
MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	
OSPFLOR 134F	Modernist Italian Cinema	
<b>Science and Engineering Course Menu (95-119)</b>		
CS 105	Introduction to Computers	3-5
CS 106A	Programming Methodology	3-5
CS 106B	Programming Abstractions	3-5
CS 106X	Programming Abstractions (Accelerated)	3-5
CS 107	Computer Organization and Systems	3-5
CS 110	Principles of Computer Systems	3-5
CS 181	Computers, Ethics, and Public Policy	4
CS 402	Beyond Bits and Atoms: Designing Technological Tools	3-5
CS 402L	Beyond Bits and Atoms - Lab	1-3
ENGR 60	Engineering Economy	3
ENGR 145	Technology Entrepreneurship	4
ENGR 150	Social Innovation and Entrepreneurship	1-6
ME 101	Visual Thinking	4
ME 115A	Introduction to Human Values in Design	3
ME 115B	Product Design Methods	3
ME 120	History and Philosophy of Design	3
ME 203	Design and Manufacturing	4
ME 216A	Advanced Product Design: Needfinding	3-4
ME 216B	Advanced Product Design: Implementation 1	4
MS&E 52	Introduction to Decision Making	3
MS&E 107	Interactive Management Science	3
MS&E 111	Introduction to Optimization	4
MS&E 120	Probabilistic Analysis	5

MS&E 121	Introduction to Stochastic Modeling	4
MS&E 130	Information Networks and Services	3
MS&E 134	Organization Change and Information Systems	3
MS&E 152	Introduction to Decision Analysis	3-4
MS&E 189	Social Networks - Theory, Methods, and Applications	3
MS&E 260	Introduction to Operations Management	3-4
MS&E 266	Management of New Product Development	3

## Environment and Sustainability

Thematic concentration in Environment and Sustainability:

Units

### Social Science Course Menu (0)

ANTHRO 31	Ecology, Evolution, and Human Health	
ANTHRO 90C	Theory of Ecological and Environmental Anthropology	
EARTHSYS 61Q	Food and security	
EARTHSYS 106	World Food Economy	
EARTHSYS 112	Human Society and Environmental Change	
EARTHSYS 143J	Climate Change in the West: A History of the Future	
EARTHSYS 147	Controlling Climate Change in the 21st Century	
EARTHSYS 173	Aquaculture and the Environment: Science, History, and Policy	
EARTHSYS 181	Concepts of Urban Agriculture	
EARTHSYS 184	Climate and Agriculture	
ECON 1A	Introductory Economics A	
ECON 50	Economic Analysis I	
ECON 155	Environmental Economics and Policy	
HUMBIO 2B	Culture, Evolution, and Society	
HUMBIO 4B	Environmental and Health Policy Analysis	
ME 297	Forecasting for Innovators: Technology, Tools & Social Change	
MS&E 92Q	International Environmental Policy	
PUBLPOL 121	Policy and Climate Change	
PUBLPOL 125	Law and Public Policy	
SIW 137	Energy and Environment: Technology, Economics and Policy	
STS 140	Science, Technology and Politics	
STS 190	Issues in Technology and the Environment	
URBANST 160	Environmental Policy and the City in U.S. History	
<b>Humanities Course Menu (0)</b>		
EARTHSYS 145	The Environmental History of North America	
HISTORY 142	Darwin in the History of Life	
HISTORY 208A	Science and Law in History	
HISTORY 254	Popular Culture and American Nature	

OSPBEB 115X	The German Economy: Past and Present
POLISCI 233F	Science, Technology, and Society in the Face of the Looming Disaster
URBANST 115	Urban Sustainability: Long-Term Archaeological Perspectives

**Science and Engineering Course Menu (0)**

BIO 43	Plant Biology, Evolution, and Ecology
BIO 101	Ecology
BIO 121	Biogeography
BIO 220	Introduction to Theoretical Population Biology
BIO 221	Methods of Theoretical Population Biology
BIOHOPK 172H	Marine Ecology
BIOHOPK 187H	Sensory Ecology
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions
CEE 70	Environmental Science and Technology
CEE 100	Managing Sustainable Building Projects
CEE 115	Goals and Methods of Sustainable Building Projects
CEE 124	Sustainable Development Studio
CEE 129	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future
CEE 134A	Site and Space
CEE 136	Green Architecture
CEE 173A	Energy Resources
CEE 177P	Sustainability in Theory and Practice
EARTHSYS 101	Energy and the Environment
EARTHSYS 102	Renewable Energy Sources and Greener Energy Processes
ENERGY 104	Transition to sustainable energy systems
ENERGY 120	Fundamentals of Petroleum Engineering
ENERGY 160	Modeling Uncertainty in the Earth Sciences
MATSCI 156	Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution
MS&E 264	Sustainable Product Development and Manufacturing

## Life Sciences and Biotechnology

Thematic concentration in Life Sciences and Biotechnology:

Units

**Social Science Course Menu (0)**

ANTHRO 82	Medical Anthropology
ANTHRO 185A	Race and Biomedicine
BIOE 131	Ethics in Bioengineering
GENE 104Q	Law and the Biosciences
HUMBIO 2B	Culture, Evolution, and Society
HUMBIO 3B	Behavior, Health, and Development
HUMBIO 4B	Environmental and Health Policy Analysis
HUMBIO 174	Foundations of Bioethics
MED 157	Foundations for Community Health Engagement
OSPFLOR 85	Bioethics: Between Human Rights, Responsibility, and Care Ethics
PSYCH 30	Introduction to Perception

PUBLPOL 122	Biosecurity and Bioterrorism Response
PUBLPOL 125	Law and Public Policy
STS 190	Issues in Technology and the Environment

**Humanities Course Menu (0)**

AMSTUD 156H	Women and Medicine in US History: Women as Patients, Healers and Doctors
ARTSTUDI 284	Art and Biology
FRENCH 219	The Renaissance Body in French Literature and Medicine
HISTORY 130A	The Rise of Scientific Medicine in the United States, 1825-Present
HISTORY 140	World History of Science
HISTORY 144	History of Women and Gender in Science, Medicine and Engineering
HISTORY 208A	Science and Law in History
HISTORY 243C	Colonial Science and Medicine
HISTORY 243G	Tobacco and Health in World History
HISTORY 244C	The History of the Body in Science, Medicine, and Culture
HUMBIO 175	Health Care as Seen Through Medical History, Literature, and the Arts
HUMBIO 175S	Novels and Theater of Illness
OSPMADRD 72	Issues in Bioethics Across Cultures
PHIL 60	Introduction to Philosophy of Science
PHIL 63S	Introduction to Bioethics
PHIL 167A	Philosophy of Biology
PHIL 167B	Philosophy, Biology, and Behavior
POLISCI 216E	International History and International Relations Theory

**Science and Engineering Course Menu (112-113)**

BIO 41	Genetics, Biochemistry, and Molecular Biology	5
BIO 42	Cell Biology and Animal Physiology	5
BIO 43	Plant Biology, Evolution, and Ecology	5
BIO 44X	Core Molecular Biology Laboratory	5
BIO 44Y	Core Plant Biology & Eco Evo Laboratory	5
BIO 109A	The Human Genome and Disease	3
BIO 109B	The Human Genome and Disease: Genetic Diversity and Personalized Medicine	3
BIO 220	Introduction to Theoretical Population Biology	2
BIO 221	Methods of Theoretical Population Biology	4
BIOE 44	Fundamentals for Engineering Biology Lab	4
BIOE 45	Computational Modeling of Microbial Communities	4
BIOE 80	Introduction to Bioengineering	4
BIOE 101	Systems Biology	4
BIOE 103	Systems Physiology and Design	4
CHEM 31A	Chemical Principles I	5
CHEM 31B	Chemical Principles II	5
CHEM 31X	Chemical Principles	4
CHEM 33	Structure and Reactivity	4

CHEM 35	Organic Monofunctional Compounds	4
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 135	Physical Chemical Principles	3
CHEM 171	Physical Chemistry	3
COMP MED 87Q	Introduction to the Mouse in Biomedical Research	3
HUMBIO 2A	Genetics, Evolution, and Ecology	5
HUMBIO 3A	Cell and Developmental Biology	5
HUMBIO 4A	The Human Organism	5
IMMUNOL 231	Medicine for Innovators and Entrepreneurs	3-4
MS&E 292	Health Policy Modeling	3

## Policy, Security, and Technology

Thematic concentration in Policy, Security, and Technology:

### Social Science Course Menu (0)

ANTHRO 135A	The Anthropology of Security	
EARTHSYS 61Q	Food and security	
POLISCI 2	Introduction to American National Government and Politics	
POLISCI 110Y	War and Peace in American Foreign Policy	
POLISCI 114D	Democracy, Development, and the Rule of Law	
POLISCI 114S	International Security in a Changing World	
POLISCI 122	Introduction to American Law	
POLISCI 218T	Terrorism	
POLISCI 248L	Political-Economy of Crime and Violence in Latin America	
PUBLPOL 121	Policy and Climate Change	
PUBLPOL 122	Biosecurity and Bioterrorism Response	
PUBLPOL 125	Law and Public Policy	
STS 110	Ethics and Public Policy	
STS 140	Science, Technology and Politics	
STS 190	Issues in Technology and the Environment	

### Humanities Course Menu (0)

GERMAN 182	War and Warfare in Germany	
POLISCI 116	History of Nuclear Weapons	
POLISCI 216E	International History and International Relations Theory	
POLISCI 233F	Science, Technology, and Society in the Face of the Looming Disaster	

### Science and Engineering Course Menu (0)

APPPHYS 219	Solid State Physics and the Energy Challenge	
CHEM 33	Structure and Reactivity	
CHEM 35	Organic Monofunctional Compounds	
CS 105	Introduction to Computers	
CS 106A	Programming Methodology	
CS 106B	Programming Abstractions	
CS 106X	Programming Abstractions (Accelerated)	

CS 107	Computer Organization and Systems	
CS 110	Principles of Computer Systems	
CS 181	Computers, Ethics, and Public Policy	
MS&E 107	Interactive Management Science	
MS&E 193	Technology and National Security	
PHYSICS 41	Mechanics	
PHYSICS 42	Classical Mechanics Laboratory	
PHYSICS 43	Electricity and Magnetism	

## Overseas Studies Courses in Science, Technology, and Society

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sciencetechnologyandsociety/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sciencetechnologyandsociety/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sciencetechnologyandsociety/http://bosp.stanford.edu>).

		Units
OSPFLOR 85	Bioethics: Between Human Rights, Responsibility, and Care Ethics	4
OSPFLOR 134F	Modernist Italian Cinema	5
OSPMOSC 68	From Science to Market: Technical Innovation Policy in Post-Soviet Russia	5

## Slavic Languages and Literatures

Courses offered by the Department of Slavic Languages and Literatures are listed on the Stanford Bulletin's ExploreCourses web site (<http://bulletin.stanford.edu>) under the subject codes SLAVIC (Slavic Studies) (<https://explorecourses.stanford.edu/search?q=SLAVIC&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-SLAVIC=on>), and SLAVLANG (Slavic Language) (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SLAVLANG&filter-catalognumber-SLAVLANG=on>). (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SLAVLIT&filter-catalognumber-SLAVLIT=on>)

The department supports coordinated study of Russian language, literature, literary and cultural history, theory, and criticism. The department's programs may also be combined with the programs in Russian, East European and Eurasian Studies, Jewish Studies, Film Studies, Drama,

International Relations, Stanford's Overseas Studies, and the Special Languages Program.

A full undergraduate program provides a choice of several tracks leading to a B.A. (with a major or a minor) or to a B.A. with Honors. The department offers a full graduate program leading to an M.A. in Russian and a Ph.D. in Slavic Languages and Literatures. Stanford undergraduates are eligible to apply to the department for a coterminal B.A./M.A. degree. Students in the department's Ph.D. program are required to choose among minor programs in other national literatures, linguistics, Russian, East European, and Eurasian Studies, Jewish Studies, art and music history, theater, or film studies; or they may design their own minor or choose the related field option.

The department runs a colloquium series, which brings distinguished speakers to Stanford; organizes international conferences and symposia; and since 1987 maintains a continuing publication series, Stanford Slavic Studies. Along with the Center for Russian, East European and Eurasian Studies, the department offers qualified undergraduates summer grants (on a competitive basis) for intensive Russian language instruction in accredited programs in Russia and the U.S.

Improving cultural understanding is a critical part of the department's mission, and the department offers a full range of courses at all levels devoted to Russian literature, music and visual arts that do not require specialized knowledge, as well as advanced research seminars for graduate students. The Slavic theme house, Slavianskii Dom, serves as an undergraduate residence for many students in the program and hosts program-related activities. Undergraduates may also choose to study in Moscow through the Stanford Overseas Studies Program. The undergraduate program has attracted students seeking careers in journalism, business, international relations, law, medicine, and human rights, as well as academia. Russian is still the lingua franca over the vast territory of the former Soviet Union, and a good command of this language offers a gateway to Eurasia's diverse cultures, ethnicities, economies, and religions.

Stanford students are in a privileged position in relation to Russian, East European and Eurasian Studies, because of Stanford's faculty resources that are without peer in the U.S. Green Library and the Hoover Institution libraries and archives hold the premier Russian and East European collections, which undergraduates and graduate students use in their research. Department students master a difficult language and a rich and challenging literature, and are rewarded by gaining entry into a unique, powerful, and diverse civilization that defined major trends in the past century and plays an increasingly significant role in the world today.

## Mission of the Undergraduate Program in Slavic Languages and Literatures

The mission of the undergraduate program in Slavic Language and Literatures is to expose students to a variety of perspectives on Russian language, history, culture, literature, and philosophical thought. The program offers three tracks. Courses in the Russian Language and Literature track focus on the linguistic and philological study of literature, as well as the history of Russian literature. The Russian Language, Culture, and History track guides students through a comprehensive interdisciplinary study of Russian literature and culture in historic context. The Russian and Philosophy track provides students with a background in the Russian language and literary tradition with emphasis on philosophical thought.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. the ability to develop effective and nuanced lines of interpretation.
2. critical thinking skills using Russian literary materials.
3. analytical writing skills and close reading skills in Russian and English.
4. skills in active listening and productive communication.
5. a minimum of Intermediate High Oral Proficiency level (established through an OPI test) in Russian or another Slavic language.

## Slavic Theme House

Slavianskii Dom, at 650 Mayfield Avenue, is an undergraduate residence that offers opportunities for students to expand their knowledge, understanding, and appreciation of Russia, Eastern Europe, and Eurasia. Assignment is made through the regular undergraduate housing draw.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Slavic Languages and Literatures and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Slavic Languages and Literatures. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Slavic Languages and Literatures and to interpret and present the results of such research.

## Bachelor of Arts in Slavic Languages and Literatures

The major tracks in Russian Language and Literature and Russian Language, Culture, and History are declared on Axess and appear on the transcript but not on the diploma. The degree option in Russian and Philosophy is not declared on Axess and does not appear on the transcript or the diploma.

## Writing in the Major

Undergraduates are required by the University to pass at least one writing-intensive course in their field of concentration in order to graduate. Majors in any Slavic track may satisfy the writing requirement in 2012-13 by passing SLAVIC 146 The Great Russian Novel: Theories of Time and Action.

## Russian Language and Literature

The Russian Language and Literature field of study is designed for those students who wish to gain command of the Russian language and to study



the nation's literary tradition. Emphasis is placed on the linguistic and philological study of literature, as well as the history of Russian literature and related media in the broader context of Russian culture. This major also welcomes students with an interest in Russian and Slavic linguistics.

Majors who concentrate in Russian Language and Literature must earn a grade point average (GPA) of 2.0 (C) or better in order to receive credit toward the major.

## Prerequisites

Completion of first year Russian, or the equivalent, as determined by the Language Center placement examination.

## Degree Requirements

Candidates for the B.A. degree with a Russian Language and Literature field of study must complete an additional 56 units according to the following distribution:

### Russian Language

A minimum of 12 units from:

	<b>Units</b>
SLAVLANG 111 Third-Year Russian, First Quarter	4
SLAVLANG 112 Third-Year Russian, Second Quarter	4
SLAVLANG 113 Third-Year Russian, Third Quarter	4
SLAVLANG 177 Fourth-Year Russian, First Quarter	3
SLAVLANG 178 Fourth-Year Russian, Second Quarter	3
SLAVLANG 179 Fourth-Year Russian, Third Quarter	3
SLAVLANG 181 Fifth-Year Russian, First Quarter	3
SLAVLANG 182 Fifth-Year Russian, Second Quarter	3
SLAVLANG 183 Fifth-Year Russian, Third Quarter	3

### Russian Literature

The 20-unit core literature sequence consisting of:

	<b>Units</b>
SLAVIC 145 Age of Experiment: Russian Experiments in Short Fiction (1820-1905)	3-5
SLAVIC 146 The Great Russian Novel: Theories of Time and Action	3-5
SLAVIC 147 Modern Russian Literature and Culture: The Age of War and Revolution	3-5
or SLAVIC 148 Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin	
SLAVIC 188 20th century Russian Poetry: From Aleksandr Blok to Joseph Brodsky	3-5

## Electives

Students must take 24 units of electives. These courses are chosen in consultation with the department's chair of undergraduate studies. With department consent, work in related academic fields may be applied toward the degree requirements. Students who have completed IHUM 28A/B. Poetic Justice: Order and Imagination in Russian Culture, or Thinking Matters Courses instructed by Slavic faculty, with a grade of 'B' or better may count these 10 units towards elective courses required for the major, as may students who have completed the SLE sequence.

Russian courses for 2012-13 include:

	<b>Units</b>
SLAVIC 179 Literature from Old Rus' and Medieval Russia	2-4
SLAVIC 181 Philosophy and Literature	5
SLAVIC 187 Russian Poetry of the 18th and 19th Centuries	3-4
SLAVIC 194 Russia: Literature, Film, Identity, Alterity	3-5

SLAVIC 195 Russian and East European Theater	3-5
SLAVIC 200 Proseminar in Literary Theory and Study of Russian Literature	3-5
SLAVIC 225 Readings in Russian Realism	3-5
SLAVIC 229 Poetry as System: Introduction to Theory and Practice of Russian Verse	3-4
SLAVIC 236 The Russian Long Take	3-5
SLAVIC 270 Pushkin's Golden Age	3-5

## Capstone

Students must designate a 200-level course taken in their junior or senior year as a capstone course. Before graduation, skills in writing, textual analysis, and discussion will be evaluated by the Chair of Undergraduate Studies based on work submitted for the capstone course.

## Russian Language, Culture, and History

The Russian Language, Culture, and History field of study is for students who want to obtain command of the Russian language and to pursue a broad, interdisciplinary study of Russian literature and culture in historical context. Emphasis is on the relation of the Russian literary tradition to other arts, including film, as well as the disciplines that have enriched the historical understanding of Russian literature: history, anthropology, art history, political science, and sociology. Majors in the Russian Language, Culture, and History must earn a GPA of 2.0 (C) or better in order to receive credit toward the major.

## Prerequisites

Completion of first year Russian, or the equivalent, as determined by the Language Center placement examination.

## Degree Requirements

Candidates for the B.A. degree with a Russian Language, Culture, and History field of study must complete an additional 56 units according to the following distribution.

### Russian Language

A minimum of 12 units from:

	<b>Units</b>
SLAVLANG 111 Third-Year Russian, First Quarter	4
SLAVLANG 112 Third-Year Russian, Second Quarter	4
SLAVLANG 113 Third-Year Russian, Third Quarter	4
SLAVLANG 177 Fourth-Year Russian, First Quarter	3
SLAVLANG 178 Fourth-Year Russian, Second Quarter	3
SLAVLANG 179 Fourth-Year Russian, Third Quarter	3
SLAVLANG 181 Fifth-Year Russian, First Quarter	3
SLAVLANG 182 Fifth-Year Russian, Second Quarter	3
SLAVLANG 183 Fifth-Year Russian, Third Quarter	3

### 19th-Century Russian Literature and History

A minimum of 10 units chosen from the following courses or the equivalent; students must choose one course from Slavic and one course from History:

	<b>Units</b>
SLAVIC 145 Age of Experiment: Russian Experiments in Short Fiction (1820-1905)	3-5

or SLAVIC 146 The Great Russian Novel: Theories of Time and Action

A pre-revolutionary Russian history course. 2012-2013 course options are:

HISTORY 120B The Russian Empire

HISTORY 221A Men, Women, and Power in Early Modern Russia, 1500-1800

## 20th-Century Russian Literature and History

A minimum of 10 units chosen from the following or the equivalent; students must choose one course from Slavic and one course from History.

SLAVIC 147 Modern Russian Literature and Culture: The Age of War and Revolution 3-5

or SLAVIC 148 Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin

A post-revolutionary Russian history course. 2012-2013 course options are:

HISTORY 222 Honor, Law, and Modernity

HISTORY 223 Art and Ideas in Imperial Russia

HISTORY 227 East European Women and War in the 20th Century

HISTORY 228 Circles of Hell: Poland in World War II

## Electives

Students must take 24 additional units of course work in Russian language, literature, history, or other fields, chosen in consultation with the Chair of Undergraduate Studies. Students who have completed IHUM 28A/B. Poetic Justice: Order and Imagination in Russian Culture, or Thinking Matters Courses instructed by Slavic faculty, with a grade of 'B' or better may count these 10 units towards elective courses required for the major, as may students who have completed the SLE sequence.

Russian courses for 2012-13 include:

		Units
SLAVIC 179	Literature from Old Rus' and Medieval Russia	2-4
SLAVIC 181	Philosophy and Literature	5
SLAVIC 187	Russian Poetry of the 18th and 19th Centuries	3-4
SLAVIC 194	Russia: Literature, Film, Identity, Alterity	3-5
SLAVIC 195	Russian and East European Theater	3-5
SLAVIC 200	Proseminar in Literary Theory and Study of Russian Literature	3-5
SLAVIC 225	Readings in Russian Realism	3-5
SLAVIC 229	Poetry as System: Introduction to Theory and Practice of Russian Verse	3-4
SLAVIC 236	The Russian Long Take	3-5
SLAVIC 270	Pushkin's Golden Age	3-5

## Capstone

Students must designate a 200-level course taken in their junior or senior year as a capstone course. Before graduation, skills in writing, textual analysis, and discussion will be evaluated by the Chair of Undergraduate Studies based on work submitted for the capstone course.

# Russian and Philosophy

The Russian and Philosophy option offers students the opportunity to gain a command of the Russian language and literary tradition, while gaining a background in philosophical thought, broadly construed. They take courses alongside students in other departments participating in the program in Philosophical and Literary Thought, administered through the DLCL. This option is not declared on Axess, thus it does not appear on the transcript or diploma. Majors who concentrate in Russian and Philosophy must earn a grade point average (GPA) of 2.0 (C) or better in order to receive credit toward the major.

## Prerequisites

Completion of first year Russian, or the equivalent, as determined by the Language Center placement examination.

## Degree Requirements

Candidates for the B.A. degree with a concentration in Russian and Philosophy must complete an additional 67 units according to the following distribution:

## Russian Language

A minimum of 12 units from:

		Units
SLAVLANG 111	Third-Year Russian, First Quarter	4
SLAVLANG 112	Third-Year Russian, Second Quarter	4
SLAVLANG 113	Third-Year Russian, Third Quarter	4
SLAVLANG 177	Fourth-Year Russian, First Quarter	3
SLAVLANG 178	Fourth-Year Russian, Second Quarter	3
SLAVLANG 179	Fourth-Year Russian, Third Quarter	3
SLAVLANG 181	Fifth-Year Russian, First Quarter	3
SLAVLANG 182	Fifth-Year Russian, Second Quarter	3
SLAVLANG 183	Fifth-Year Russian, Third Quarter	3

## Russian Literature

A minimum of 16 units of Russian literature, including the following:

		Units
SLAVIC 145	Age of Experiment: Russian Experiments in Short Fiction (1820-1905)	3-5
SLAVIC 146	The Great Russian Novel: Theories of Time and Action	3-5
or SLAVIC 148	Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin	
SLAVIC 147	Modern Russian Literature and Culture: The Age of War and Revolution	3-4
SLAVIC 188	20th century Russian Poetry: From Aleksandr Blok to Joseph Brodsky	3-5

## Electives

At least 12 units of electives in Russian language and literature, chosen in consultation with the Chair of Undergraduate Studies.

## Philosophy and Literature Gateway Course

		Units
SLAVIC 181	Philosophy and Literature	5

## Philosophy Writing in the Major

	Units
PHIL 80 Mind, Matter, and Meaning (prerequisite: introductory philosophy course)	5

## Philosophy Core

12 units, including the following:

	Units
A course in the PHIL 170 series (value theory)	4
A course in the PHIL 180 series (theories of the mind, language, action)	4
A course in PHIL 100-139 series (history of philosophy)	4

## Related Course

An upper-division course of special relevance to philosophy and literature. A list of approved courses is available from the program director.

## Capstone Seminar

One capstone seminar must be taken in the student's senior year. This year's capstone seminars are:

	Units
ENGLISH 117A Irony: From Socrates to David Foster Wallace	5
COMPLIT 199 Senior Seminar	3-5
COMPLIT 213A Martin Heidegger	3-5

## Honors Program

Slavic majors with an overall grade point average (GPA) of 3.3 or above, and who maintain a 3.5 (GPA) in major courses, are eligible to participate in the DLCL's honors program. Prospective honors students must choose a senior thesis adviser from among their home department's regular faculty, in their junior year, preferably by March 1, but no later than May 1.

Honors papers vary considerably in length as a function of their topic, historical scope, and methodology. They may make use of previous work developed in seminars and courses, but display an enhanced comparative or theoretical scope. Quality rather than quantity is the key criterion. Honors theses range from 40-90 pages not including bibliography and notes.

During Spring Quarter of the junior year, a student interested in the honors program should consult with the Chair of Undergraduate Studies of their home department to submit a thesis proposal (2-5 pages), DLCL Honors application and an outline of planned course work for their senior year. During this quarter, students may enroll for 2 units in DLCL 189C Honors Thesis Seminar for the drafting or revision of the thesis proposal. The proposal is reviewed by the Chair of Undergraduate Studies and the Director of the department and will be approved or returned for submission.

Honors students are encouraged to participate in the honors college hosted by Bing Honors College ([http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/OO\\_honors\\_BingHonors.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/OO_honors_BingHonors.html)) and coordinated by the Division of Literatures, Cultures, and Languages. The honors college is offered at the end of the summer, during the weeks directly preceding the start of the academic year, and is designed to help students develop their honors thesis projects. Applications must be submitted through the Bing program. For more information, view the Bing Honors website.

In Autumn Quarter of the senior year, the students must enroll in DLCL 189A Honors Thesis Seminar, a 5 unit seminar that focuses on researching and writing the honors thesis. During Winter Quarter students then enroll for 5 units in DLCL 189B Honors Thesis Seminar while composing their thesis. Students who did not enroll in DLCL 189C Honors Thesis Seminar during their Spring Quarter junior year may do so in the Spring Quarter of their senior year while revising the thesis, if approved by the thesis

supervisor. A total of 10-12 units will be awarded for completion of honors course work, and the finished thesis. Honors essays are due to the thesis adviser no later than 5:00 p.m. on May 15th of the terminal year. If an essay is found deserving of a grade of 'A-' or better by the thesis adviser, honors are granted at the time of graduation.

## Minors in Slavic Languages and Literatures

The Department of Slavic Languages and Literatures offers three undergraduate minor options.

The minor is designed for students who, while pursuing a major in another program, seek a comprehensive introduction to Russian culture through Russian language courses, a combination of minimal proficiency in Russian and courses in the history of Russian culture, or a multidisciplinary introduction to Russian, East European, and Eurasian studies. Students seeking a Slavic minor are encouraged to take advantage of the Bing Overseas Studies Program in Moscow. Students who have chosen one of the minor programs in Russian may use 5 units IHUM 28A/B. Poetic Justice: Order and Imagination in Russian Culture, with a grade of 'B' or better towards their electives.

## Minor in Russian Language

### Prerequisites

The minor option in Russian Language requires completion of second year Russian, or the equivalent, as determined by the results of the Language Center placement examination.

### Requirements

Candidates for the B.A. degree with a minor option in Russian Language must complete 24 units of Russian language and literature courses according to the following distribution:

12 to 15 units of Russian language:

	Units
SLAVLANG 111 Third-Year Russian, First Quarter	4
SLAVLANG 112 Third-Year Russian, Second Quarter	4
SLAVLANG 113 Third-Year Russian, Third Quarter	4
SLAVLANG 177 Fourth-Year Russian, First Quarter	3
SLAVLANG 178 Fourth-Year Russian, Second Quarter	3
SLAVLANG 179 Fourth-Year Russian, Third Quarter	3

The remaining 9-12 units should be chosen from:

	Units
SLAVIC 145 Age of Experiment: Russian Experiments in Short Fiction (1820-1905)	3-5
SLAVIC 146 The Great Russian Novel: Theories of Time and Action	3-5
SLAVIC 147 Modern Russian Literature and Culture: The Age of War and Revolution	3-4
SLAVIC 148 Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin	3-5
SLAVIC 187 Russian Poetry of the 18th and 19th Centuries	3-4
SLAVIC 188 20th century Russian Poetry: From Aleksandr Blok to Joseph Brodsky	3-5

Other courses offered within the Slavic Languages and Literatures department.

Or, with the approval of the department's Chair of Undergraduate Studies, courses in history, politics, linguistics, or other relevant programs.

## Minor in Russian Language, Literature, and Culture

### Prerequisites

The minor option in Russian Language, Literature, and Culture requires completion of first year Russian, or the equivalent, as determined by the results of the Language Center placement examination.

### Requirements

Candidates for the B.A. degree with the minor option in Russian Language, Literature, and Culture must complete 28 units according to the following distribution:

A minimum of 16 units of courses on literature and culture including:

#### Units

Option 1:

Two courses from the following:

SLAVIC 145 Age of Experiment: Russian Experiments in Short Fiction (1820-1905)

SLAVIC 146 The Great Russian Novel: Theories of Time and Action

SLAVIC 147 Modern Russian Literature and Culture: The Age of War and Revolution

SLAVIC 148 Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin

Option 2:

One course from the following:

SLAVIC 145 Age of Experiment: Russian Experiments in Short Fiction (1820-1905)

SLAVIC 146 The Great Russian Novel: Theories of Time and Action

SLAVIC 147 Modern Russian Literature and Culture: The Age of War and Revolution

SLAVIC 148 Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin

and one course from the following:

SLAVIC 187 Russian Poetry of the 18th and 19th Centuries

SLAVIC 188 20th century Russian Poetry: From Aleksandr Blok to Joseph Brodsky

12 units of elective courses either in the Department of Slavic Languages and Literatures or, with the approval of the Slavic Department's Chair of Undergraduate Studies, in other relevant programs dealing with Russian culture, politics, society, and history.

## Minor in Russian, East European, and Eurasian Studies

The minor in Russian, East European and Eurasian Studies offers students the opportunity to choose courses offered by the Center for Russian, East European and Eurasian Studies (subject code REES) in various departments for their minor.

## Requirements

Candidates for the B.A. degree with the minor option in Russian, East European, and Eurasian Studies must complete 28 units according to the following distribution:

1. Two core courses: one on Russia and one on Eastern Europe or Eurasia, to be chosen by the student from an annual list of qualifying courses issued by CREEES for their M.A. students.
2. At least four additional REES courses, totaling at least 20 units.
3. The student's core and additional courses must include 9 units of course work in the Slavic Department, either literature courses or Russian language in the third year or above. Courses must be distributed among at least three disciplines, such as Slavic, History, Political Science, Anthropology, Art and Art History, Economics, Religious Studies, and Sociology. The Slavic Chair of Undergraduate Studies determines which courses qualify for the minor.
4. A capstone experience in CREEES, including, but not limited to, one of the following:
  - A. a departmental seminar course for advanced undergraduates.
  - B. directed reading and research with a Stanford faculty member or a CREEES-approved resident or visiting scholar.
  - C. participation in the Stanford Overseas Studies Program in Moscow or Berlin.

## Foreign Language

The Slavic/REES minor has no language requirement, but students are strongly encouraged to attain working competence in Russian or another relevant language. Courses at the third-year level or above in Russian or another language of Central Asia, the Caucasus, or Eastern Europe may be counted towards the Slavic/REES minor, up to a maximum of 3 units per academic quarter, 9 units total.

## Additional Information

Courses taken at Stanford overseas campuses in Moscow and Berlin may count towards the REES minor, with the approval of the Slavic Chair of Undergraduate Studies; at least three courses for the minor must be taken in residence at Stanford.

Students interested in pursuing the Slavic/REES minor should consult the Slavic Chair of Undergraduate Studies.

## Minor in Modern Languages

The Division of Literatures, Cultures, and Languages offers a minor in Modern Languages. This minor draws on literature and language courses offered in this and other literature departments. See the "Literatures, Cultures, and Languages (<http://www.stanford.edu/dept/registrar/bulletin/6009.htm>)" section of this bulletin for further details about this minor and its requirements.

## Coterminal Bachelor's and Master's Program in Slavic Languages and Literatures

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees" section of this bulletin.

The department allows a limited number of undergraduates to work for coterminal B.A. and M.A. degrees in Slavic Languages and Literatures with

a concentration in Russian. In addition to University requirements for the B.A. degree, the student must:

1. Submit an application for admission by January 31 of the senior year. Applicants must meet the same general standards as those seeking admission to the M.A. program. Applicants must submit: an application for admission; a written statement of purpose; a transcript; and three letters of recommendation, at least two of which should be from members of the Department of Slavic Languages and Literatures faculty.
2. Meet all requirements for both the B.A. and M.A. degrees. Applicants must complete 15 full-time quarters (or the equivalent), or three full-time quarters after completing 180 units, for a total of 225 units. During the senior year they may, with the consent of the instructors, register for as many as two graduate courses. In the final year of study, they must complete at least three graduate-level courses.

## Master of Arts in Slavic Languages and Literatures

University requirements for the M.A. degree are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

### Admission

The requirements for admission to the master's degree program in Russian are:

1. A B.A. (or its equivalent) from an accredited college or university.
2. A command of the Russian language sufficient to permit the student to do satisfactory graduate work.
3. A familiarity with Russian literature sufficient to permit the student to perform adequately in courses at the graduate level.

The applicant's previous academic training in Russian language and literature normally serves as an indication of competence. Accordingly, the department does not ordinarily consider applications from students who have not had at least three years of college Russian and some undergraduate training in Russian literature of the 19th and 20th centuries. Before registering for the first quarter's work in the department, entering graduate students are required to take placement examinations in Russian. Students who fail to perform satisfactorily on such examinations must register for remedial courses in the areas in which they are deficient. Course work in third-year Russian and below carries no credit toward the M.A. degree.

### Course Requirements

Candidates for the M.A. should plan course work that ensures adequate preparation for the M.A. final examination at the end of the third quarter of work. Course work should be planned in consultation with the graduate adviser, whose approval of the overall course load is required.

Candidates for the M.A. must complete a program of 45 units, of which 36 units must be selected from courses given by the department.

### The M.A. Thesis

The M.A. thesis represents a complete article-length research paper (6,000-9,000 words) that, in both form and substance, qualifies for submission to English-language professional publications in the Slavic field. The M.A. thesis must be submitted to the thesis adviser no later than the eighth week of the final quarter of registration.

### Final Examination

A final examination may substitute for the M.A. thesis requirement. The final examination requires a student to demonstrate in a written examination:

1. command of the phonology, morphology, syntax, and lexicology of contemporary standard Russian sufficient to teach beginning and intermediate courses at the college level
2. an ability to read contemporary Standard Russian sufficiently to assist students studying contemporary Russian poetry or literary prose
3. sufficient familiarity with Russian literature of either the 19th or 20th century to successfully handle survey courses dealing with the chosen period of specialization.

The examination should be taken at the end of the final quarter of required course work.

## Doctor of Philosophy in Slavic Languages and Literatures

University requirements for the Ph.D. are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

Students enrolled in the Ph.D. program in Slavic Languages and Literatures are expected to fulfill the following requirements while meeting the program's deadlines in the course of their progress toward the degree:

### 1. Course Work, Breadth Requirements, and Overall Scheduling

In consultation with the Chair of Graduate Studies, students are expected to take 18 units of credit each quarter of their first year, 10 units each funded summer, and 10 units each quarter thereafter. They are expected to reach 135 units and attain TGR status in the winter of their fourth year. Entering graduate students must enroll in SLAVIC 200 Proseminar in Literary Theory and Study of Russian Literature. For the Ph.D. degree students are free to select course work to suit their individual program of study. However, candidates must do so in consultation with their adviser (Chair of Graduate Studies or principal dissertation adviser) and are held responsible for all of the areas covered by the general examinations, regardless of whether they have registered for the department's offerings in a given field. For this reason, it is strongly recommended that before taking Ph.D. examinations, students complete seminar-level work directly related to the following broad areas:

- A. Russian Poetry
- B. the Russian novel
- C. 20th-century Russian literature
- D. 19th-century Russian literature (the Age of Pushkin and after)
- E. 18th-century Russian literature (the early 1700's to the Age of Pushkin)
- F. medieval Russian literature
- G. a monograph course on a major Russian author
- H. theory of literature relevant to the major field

### 2. Minor or Related Fields

During the course of study, students must develop substantial expertise in a field contiguous to the area of specialization. A candidate may elect to present a full minor or, in consultation with the graduate adviser, develop a special program in a related field, preferably no later than the second quarter of enrollment.

A. *Related Field*—A student is required to complete a sequence of basic courses (12 units) in a chosen discipline outside the department of Slavic Languages and Literatures. The choice of patterns is one of the following:

- i a sequence of three courses in one West European literature, selected in consultation with the adviser, or
- ii three basic courses in comparative literature chosen in consultation with the Chair of Graduate Studies (CGS), or
- iii a sequence of three courses in another department selected in consultation with the CGS.

B. *Minor*—Students electing a minor should take a minimum of 20 units in graduate-level courses in the minor department or fulfill the Ph.D. minor requirements established by that department. Students considering minors should consult with their adviser, the CGS, the Chair of Slavic Languages and Literatures, and the Chair of the minor department.

### 3. Admission to Candidacy

Candidates should read carefully the general regulations governing the degree, as described in the "Graduate Degrees" section of this bulletin. Department faculty make the decision to advance students to candidacy on the basis of the student's overall progress and promise in the sixth quarter of registration. The candidate by that time must have demonstrated commitment to graduate studies by completing a minimum of 21 content courses (not counting Summer Quarter) with a grade point average (GPA) of 3.3 or better. These must include 14 seminars in the Slavic Department.

### 4. M.A. Thesis

The candidate must submit a complete draft of an M.A. thesis approved by the thesis adviser. The M.A. thesis represents a complete article-length research paper (6,000-9,000 words) that qualifies in both form and substance for submission to an English language professional publication in the Slavic field. The deadline for the M.A. thesis approval is the eighth week of the sixth quarter of registration. Failure to meet these requirements results in termination of enrollment from the Ph.D. program. Following such termination, the student who has fulfilled all of the M.A. requirements may be given the opportunity to take the M.A. written examination in the history of Russian literature. If successful, the student is then awarded the terminal M.A. degree. In exceptional cases, the written examination requirement may be waived at the discretion of the Chair of Graduate Studies and the Chair of the department.

### 5. Proficiency Test

Administered to all entering graduate students, this test determines whether the student's knowledge of Russian language and literature falls below the department's standard (Advanced Low on the OPI test). Students who fail are required to complete appropriate courses in the first year of graduate study. Courses required to meet the language proficiency are not counted towards the Course Work requirement of the Ph.D. degree.

### 6. Foreign Languages

A candidate must demonstrate reading knowledge of French or German, plus another language useful for the student's area of concentration, by passing written examinations, or receiving a grade of 'A-' or better in a qualifying class with consent of the CGS. The reading examination in German or French must be passed by the end of the first year of study. The reading examination in the second language of choice must be passed by the end of the second year of study.

## 7. Examinations

A candidate must pass the departmental general qualifying examinations, which have written and oral parts. These must be scheduled early in the seventh quarter of enrollment (preferably a day or two before the beginning of academic instruction). The written part covers the history of Russian literature from the medieval period through the twentieth century. The departmental oral qualifying examination follows no later than two weeks after completion of the written exams. The oral examination committee consists of four faculty members and may include one member representing the student's minor or related field; the rest must be drawn from among the Slavic Department faculty. The student makes a 20-minute presentation, following an academic conference format, and based possibly on the student's M.A. thesis. Each examiner questions the student on the presentation and related topics in the history of Russian literature and the minor related field. Following the departmental examinations, a candidate must pass a University Oral examination, consisting of a defense of a doctoral dissertation prospectus and covering content relevant to the area of study, rationale for the proposed investigation, and strategy to be employed in the dissertation research. The prospectus defense is expected to be scheduled at the end of the ninth and, in any case, no later than the beginning of the tenth quarter of registration. Note: Ph.D. examinations are scheduled by the graduate student in consultation with the CGS.

## 8. Teaching

Students are required to complete five quarters of teaching within the funding period, including three quarters of first-year Russian and two quarters as a teaching assistant of literature for a faculty member, usually in the survey courses in translation:

A. SLAVIC 145	Age of Experiment: Russian Experiments in Short Fiction (1820-1905)	3-5
SLAVIC 146	The Great Russian Novel: Theories of Time and Action	3-5
SLAVIC 147	Modern Russian Literature and Culture: The Age of War and Revolution	3-4
SLAVIC 148	Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin	3-5

B. Students are required to take DLCL 301 The Learning and Teaching of Second Languages in preparation for teaching.

## 9. Continuation

Continuation in the Ph.D. program is contingent on fulfilling the following criteria: for first-year students, a high quality of performance in course work (decided by department evaluation); for second-year students, satisfactory academic progress and approval of the M.A. thesis as described above. The principal conditions for continued registration of a graduate student are the timely and satisfactory completion of the university, department, and program requirements for the degree, and fulfillment of minimum progress requirements. Failure to meet these requirements will result in corrective measures, which may include a written warning, academic probation, and/or release from the program.

*Emeriti:* (Professors) Joseph Frank, Richard D. Schupbach, Joseph A. Van Campen

*Director:* Gabriella Safran

*Chair of Graduate Studies:* Monika Greenleaf

*Chair of Undergraduate Studies:* Gabriella Safran

*Professors:* Lazar Fleishman, Gregory Freidin, Gabriella Safran

*Associate Professor:* Monika Greenleaf

*Assistant Professor:* Nariman Skakov

*Courtesy Professor:* Nancy Ruttenburg

*Senior Lecturer:* Rima Greenhill

*Lecturer:* Eugenia Khassina

## Overseas Studies Courses in Slavic Languages and Literatures

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/slaviclanguagesandliteratures/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/slaviclanguagesandliteratures/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/slaviclanguagesandliteratures/http://bosp.stanford.edu>).

		Units
OSPMOSC 62	Economic Reform and Economic Policy in Modern Russia	5
OSPMOSC 72	Space, Politics, and Modernity in Russia	5
OSPMOSC 74	Post-Soviet Eurasia and SCO: Society, Politics, Integration	5

## Sociology

Courses offered by the Department of Sociology are listed under the subject code SOC on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SOC&filter-catalognumber-SOC=on>) web site.

Sociology seeks to understand all aspects of human social behavior, including the behavior of individuals as well as the social dynamics of small groups, large organizations, communities, institutions, and entire societies. Sociologists are typically motivated both by the desire to better understand the principles of social life and by the conviction that understanding these principles may aid in the formulation of enlightened and effective social policy. Sociology provides an intellectual background for students considering careers in the professions or business. Students may pursue degrees in sociology at the bachelor's, master's, or doctoral levels. The department organizes its courses by areas of study to assist students in tailoring their education and research to their academic interests and career goals.

## Mission of the Undergraduate Program in Sociology

The mission of the undergraduate program in Sociology is to provide students with the skills necessary to understand and address social problems and inequalities in global, institutional, and interpersonal social relations. At its core, the curriculum in the major is rooted in social theory and the scientific method. Sociology majors are given opportunities to develop a broad understanding of core sociological theories and the methodological skills used to evaluate human behavior and social organizations. Sociology provides an intellectual background for students considering careers in business, social services, public policy, government service, international nongovernmental organizations, foundations, or academia.

The Sociology major consists of a core curriculum plus elective courses intended to provide breadth of exposure to the variety of areas encompassed by sociology.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the department's undergraduate program. Students are expected to demonstrate:

1. an understanding of core knowledge within the discipline of sociology.
2. the ability to communicate ideas clearly and persuasively in writing.
3. the ability to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. the ability to evaluate theory and critique research within the discipline of sociology.

## Graduate Programs in Sociology

The Department of Sociology offers three types of advanced degrees:

- the Doctor of Philosophy
- the coterminal Master of Arts in Sociology which is restricted to currently enrolled Stanford undergraduates
- the Master of Arts in Sociology which is available to Stanford students who are currently enrolled in other advanced degree programs.

The department does not have a terminal M.A. program for external applicants.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Sociology and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Sociology. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original

contributions to the knowledge of Sociology and to interpret and present the results of such research.

## Areas of Study

The Department of Sociology specializes in four general areas of study, allowing students to tailor their education and research to their academic interests and career goals. The four areas of study supported by the department are:

### Organizations, Business, and the Economy

Focus is on the arrangements which societies construct for the provision of material goods or services. A formal organization which provides goods or services for profit and sells them through a market is called a business, and the economic system is capitalism. Social needs are also met through government and not-for-profit organizations, such as garden clubs, hospitals, prisons, and the Red Cross; some private and social needs are met outside of organizations, such as health care provided by family members and exchange of favors among friends. Courses stress the factors that determine whether needs that people define are met through markets or non-market allocation, through organizations, or by other means. They also investigate the environmental and technical factors that shape organization structure, the determinants of how efficiently organizations operate, and the interpersonal processes that shape individual behavior within organizations. Careers related to this field include management and administration in business or public settings, management consulting and analysis, and legal studies related to corporations, organizations, and business.

### Social Movements, Comparative Politics, and Social Change

Focus is on the emergence, reproduction, and change of political systems and institutions, especially on why and how different political systems and social movements appear in different times and places, and how differences in political regimes and economic systems influence attempts to change these systems. The origins and significance of national and transnational social movements, transition to democracy, including revolution, nationalism, and other forms of collective action, in creating and sustaining these changes analyzed across countries and over time. Careers that are relevant to this field include law, public policy, government service, nonprofit and international nongovernmental organizations, business organizations (especially those with international interests), consulting, and managerial jobs.

### Social Psychology and Interpersonal Processes

Focus is on the social organization of individual identity, beliefs, and behavior, and upon social structures and processes which emerge in and define interpersonal interactions. Processes studied include social acceptance and competition for prestige and status, the generation of power differences, the development of intimacy bonds, the formation of expectation states which govern performance in task oriented groups, and social pressures to constrain deviance. Foundation courses emphasize the effect of social processes on individual behavior and the analysis of group processes. This field provides training for careers with a significant interpersonal component, including advertising and marketing, business, education, law, management, medicine and health, or social work.

### Social Inequality

Focus is on forms of social inequality, including fields such as: the shape and nature of social inequalities; competition for power; allocation of privilege; production and reproduction of social cleavages; and consequences of class, race, and gender for outcomes such as attitudes, political behavior, and life styles. Many courses emphasize changes in

the structure of social inequalities over time, and the processes which produce similarities or differences in stratification across nations. Topics include educational inequality, employment history, gender differences, income distributions, poverty, race, and ethnic relations, social mobility, and status attainment. Careers related to this field include administration, advertising, education, foreign service, journalism, industrial relations, law, management consulting, market research, public policy, and social service.

### Race, Gender, Immigration, Identity and Policy

Focus is on population diversity, primarily in the United States, and on how identity is formed and maintained. Classes in this subject area address segregation, integration, and assimilation. What does it mean to cross from one group to another? How has the law treated racial minorities, sexual minorities, and immigrants differently over time? Careers related to this field include social work, teaching, research, law, management, and population studies which can be applied to any industry.

## Joint Programs in Sociology with the School of Law

The School of Law and Department of Sociology conduct joint programs leading to either a combined J.D. degree with an M.A. degree in Sociology or to a combined J.D. degree with a Ph.D. in Sociology.

Law students interested in pursuing an M.A. in Sociology apply for admission to the Department of Sociology during the first year of Law school. Once admitted to the Department of Sociology, the student must complete standard departmental master's degree requirements as specified in this bulletin. Applications for the joint J.D./M.A. degree program must be approved by both the department and the Law school. Faculty advisers from each program participate in the planning and supervising of the student's academic program.

The J.D./Ph.D. degree program is designed for students who wish to prepare themselves for research or teaching careers in areas relating to both legal and sociological concerns. Students interested in the joint degree program must be admitted to both the School of Law and the Department of Sociology. Interest in the joint degree program must be noted on each of the student's applications. Alternatively, an enrolled student in either the Law School or the Sociology department may apply to the other program, preferably during their first year of study. Students participating in the joint degree program are not eligible to transfer and receive credit for a masters, or other degree, towards the Sociology Ph.D..

Upon admission, students are assigned a joint program faculty adviser who assists the student in planning an appropriate program and ensuring that all requirements for both degrees are satisfied. The faculty adviser serves in this capacity during the student's course of study regardless of whether the student is enrolled in the School of Law or the Sociology department.

J.D./Ph.D. students may elect to begin their course of study in either the School of Law or the Department of Sociology. Students must be enrolled full-time in the Law school for the first year of Law school, and must enroll full time in the graduate school for the first year of the sociology program. After that time, enrollment may be in the graduate school or the Law school, and students may choose courses from either program regardless of where enrolled. Students must satisfy the requirements for both the J.D. and the Ph.D. degrees. Up to 81 quarter (54 semester) hours of approved courses may be counted toward both degrees, but no more than 36 quarter (24 semester) hours of courses that originate outside the Law school may count toward the Law degree. To the extent that courses under this joint degree program originate outside of the Law school but count toward the Law degree, the Law school credits permitted under Section 17(1) of the Law School Regulations for cross-registration in other schools or departments of Stanford University are reduced on a unit-per-unit basis, but not below zero. Students must complete the equivalent of 183 quarter units to complete both



degrees. Tuition and financial aid arrangements normally are through the school in which the student is currently enrolled.

The law degree may be conferred upon completion of applicable law school requirements; it is not necessary to have both degrees conferred simultaneously.

For more information, see the Sociology (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sociology/> <http://sociology.stanford.edu>) web site, and the Law School web site on the J.D./Ph.D. (<http://www.law.stanford.edu/program/degrees/joint/sociology>)

## Bachelor of Arts in Sociology

### Declaring the Major in Sociology

To declare a major in Sociology, students should declare the B.A. in AxBess, then download the major declaration form from the department website. Complete the top portion of the form, sign, and email the Director of the Undergraduate Program in Sociology to set up an entrance advising meeting.

### Major Requirements

A 3.0 GPA is required to enter the Sociology major. The B.A. in Sociology requires 60 units of course work. Units applied to the major must be taken for a letter grade (except for independent study or directed reading), and all earned grades must be 'C' or better.

### Core Curriculum for all Sociology Majors

Students are encouraged to complete some course work at the 200-level. Sociology majors are encouraged to participate in directed research or undertake independent research with Sociology faculty. See the department web site for additional information.

Units required for the Sociology B.A. are:

	Units
Sociology Core Courses	20
Sociology Foundation Courses	15
Social Science Electives	20
Statistics	5
<b>Total Units</b>	<b>60</b>

### Core Courses Required for the Major

The following core courses are required of all Sociology majors.

	Units
SOC 170 Classics of Modern Social Theory	5
SOC 180A Foundations of Social Research	5
SOC 180B Introduction to Data Analysis	5
SOC 200 Junior/Senior Seminar for Majors	5
or SOC 202 Preparation for Senior Research	
<b>Total Units</b>	<b>20</b>

- It is recommended that students take this required course during junior year or as early as possible during senior year. Students pursuing the regular B.A. should take SOC 200 Junior/Senior Seminar for Majors. Students considering honors are encouraged to enroll in SOC 202 Preparation for Senior Research instead of SOC 200 Junior/Senior Seminar for Majors.

## Foundation Courses Required for the Major

Sociology majors must complete 15 units of foundation courses; one course in three different areas for a total of three courses. For further information about Sociology areas of study, see the department web site.

Foundation courses, classified by area of study, are as follows:

### Organizations, Business, and the Economy

	Units
SOC 114 Economic Sociology	5
SOC 162 Markets and Governance	5

### Social Movements, Comparative Politics, and Social Change

	Units
SOC 118 Social Movements and Collective Action	5
SOC 119 Understanding Large-Scale Societal Change: The Case of the 1960s	5
SOC 130 Education and Society	4-5

### Social Psychology and Interpersonal Processes

	Units
SOC 120 Interpersonal Relations	5
SOC 121 The Individual in Social Structure: Foundations in Sociological Social Psychology (not offered 2012-13)	5
SOC 127 Bargaining, Power, and Influence in Social Interaction (not offered 2012-13)	5

### Social Inequality

	Units
SOC 140 Introduction to Social Stratification	5
SOC 141 Controversies about Inequality (not offered 2012-13)	5
SOC 144 Inequality and the Workplace (not offered 2012-13)	5
SOC 149 The Urban Underclass	5

### Race, Gender, Immigration, Identity, and Policy

	Units
SOC 135 Poverty, Inequality, and Social Policy in the United States	5
SOC 142 Sociology of Gender	5
SOC 145 Race and Ethnic Relations in the USA	5
SOC 155 The Changing American Family	5

### Social Science Elective Courses

Four Social Science electives (20 units) are required for the major. You may take all four courses in Sociology if you wish. Students may choose their elective courses according to personal interest. Non-Sociology courses must be approved by the director of undergraduate studies. A maximum of 10 units taken in other Social Science departments (Anthropology, Communication, Economics, Political Science, Psychology) may be counted towards the 60 units required for the Sociology B.A.

## Statistics Requirement

Sociology majors are required to take at least one statistics course (5 units). The department suggests the courses listed below, or other comparable course with approval of the director of undergraduate studies.

Suggested Statistics courses for Sociology majors:

		Units
PSYCH 10	Introduction to Statistical Methods: Precalculus	5
SOC 181B	Sociological Methods: Statistics (not offered 2012-13)	5
STATS 60	Introduction to Statistical Methods: Precalculus	5

## Honors Program

Sociology majors who wish to complete an independent scholarly project under the direction of a faculty member are encouraged to apply for admission to the department's honors program. Admission to the program requires a grade point average (GPA) of 3.5 or higher in courses taken within the major, and an overall GPA of 3.3 (B+) or higher in all undergraduate course work. Applicants are required to identify a Sociology faculty member to advise on the research and writing of the essay. With the approval of the Director of Undergraduate Studies, students may work with faculty advisors in other departments.

Students are encouraged to begin planning their honors thesis in their junior year; at this time they should enroll in SOC 202 Preparation for Senior Research, or SOC 200 Junior/Senior Seminar for Majors. Students begin designing their honors project in connection with this seminar and in consultation with the seminar leader. To apply for the honors program, students should complete the honors application, obtain an advisor's approval and signature, and submit the application with a brief description of the proposed project, and a copy of the student's unofficial undergraduate transcript, to the Director of Undergraduate Studies. Prospective candidates are asked to submit an honors application as soon as possible in their junior or senior year, ideally no later than the end of the fourth quarter prior to graduation (typically Spring Quarter of the junior year). Honors students may earn up to 12 independent study units for work leading to completion of the required honors thesis, excluding units associated with the Junior/Senior Seminar.

If the student is admitted to the program, students will be directed to declare the B.A.H. in Axess and drop the general B.A. Completion of honors in Sociology requires:

1. Application and acceptance into the Sociology Honors Program
2. Completion of all requirements of the Sociology major
3. Completion of an honors thesis with a grade of A- or higher
4. Participation in the Sociology Honors Colloquium in the Spring quarter prior to graduation.

If honors program requirements are not met, students must drop the BAH degree program in Axess and declare the B.A. before applying to graduate.

## Minor in Sociology

Students must complete a minimum of 35 units in Sociology for the minor. Courses must be taken for a letter grade, and a minimum grade point average (GPA) of 2.0 (C) must be achieved. Students are encouraged to complete a course in sociological theory, such as SOC 170 Classics of Modern Social Theory, and to obtain exposure to one of the areas of study. Students who wish to declare a minor in Sociology must do so no later than the deadline for their application to graduate. Related course work from other departments may fulfill a minor requirement. All course substitutions must be pre-approved by the Sociology student services office and the

Undergraduate Program Director; a student may not exceed 5 substitution units for the minor.

Course requirements for a minor in Sociology are as follows:

		Units
SOC 1	Introduction to Sociology at Stanford	5
SOC 180A or SOC 180B	Foundations of Social Research or Introduction to Data Analysis	5
Two foundation courses: see foundation courses required for the major above		10
Additional course work in the department (100- or 200-level courses)		15
Total Units		35

## Coterminal Master of Arts in Sociology

Stanford undergraduates, regardless of undergraduate major, who wish to pursue an M.A. in Sociology may apply for the coterminal master's program. The coterminal M.A. in Sociology is a flexible, self-designed program. Most students complete their M.A. in a fifth year at Stanford; occasionally students are able to complete their B.A. and coterminal M.A. in the fourth year.

### Application and admission

Undergraduates must be admitted to the program and enrolled as a graduate student for at least one quarter prior to their B.A. conferral. A cumulative GPA of at least 3.5 in previous undergraduate work is required for admission; GRE test scores are required. It is highly recommended that applicants have completed at least one Sociology course at the 100 level with a grade of 'B' or better. The department accepts applications once a year; the application deadline is January 15th for admission in the Spring quarter immediately following. There are no exceptions to this deadline. All application materials are submitted directly to the Sociology graduate student services office. The department does not fund coterminal M.A. students. To apply for admission to the Sociology coterminal M.A. program, students must submit the coterminal application and the following:

1. Statement of purpose; should be 2-5 pages double-spaced. Applicants should outline reasons for pursuing the M.A. in Sociology, including career aspirations and/or future plans for additional advanced degrees;
2. Preliminary program; this is a form in the application packet. Specify at least 45 units of course work relevant to the degree program with at least 40 units in Sociology;
3. Current unofficial undergraduate transcript;
4. Two letters of recommendation from Stanford faculty familiar with the student's academic work; additional letters from teaching assistants, employers, or other individuals will be accepted as supplemental materials but are not required;
5. GRE scores.

### Program requirements

Coterminal M.A. students are required to take 45 units of course work during their graduate career; 40 of these units must be in Sociology courses. All units for the coterminal M.A. must be taken at or above the 100 level; advanced-level course work is encouraged and a minimum of 20 units must be taken at the 200 level. Students who wish to take courses outside the department must seek prior approval from the Sociology student services office; coterminal master's students are limited to 5 units from outside of the department; outside courses must be taken in other Social Science departments. Students may transfer a maximum of 10 units from

their undergraduate career; to be eligible for transfer, courses must have been taken in the two quarters preceding admission to the M.A. program. Courses cannot be transferred after a student's BA has been conferred. All units applied to the coterminal master's degree must be taken for a letter grade, and an overall grade point average (GPA) of 3.0 (B) or better is required for the degree. Because research methods are an important component of graduate training in the social sciences, coterminal students are encouraged to take SOC 180A Foundations of Social Research, and SOC 180B Introduction to Data Analysis, in sequence when possible. These methods courses provide skills for research opportunities within the department and in academic or professional careers. Coterminal M.A. students should meet with their assigned faculty adviser upon acceptance to the program.

Students are responsible for knowing and adhering to University and Departmental policies, standards, and requirements for coterminal students. For University coterminal degree program rules and University application forms, see <http://registrar.stanford.edu/bulletin/4874.htm>. (<http://registrar.stanford.edu/pdf/CotermApplic.pdf.html>) For detailed information regarding the Sociology coterminal M.A. and how to apply, see the Department of Sociology (<http://www.stanford.edu/dept/soc/coterminal>) web site.

## Master of Arts in Sociology for Current Stanford Graduate Students

The M.A. degree in Sociology is available to current Ph.D. candidates in Sociology and to students in advanced degree programs (Ph.D., J.D., M.D.) from other Stanford departments and schools.

For the M.A. degree, students must complete a minimum of 45 units of Sociology course work with a grade point average (GPA) of 3.0 (B) or better. All 45 units must be taken in courses taught by Sociology faculty. Students must enroll in SOC course offerings; crosslisted offerings are not accepted. All courses must be taken for a letter grade if possible. Workshop, research, directed reading, and independent study units do not count towards the M.A.

University regulations pertaining to the M.A. are listed in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

Students who wish to engage in more in-depth study in a specific area may do so by focusing on course work within an area of study.

No thesis is required.

While formal application to the M.A. program is not required, applicants from outside of the Sociology department must submit:

1. Graduate Authorization Petition form, available electronically through Axxess (<https://axess.stanford.edu>);
2. Program Proposal for an M.A. form available for download from the registrar's office website, submitted to Sociology graduate student services officer;
3. Short statement of purpose; 1 page double-spaced, submitted to Sociology graduate student services officer.

Sociology Ph.D.s may receive their M.A. in their second or third year of graduate study. Interested students from other degree programs should visit the department's (<http://www.stanford.edu/dept/soc/doctrinal/magrad.html>) web site.

## Doctor of Philosophy in Sociology

The Ph.D. curriculum and degree requirements are designed to provide students with the knowledge and skills to become proficient scholars and teachers. Doctoral students in the department must take required courses for a letter grade if available and are expected to earn a grade of 'B+' or better in each course. Any grade of 'B' or below is considered to be less than satisfactory. Grades of 'B' or below are reviewed by faculty and the following actions may take place: the grade stands and the student's academic performance is monitored to ensure that satisfactory progress is being made; the grade stands and the student is required to revise and resubmit the work associated with that course; or the student may be required to retake the course. The following program requirements apply to students who entered the Ph.D program in 2010-11; students admitted prior to 2010 should consult the department or the Bulletin from their year of admission for requirements specific to their cohort.

Students must complete the following department requirements for the Ph.D. degree in Sociology:

1. Students must enroll in , in Autumn Quarter of the first year; the course provides an introduction and orientation to the field of sociology, and to the department and faculty. One unit of credit is given for this course; grading is on a satisfactory/no credit basis.
2. Students are required to complete 45 units of course work in Sociology in the first academic year, then 15 units of Sociology course work in the second academic year. Course work excludes workshop, independent study, and directed reading units.
3. Theory: Students are required to take at least two courses in sociological theory. One course should be in either macro-sociological theory (SOC 370A Sociological Theory: Social Structure, Inequality, and Conflict), or micro-sociological theory (SOC 370B Social Interaction and Group Process), in the first year of the program. A second course, in research design, should be taken during the second year in the program (SOC 670 Designing Social Research or SOC 372 Theoretical Analysis and Design). Students without a background in Sociology are encouraged to enroll in SOC 370A Sociological Theory: Social Structure, Inequality, and Conflict as well as SOC 370B Social Interaction and Group Process.
4. Methodology: Students are required to complete a series of courses in methodology as well as one methods elective. Students with little background in statistics are encouraged to take an undergraduate statistics course in their first quarter of the program. The required methods sequence, to be taken in order, is listed below.
5. Survey Courses: Students must complete four broad survey courses to demonstrate command of a range of sociological literature. Each year the department specifies which courses meet this requirement, and will undertake to ensure that an adequate selection of such courses is offered. A list of courses that generally fulfill this requirement is listed below. Students should consult with their advisor to ensure that the combination of courses selected to meet this requirement exhibits sufficient breadth. This requirement is normally completed by the end of the second year of residency and must be met by the end of the third year of residency. The most current list of approved survey courses is available on the department website.
6. Workshops: Beginning in year two, doctoral students are required to enroll in at least one workshop each quarter. First year students may attend workshops but are not required to enroll. Sociology workshops are offered for 1-2 units on a credit/non-credit basis only and attendance is required to receive course credit. The Graduate Studies Director may approve a student's petition to attend a workshop when enrollment is prohibited by unit constraints; such attendance is not

noted on the transcript. A list of approved workshops that fulfill this requirement is listed in the requirements section below and also on the department website.

7. **Qualifying Exam #1:** The first comprehensive examination is designed to ensure that students will enter their second year with a firm reading knowledge of two substantive subfields. Students will write two essays in response to questions provided by the examining committee. The questions are due exactly one week later. Students will choose one out of two questions to write on for each subfield. Examinations will be offered in seven subject areas, based on comprehensive readings lists that will be available at the beginning of each academic year. Each subject area will have one faculty point person or "group leader." Group leaders are responsible for assembling essay questions and agree to meet with students as requested. Exam subject areas and the for 2012-13 are: Economic Sociology; Gender; Historical and Comparative Sociology; Organizations; Political Sociology; Population, Family, Demography, and Marriage; Race, Ethnicity, and Immigration; Social Inequality; Social Movements; Social Psychology. Students may work together to read and discuss the materials on the comprehensive reading lists (and in fact they are encouraged to do so). They may consult with faculty members as they study for the exams. However, once the examination questions are released, all such collaboration and consultation should stop, and students should work independently on their essays.
8. **Qualifying Exam #2:** The second qualifying examination is a longer critical essay that focuses on a bibliography devised by the student jointly with their faculty advisor. This exam will provide students with a more focused critical engagement in a specialized subfield or research area, and serves as a test of the student's ability to work and think independently. Exam #2 is due by May 15 of the second year in residence. A two-person committee that includes the primary advisor evaluates the paper. Although the reading committee is usually comprised of two regular faculty members in the department, emeritus and other faculty outside of the department may serve as a committee member with prior approval. Examinations are graded by both committee members, and the grades on these qualifying exams are an important component of the decision to advance a student to candidacy. To accommodate student interests and goals, there are two options for Exam #2, an analytic essay (option 1) or research paper (option 2) – see department website for more detailed information. Students may employ one of the comprehensive examination reading lists (from exam #1) for an area in which they did not take the exam to construct the bibliography. If students would like to be examined in a more specialized sub-area within one of the fields that they took for exam #1, they should consult with their reading committee and receive approval from the Director of Graduate Studies. Students should submit the Second Year Qualifying Paper form to the department (Student Services Officer) by the end of Fall quarter of the 2nd year.
9. **Third Year Paper:** In preparation for a career of writing scholarly papers, each student must complete a research paper in the third year of residency. This third-year paper may be on any sociological topic, and may address theoretical, empirical, or methodological issues. The paper is expected to reflect original work and be of publishable quality. Students will select a committee of at least two Sociology faculty members to serve as third year paper readers. To ensure that students are making adequate progress on their paper, students are required to provide a first draft of the paper to readers by April 1st. The final deadline for paper submission is May 15th. The committee will provide a review that speaks to (1) whether the paper is publishable and whether the student should therefore invest in attempting to publish it, and (2) what types of revisions, insofar as the paper is publishable, that the student should be pursuing to

ready the paper for publication. These comments will be shared with the Director of Graduate Studies, and copies of the paper and faculty comments will go in the student file.

10. **TA requirement:** Students must complete three quarters of teaching apprenticeship in departmental courses, or in other courses by approval. Work as either a teaching assistant (TA) under the supervision of a faculty member or as a teaching fellow (TF) fulfills this requirement. Students are required to take SOC 300, Workshop: Teaching Development, in Spring Quarter of the first year. In addition, students are encouraged to take advantage of department and University teacher training programs. Students for whom English is a second language are expected to acquire sufficient facility in English to be an effective teacher.
11. **RA requirement:** As partial preparation for becoming an accomplished researcher, each student must complete three quarters of research experience, working under the supervision of one or more faculty members, including regular, emeritus, and affiliated faculty. The experience may involve paid (or unpaid) work as a Research Assistant (RA). With the approval of the Director of Graduate Studies, research experience may be acquired by involvement in research projects outside the department. It is recommended that students complete their research requirements early in their graduate program; the requirement must be completed by the end of the fourth year of residency.
12. Students are required to present at least two papers at a major professional meeting (e.g., ASA) in their first five years of graduate study.
13. In order to demonstrate the ability to conduct independent scholarly work, each student must prepare and defend dissertation prospectus by the end of May during the fourth year in residence.
14. **Dissertation Prospectus and Prospectus Defense:** In order to demonstrate the ability to conduct independent scholarly work, each student must prepare and defend dissertation prospectus by the end of May during the fourth year in residence. Students should have their dissertation committee selected by the end of their third year in the program.
15. Each student must complete and defend a doctoral dissertation. At the choice of the student (and in consultation with her or his advisor), the dissertation requirement may be met either by (1) submitting the usual book-length document of the sort now required, or (2) submitting three independent papers. The papers may address the same topic, but should be written as stand-alone, single-authored papers in standard journal format (i.e., AJS or ASR). None of these papers may overlap substantially with one another, and none of them may be co-authored. (The main criterion in judging "substantial overlap" is whether any standard journal, such as AJS, would regard the papers as too similar to publish both.) The dissertation must be submitted to all committee members at least 30 days in advance of the defense date. The dissertation defense serves as the Oral Examination required by the University. Assessment of satisfactory completion is determined by the student's doctoral committee members. All students are invited to present their dissertation findings at an informal department colloquium.

The faculty are responsible for providing students with timely and constructive feedback on their progress toward the Ph.D. In order to evaluate student progress and to identify potential problem areas, the department's faculty reviews the academic progress of each first-year student at the beginning of Winter and Spring quarters and again at the end of the academic year. The first two reviews are primarily intended to identify developing problems that could impede progress. In most cases, students are simply given constructive feedback, but if more serious concerns warrant, a student may be placed on probation with specific guidelines for addressing the problems detected. The review at the end of Spring Quarter is more thorough; each student's performance during the first year is reviewed and discussed. Possible outcomes of the spring

review include: (1) continuation of the student in good standing, or (2) placing the student on probation, with specific guidelines for the period of probation and the steps to be taken in order to be returned to good standing. For students on probation at this point (or at any other subsequent points), possible outcomes of a review include: (1) restoration to good standing; (2) continued probation, again with guidelines for necessary remedial steps; or (3) termination from the program. Students leaving the program at the end of the first year are usually allowed to complete the requirements to receive an M.A. degree, if this does not involve additional residence or financial support. All students are given feedback from their advisers at the end of their first year of graduate work, helping them to identify areas of strengths and potential weakness.

At the end of the second year of residency, students who are performing well, as indicated by their coursework, performance on qualifying examinations, and teaching and research assistantship performance, are advanced to candidacy. This step implies that the student has demonstrated the relevant qualities required for successful completion of the Ph.D. Future evaluations are based on the satisfactory completion of specific remaining department and University requirements. Students who are not advanced to candidacy will normally be terminated from the program and awarded an M.A. degree. In some cases, the department may require that a student complete outstanding work or complete unmet requirements before admission to candidacy. The university requires that all students must be admitted to candidacy by the beginning of the third year in residence in order to continue in the Ph.D. program. Therefore all requirements stipulated by the department must be met before registration for the fall quarter of the student's third year.

At any point during the degree program, evidence that a student is performing at a less than satisfactory level may be cause for a formal academic review of that student.

## Degree Requirements

### Survey Courses

Students must complete four courses from an approved list. This list is updated and circulated to students at the start of each academic year. *Note:* class offerings rotate; not all approved survey courses are offered every year. The following courses typically fulfill the survey course requirement:

	Units	
SOC 310	Political Sociology	
SOC 314	Economic Sociology	
SOC 316	Historical and Comparative Sociology	
SOC 318	Social Movements and Collective Action	
SOC 320	Foundations of Social Psychology	
SOC 339	Gender Meanings and Processes	
SOC 342B	Gender and Social Structure	
SOC 347	Race and Ethnicity in Society and Institutions	
SOC 357	Immigration and Assimilation	
SOC 358	Sociology of Immigration	
SOC 362	Organization and Environment	
SOC 363A	Seminar on Organizational Theory	
SOC 366A	Organizational Ecology	
SOC 376	Perspectives on Organization and Environment: Social Movement Organizations and Environments	

### Research Methods

Required methodology courses are listed below. Students are required to enroll in SOC 384 New Models and Methods in the Social Sciences, in their first or second year of the program.

		Units
SOC 381	Sociological Methodology I: Introduction	5
SOC 382	Sociological Methodology II: Multivariate Regression	4-5
SOC 383	Sociological Methodology III: Models for Discrete Outcomes	5
SOC 384	New Models and Methods in the Social Sciences (not offered 2012-13)	2-5

### Theory

		Units
SOC 370A	Sociological Theory: Social Structure, Inequality, and Conflict	5
SOC 370B	Social Interaction and Group Process	3-5
SOC 670	Designing Social Research	4
SOC 372	Theoretical Analysis and Design	3-5

### Workshops

		Units
SOC 311A	Workshop: Comparative Studies of Educational and Political Systems (not offered 2012-13)	1-5
SOC 311B	Workshop: Comparative Systems of Educational and Political Systems	1-5
SOC 311C	Workshop: Comparative Studies of Educational and Political Systems	1-5
SOC 312W	Workshop: Political Sociology, Social Movements, and Collective Action	1-2
SOC 315W	Workshop: Economic Sociology and Organizations	1-2
SOC 317W	Workshop: Networks, Histories, and Theories of Action	1-2
SOC 321W	Workshop: Social Psychology and Social Structure	1-2
SOC 338W	Workshop: Sociology of Law	1-2
SOC 341W	Workshop: Inequality	1-2
SOC 350W	Workshop: Migration, Race, Ethnicity and Nation	1-3
SOC 368W	Workshop: China Social Science	1

## Ph.D. Minor in Sociology

Sociology offers a minor for currently enrolled doctoral students in other Stanford departments and schools. Students must complete a minimum of 30 graduate-level units with a grade point average (GPA) of 3.0 (B) or better. All 30 units for the minor are to be in courses taught by Sociology faculty. Students must enroll in the SOC course offerings (not cross-listed sections). There is one exception: 5 units may be taken in a statistics or methods course taught in another department. All units must be taken for a letter grade. Workshop, research, directed reading, or independent study units do not count towards the Ph.D. Minor. The program must be approved by a Sociology adviser and filed with the Sociology student services office. While there is not a formal application process, candidates must submit a short statement of purpose (2 pages), and a completed Application for Ph.D. Minor to the Sociology student services office. The Application for Ph.D. Minor must have all Sociology or other courses to be applied to the minor listed, including course number, units, and final grades.

*Emeriti: (Professors)* Joseph Berger, Bernard P. Cohen, Sanford M. Dornbusch, James G. March, John W. Meyer, W. Richard Scott, Nancy B. Tuma, Morris Zelditch Jr.

*Chair:* Mark Granovetter

*Professors:* Karen Cook, Shelley Correll, Mark Granovetter, David Grusky, Michael T. Hannan, Douglas McAdam, Susan Olzak, Cecilia Ridgeway, Gi-Wook Shin, C. Matthew Snipp, Andrew Walder, Xueguang Zhou

*Associate Professors:* Michael Rosenfeld

*Assistant Professors:* Corey Fields, Tomás Jiménez, Paolo Parigi, Aliya Saperstein, Cristobal Young

*Courtesy Professors:* Glenn Carroll, Michele Landis Dauber, Larry Diamond, Clifford J. Nass, Walter Powell, Francisco Ramirez, Jesper Sorensen, Sarah Soule

*Courtesy Associate Professors:* Prudence Carter, Daniel McFarland, Sean Reardon, Mitchell Stevens, Christine Min Wotipka

*Lecturer:* Patricia Chang, Eva Meyersson Milgrom, Patricia Young

*Consulting Professor:* Ruth Cronkite

*Visiting Associate Professors:* Patricia Thornton

## Overseas Studies Courses in Sociology

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sociology/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sociology/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/sociology/http://bosp.stanford.edu>).

		Units
OSPBEIJ 41	Chinese Society and Business Culture	4
OSPBER 66	Theory from the Bleachers: Reading German Sports and Culture	3
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPFLOR 79	Migration, Media and Identity in Italy	5
OSPMADRD 61	Society and Cultural Change: The Case of Spain	5
OSPOXFRD 46	Organizations and Society	3
OSPOXFRD 117W	Gender and Social Change in Modern Britain	4-5

## Statistics

Courses offered by the Department of Statistics are listed under the subject code STATS on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=STATS&filter-catalognumber-STATS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=STATS&filter-catalognumber-STATS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=STATS&filter-catalognumber-STATS=on>).

The department's goals are to acquaint students with the role played in science and technology by probabilistic and statistical ideas and methods, to provide instruction in the theory and application of techniques that have been found to be commonly useful, and to train research workers in probability and statistics. There are courses for general students as well as those who plan careers in statistics in business, government, industry, and teaching.

The requirements for a degree in Statistics are flexible, depending on the needs and interests of the students. Some students may be interested in the theory of statistics and/or probability, whereas other students may wish to apply statistical and probabilistic methods to a substantive area. The department has long recognized the relation of statistical theory to applications. It has fostered this by encouraging a liaison with other departments in the form of joint and courtesy faculty appointments: Economics (Anderson, Romano), Education (Olkin, Rogosa), Electrical Engineering (Montanari), Geological and Environmental Sciences (Rajaratnam, Switzer), Health Research and Policy (Efron, Hastie, Johnstone, Lavori, Olshen, Tibshirani, Wong), Mathematics (Candes, Dembo, Diaconis), Political Science (Jackman), and the SLAC National Accelerator Laboratory (Friedman). The research activities of the department reflect an interest in applied and theoretical statistics and probability. There are workshops in biology/medicine and in environmental factors in health.

In addition to courses for Statistics students, the department offers a number of service courses designed for students in other departments. These tend to emphasize the application of statistical techniques rather than their theoretical development.

The department has always drawn visitors from other countries and universities. As a consequence, there is usually a wide range of seminars offered by both the visitors and the department's own faculty.

## Undergraduate Programs in Statistics

### Majoring in Statistics

Students wishing to build a concentration in probability and statistics are encouraged to consider declaring a major in Mathematical and Computational Science (<http://www.stanford.edu/group/mathcompsci>). This interdepartmental program is administered in the Department of Statistics and provides core training in computing, mathematics, operations research, and statistics, with opportunities for further elective work and specialization. See the "Mathematical and Computational Science" section of this bulletin.

## Graduate Programs in Statistics

University requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Statistics and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses, in the primary field as well as related areas, and experience with independent work and specialization.

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Statistics. Through completion of advanced course work and rigorous

skills training, the doctoral program prepares students to make original contributions to the knowledge of Statistics and to interpret and present the results of such research.

## Minor in Statistics

The undergraduate minor in Statistics is designed to complement major degree programs primarily in the social and natural sciences. Students with an undergraduate Statistics minor should find broadened possibilities for employment. The Statistics minor provides valued preparation for professional degree studies in postgraduate academic programs.

The minor consists of a minimum of six courses with a total of at least 20 units. There are two required courses (8 units) and four qualifying or elective courses (12 or more units). All courses for the minor must be letter graded. An overall 2.75 grade point average (GPA) is required for courses fulfilling the minor.

### Required Courses

		Units
STATS 116	Theory of Probability	3-5
STATS 200	Introduction to Statistical Inference	3

### Qualifying Courses

At most, one of these two courses may be counted toward the six course requirement for the minor:

		Units
MATH 52	Integral Calculus of Several Variables	5
STATS 191	Introduction to Applied Statistics	3-4

### Elective Courses

At least one of the elective courses should be a STATS 200-level course. The remaining two elective courses may also be 200-level courses. Alternatively, one or two elective courses may be approved courses in other departments. Special topics courses and seminars for undergraduates are offered from time to time by the department, and these may be counted toward the course requirement. Students may not count any Statistics courses below the 100 level toward the minor. Examples of elective course sequences are:

		Units
Examples of elective course sequences are:		
<b>Data Analysis and Applied Statistics (6)</b>		
STATS 202	Data Mining and Analysis	3
STATS 203	Introduction to Regression Models and Analysis of Variance	3
<b>Statistical Methodology (9)</b>		
STATS 205	Introduction to Nonparametric Statistics	3
STATS 206	Applied Multivariate Analysis	3
STATS 207	Introduction to Time Series Analysis	3
<b>Economic Optimization (8)</b>		
STATS 206	Applied Multivariate Analysis	3
ECON 160	Game Theory and Economic Applications	5
<b>Psychology Modeling and Experiments (3)</b>		
STATS 206	Applied Multivariate Analysis	3
<b>Signal Processing (9)</b>		
STATS 207	Introduction to Time Series Analysis	3
EE 264	Digital Signal Processing	3
EE 279	Introduction to Digital Communication	3
<b>Genetic and Ecologic Modeling (6)</b>		

STATS 217	Introduction to Stochastic Processes	3
BIO 283	Theoretical Population Genetics	3

#### Probability and Applications (6)

STATS 217	Introduction to Stochastic Processes	3
STATS 218	Introduction to Stochastic Processes	3

#### Mathematical Finances (9-11)

STATS 240	Statistical Methods in Finance	3-4
STATS 243	Statistical Models and Methods for Risk Management and Surveillance	3-4
STATS 250	Mathematical Finance	3

## Master of Science in Statistics

The department requires that the student take 45 units of work from offerings in the Department of Statistics (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&filter-coursestatus-Active=on&page=0&catalog=&q=stats&collapse=>) or from authorized courses in other departments. With the advice of the masters advisers and of peer students, each student selects his or her own set of electives and pace of study. All requirements for the Statistics master's degree must be completed within three years after the student's first term of enrollment in the master's program (five years for Honors Cooperative students). Students pursuing a coterminal master's degree must complete their requirements within three years of their first quarter of graduate standing. Ordinarily, four or five quarters are needed to complete all requirements.

Students must fulfill the following requirements for the M.S. degree:

1. Statistics core courses (must complete all four courses):

		Units
STATS 116	Theory of Probability	3-5
STATS 191	Introduction to Applied Statistics	3-4
STATS 200	Introduction to Statistical Inference	3
STATS 217	Introduction to Stochastic Processes	3

All must be taken for a letter grade. Students with prior background may replace each course with a more advanced course from the same area. Courses previously taken may be waived by the adviser, in which case they must be replaced by other graduate courses offered by the department.

2. Linear Algebra Mathematics requirement:

		Units
Select one of the following:		
MATH 104	Applied Matrix Theory	3
MATH 113	Linear Algebra and Matrix Theory	3
MATH 115	Functions of a Real Variable	3
MATH 171	Fundamental Concepts of Analysis	3

Substitution of other courses in Mathematics and Computer Science may be made with consent of the adviser (may be taken for a letter grade or credit/no credit).

3. Programming requirement:

		Units
Select one of the following: <sup>1</sup>		
CS 106A	Programming Methodology	3-5
CS 106X	Programming Abstractions (Accelerated)	3-5
CME 108	Introduction to Scientific Computing	3-4

<sup>1</sup> The following courses are not offered this year but may be used by students who completed them in fulfillment of this requirement: CS 137, CS 138.

Substitution of other courses in Mathematics and Computer Science may be made with consent of the adviser (may be taken for a letter grade or credit/no credit).

4. At least four additional Statistics courses must be taken from graduate offerings in the department (202-399). All must be taken for a letter grade. Students cannot count more than 6 units of STATS 260A, STATS 260B, STATS 260C Workshop in Biostatistics, STATS 298 Industrial Research for Statisticians, STATS 390 Consulting Workshop, STATS 299 Independent Study, and STATS 399 Research toward the master's degree requirements.

		Units
STATS 260A	Workshop in Biostatistics	1-2
STATS 260B	Workshop in Biostatistics	1-2
STATS 260C	Workshop in Biostatistics	1-2
STATS 298	Industrial Research for Statisticians	1-3
STATS 299	Independent Study	1-10
STATS 390	Consulting Workshop	1-3
STATS 399	Research	1-10

5. Additional elective units to complete the requirements may be chosen from the list available from the department web site ([http://www-stat.stanford.edu/academics/msc\\_electives.html](http://www-stat.stanford.edu/academics/msc_electives.html)). Other graduate courses (200 or above) may be authorized by the adviser if they provide skills relevant to statistics or deal primarily with an application of statistics or probability and do not overlap courses in the student's program. There is sufficient flexibility to accommodate students with interests in applications to business, computing, economics, engineering, health, operations research, and biological and social sciences.

Courses below 200 level are generally not acceptable, with the following exceptions:

		Units
STATS 116	Theory of Probability	3-5
STATS 191	Introduction to Applied Statistics	3-4
MATH 104	Applied Matrix Theory	3
MATH 113	Linear Algebra and Matrix Theory	3
MATH 115	Functions of a Real Variable	3
MATH 171	Fundamental Concepts of Analysis	3
MATH 180	Introduction to Financial Mathematics	3
CS 106A	Programming Methodology	3-5
CS 106B	Programming Abstractions	3-5
CS 106X	Programming Abstractions (Accelerated)	3-5
CS 140	Operating Systems and Systems Programming	3-4
CS 142	Web Applications	3
CS 143	Compilers	3-4
CS 144	Introduction to Computer Networking	3-4
CS 145	Introduction to Databases	3-4
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 149	Parallel Computing	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 155	Computer and Network Security	3
CS 157	Logic and Automated Reasoning	3
CS 161	Design and Analysis of Algorithms	3-5
CS 164	Computing with Physical Objects: Algorithms for Shape and Motion	3

CS 170	Stanford Laptop Orchestra: Composition, Coding, and Performance	1-5
CS 178	Digital Photography	3-5
CS 181	Computers, Ethics, and Public Policy	4

At most, one of these courses may be counted:

		Units
MATH 104	Applied Matrix Theory	3
MATH 113	Linear Algebra and Matrix Theory	3
MATH 151	Introduction to Probability Theory	3
STATS 116	Theory of Probability	3-5

6. Submission of approved Masters Program Proposal ([http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/statistics/STATS-MS\\_Program\\_Proposal\\_Form\\_2011.pdf](http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/statistics/STATS-MS_Program_Proposal_Form_2011.pdf)) by the master's adviser to the student services officer by the end of the first quarter of the master's degree program.

Students with a strong mathematical background who may wish to go on to a Ph.D. in Statistics should consider applying to the Ph.D. program.

The eight Statistics courses required for the M.S. degree must be taken for letter grades. Courses other than the eight required statistics courses may be taken for a letter grade or Credit/No Credit. There is no thesis requirement. An overall 2.75 grade point average (GPA) is required.

Units for a given course may not be counted to meet the requirements of more than one degree, that is, no units may be double-counted.

Students pursuing a coterminal master's degree must complete their requirements within three years of their first quarter of graduate standing. No courses taken more than two quarters prior to admission to the coterminal master's program may be used to meet the 45-unit university minimum requirement for the master's degree.

For further information about the Statistics master's degree program requirements, see the department web site (<http://www-stat.stanford.edu/academics/msc.html>).

## Doctor of Philosophy in Statistics

The department looks for students who wish to prepare for research careers in statistics or probability, either applied or theoretical. Advanced undergraduate or master's level work in mathematics and statistics provides a good background for the doctoral program. Quantitatively oriented students with degrees in other scientific fields are also encouraged to apply for admission. In particular, the department is expanding its research and educational activities towards computational biology, mathematical finance and information science, via a VIGRE program. The program normally takes four years to complete.

### Program Summary

		Units
<b>First-year core program (18-34)</b>		
STATS 300A	Theory of Statistics	2-3
STATS 300B	Theory of Statistics	2-4
STATS 300C	Theory of Statistics	2-4
STATS 305	Introduction to Statistical Modeling	2-4
STATS 306A	Methods for Applied Statistics	2-4
STATS 300B	Theory of Statistics	2-4
STATS 310A	Theory of Probability	2-4
STATS 310B	Theory of Probability	2-3
STATS 310C	Theory of Probability	2-4



- Pass two of three parts of the qualifying examinations (end of first year); breadth requirement (second or third year); successfully complete the thesis proposal meeting (before end of third year); pass the University oral examination (fourth year); dissertation (fourth year).
- In addition, students are required to take 9 units of advanced topics courses offered by the department:

**Units**

Select at least two of the following:

STATS 314	Advanced Statistical Methods
STATS 317	Stochastic Processes
STATS 318	Modern Markov Chains
STATS 315A	Modern Applied Statistics: Learning
STATS 315B	Modern Applied Statistics: Data Mining

- Complete 3 units of STATS 390 Consulting Workshop.
- All students who have passed the qualifying exams but have not yet passed the University oral examination must take STATS 319 Literature of Statistics at least once per year.

## First-Year Core Courses

- STATS 300 Advanced Topics in Statistics systematically surveys the ideas of estimation and of hypothesis testing for parametric and nonparametric models involving small and large samples.
- STATS 305 Introduction to Statistical Modeling is concerned with linear regression and the analysis of variance.
- STATS 306A Methods for Applied Statistics and STATS 306B Methods for Applied Statistics: Unsupervised Learning survey a large number of modeling techniques, related to but going beyond the linear models of STATS 305 Introduction to Statistical Modeling.
- STATS 310A Theory of Probability, STATS 310B Theory of Probability, and STATS 310C Theory of Probability are measure-theoretic courses in probability theory, beginning with basic concepts of the law of large numbers and martingale theory.
  - Students who do not have enough mathematics background can take STATS 310A,B,C after their first year but need to have their first-year program approved by the Ph.D. program adviser.

## Qualifying Examinations

These are intended to test the student's level of knowledge when the first-year program, common to all students, has been completed. There are separate examinations in the three core subjects of statistical theory and methods, applied statistics, and probability theory, and all are typically taken during the summer between the student's first and second years. Students may take two or three of these examinations and are expected to show acceptable performance in two examinations. Letter grades are not given. After passing the qualifying exams, students will file for Ph.D. candidacy, a University milestone.

## Breadth Requirement

Students are advised to choose an area of concentration in a specific scientific field of statistical applications; this can be realized by taking at least 15 units of course work approved by the Ph.D. program adviser.

Current areas with suggested course options include:

## Computational Biology and Statistical Genomics

Students are expected to take 9 units of graduate courses in genetics or neurosciences (imaging), such as GENE 203/BIO 203 (Advanced Genetics), as well as 9 units of classes in Statistical Genetics or Bioinformatics:

**Units**

Courses can be chosen from the following list: <sup>1</sup>

STATS 345	Computational Algorithms for Statistical Genetics	2-3
STATS 366	Modern Statistics for Modern Biology	3

<sup>1</sup> The following courses are not offered this year but may be used by students who completed them in fulfillment of this requirement: GENE 344A, GENE 344B, STATS 367.

## Machine Learning

**Units**

Courses can be chosen from the following list:

<b>Statistical Learning (4-6)</b>		
STATS 315A	Modern Applied Statistics: Learning	2-3
STATS 315B	Modern Applied Statistics: Data Mining	2-3

<b>Data Bases (6) <sup>1</sup></b>		
CS 245	Database Systems Principles	3
CS 347	Parallel and Distributed Data Management	3

<b>Probabilistic Methods in AI (6-7)</b>		
CS 221	Artificial Intelligence: Principles and Techniques	3-4
CS 354	Topics in Circuit Complexity	3

<b>Statistical Learning Theory and Pattern Classification (3-4)</b>		
CS 229	Machine Learning	3-4

<sup>1</sup> CS 346 is not offered this year, but the department may offer it next year. If so, this course may be used in fulfillment of this requirement.

## Applied Probability

Students are expected to take 15 units of graduate courses in some of the following areas:

**Units**

<b>Control and Stochastic Calculus (6) <sup>1</sup></b>		
MS&E 322	Stochastic Calculus and Control	3
MS&E 351	Dynamic Programming and Stochastic Control	3

<b>Finance (10)</b>		
STATS 250	Mathematical Finance	3
FINANCE 622	Dynamic Asset Pricing Theory	4
MATH 236	Introduction to Stochastic Differential Equations	3

<b>Information Theory (3) <sup>1</sup></b>		
EE 376A	Information Theory	3

<b>Monte Carlo (10-12)</b>		
STATS 318	Modern Markov Chains	3
STATS 345	Computational Algorithms for Statistical Genetics	2-3
STATS 362	Monte Carlo	2-3
MS&E 335	Queueing and Scheduling in Processing Networks	3

<b>Stochastic Processes (6)</b>		
STATS 317	Stochastic Processes	3
MATH 234	Large Deviations Theory	3

<sup>1</sup> The following courses are not offered this year but may be used by students who completed them in fulfillment of this requirement: MATH 237, EE 363, EE 376B.

## Earth Science Statistics

Students are expected to take:

<b>Units</b>		
STATS 317	Stochastic Processes	3
STATS 318	Modern Markov Chains	3

Three courses from the GES or Geophysics departments, such as GES 144.<sup>1</sup>

<sup>1</sup> GES 144 is no longer offered but may be used by students who completed the course in fulfillment of this requirement.

## Social and Behavioral Sciences

Students are expected to take three advanced courses from the department with an applied orientation such as:

Units

Courses can be chosen from the following list:<sup>1</sup>

STATS 261/262	Intermediate Biostatistics: Analysis of Discrete Data	3
STATS 324	Multivariate Analysis	2-3

<sup>1</sup> The following courses are not offered this year but may be used by students who completed them in fulfillment of this requirement: STATS 343, 354.

In addition, students must complete at least three advanced quantitative courses from departments such as Anthropology, Economics, Political Science, Psychology, and Sociology, and the schools of Education, Business, or Medicine.

## Thesis Proposal Meeting and University Oral Examinations

The thesis proposal meeting is intended to demonstrate students' depth in some areas of statistics, and to examine the general plan for their research. It also confirms that students have chosen a Ph.D. faculty adviser and have started to work with that adviser on a research topic. In the meeting, they will give a short presentation and discuss their ideas for completing a PhD thesis, with a committee consisting of their adviser and thesis committee (a total of four members). The meeting must be successfully completed before the end of their third year. "Successful completion" means that the general research plan is sound and has a reasonable chance of success. If they do not successfully complete the meeting to the satisfaction of the committee, then the meeting must be repeated. Repeated failure can lead to a loss of financial support.

The oral examination consists of a 40-minute presentation on the thesis topic, followed by a question period. The questions relate both to the student's presentation and also explore the student's familiarity with broader statistical topics related to the thesis research. The oral examination is normally completed within the last few months of the student's Ph.D. period. The examining committee usually consists of four faculty members from the Statistics Department and a fifth faculty member from outside the department. Four out of five passing votes are required and no grades are given. Nearly all students can expect to pass this examination, although it is common for specific recommendations to be made regarding completion of the thesis.

A reading committee must also read and approve the thesis. The reading committee is typically the same as the thesis committee from the thesis proposal meeting.

For further information on University oral examinations and committees, see the Graduate Academic Policies and Procedures (GAP) Handbook, section 4.7 (<http://gap.stanford.edu/4-7.html>) or the "University Oral Examination (p. 40)" section of this bulletin.

## Doctoral and Research Advisers

From the student's arrival until the selection of a research adviser, the student's academic progress is monitored by the department Doctoral Adviser. Each student should meet at least once a quarter with the Doctoral Adviser to discuss their academic plans and their progress towards choosing a thesis adviser.

## Financial Support

Students accepted to the Ph.D. program are offered financial support. All tuition expenses are paid and there is a fixed monthly stipend determined to be sufficient to pay living expenses. Financial support can be continued for five years, department resources permitting, for students in good standing. The resources for student financial support derive from funds made available for student teaching and research assistantships. Students receive both a teaching and research assignment each quarter which, together, do not exceed 20 hours. Students are encouraged to apply for outside scholarships, fellowships, and other forms of financial support.

## Ph.D. Minor in Statistics

Students must complete 30 total units for the Ph.D. minor. 20 units must be from Statistics courses numbered 300 and above and taken for letter grades. The remaining 10 units can be from Statistics courses numbered 200 and above. The selection of courses must be approved by one of the M.S. advisers. The Application for the Ph.D. Minor form must be approved by both the student's Ph.D. department and the Statistics department.

For further information about the Statistics Ph.D. degree program requirements, see the department web site (<http://www-stat.stanford.edu/academics/msc.html>).

*Emeriti:* Theodore W. Anderson, Jerome H. Friedman, Ingram Olkin, Charles Stein, Paul Switzer

*Chair:* Guenther Walther

*Professors:* Emmanuel Candes, Amir Dembo, Persi Diaconis, David L. Donoho, Bradley Efron, Trevor J. Hastie, Iain M. Johnstone, Tze L. Lai, Art Owen, Joseph P. Romano, David O. Siegmund, Robert J. Tibshirani, Guenther Walther, Wing H. Wong

*Associate Professors:* Andrea Montanari, Jonathan Taylor

*Assistant Professors:* Balakanapathy Rajaratnam

*Courtesy Professors:* John Ioannidis, Philip W. Lavori, Richard A. Olshen, Hua Tang

*Courtesy Associate Professors:* Simon Jackman, David Rogosa, Chiara Sabatti

*Consulting Professors:* John Chambers, Charles Chui

*Stein Fellows:* Michael Baiocchi, Sergio Bacallado

## Symbolic Systems

Courses offered by the Program in Symbolic Systems are listed under the subject code SYMSYS on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SYMSYS&filter-catalognumber-SYMSYS=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SYMSYS&filter-catalognumber-SYMSYS=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SYMSYS&filter-catalognumber-SYMSYS=on>).

The observation that both human beings and computers can manipulate symbols lies at the heart of Symbolic Systems, an interdisciplinary program focusing on the relationship between natural and artificial systems that represent, process, and act on information. Computer programs, natural languages, the human mind, and the Internet embody concepts whose study forms the core of the Symbolic Systems curriculum, such as computation, representation, communication, and intelligence. A body of knowledge and theory has developed around these notions, from disciplines such as philosophy, computer science, linguistics, psychology, statistics,

neurobiology, and communication. Since the invention of computers, researchers have been working across these disciplines to study questions such as: in what ways are computers and computer languages like human beings and their languages; how can the interaction between people and computers be made easier and more beneficial?

The core requirements of the Symbolic Systems Program (SSP) include courses in symbolic logic, the philosophy of mind, formal linguistics, cognitive psychology, programming, the mathematics of computation, statistical theory, artificial intelligence, and interdisciplinary approaches to cognitive science. These courses prepare students with the vocabulary, theoretical background, and technical skills needed for study and research at the advanced undergraduate and graduate levels. Most of the courses in SSP are drawn from affiliated departments. Courses designed specifically for the program are aimed at integrating and supplementing topics covered by the department-based offerings. The curriculum includes humanistic approaches to questions about language and intelligence, as well as training in science and engineering.

SSP offers B.S. and M.S. degree programs. Both programs require students to master a common core of required courses and to choose an area of specialization.

## Mission of the Undergraduate Program in Symbolic Systems

The undergraduate program in Symbolic Systems is an interdisciplinary program focusing on the relationship between natural and artificial systems that represent, process, and act on information. The mission of the program is to prepare majors with the vocabulary, theoretical background, and technical skills necessary to research questions about language, information, and intelligence, both human and machine. The curriculum offers a combination of traditional humanistic approaches to these questions as well as a training and familiarity with contemporary developments in the science and technology of computation. Students in the major take courses in cognitive science, computer programming, computational theory, probability, cognitive psychology, linguistics, and artificial intelligence. The program prepares student for careers in corporate and private sectors as well as for further study in graduate school.

## Learning Outcomes (Undergraduate)

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Symbolic Systems Program. Students are expected to demonstrate:

1. understanding of important concepts from the undergraduate core requirements.
2. ability to apply core concepts to an advanced problem area.
3. ability to apply concepts and methods from more than one discipline to a particular issue.
4. ability to think critically about advanced reading material.
5. ability to present a cogent, coherent, evidence-backed argument.

## Learning Outcomes (Graduate)

The purpose of the master's program is to further develop knowledge and skills in Symbolic Systems and to prepare students for a professional career or doctoral studies. This is achieved through completion of courses

representing each of the core disciplines of Symbolic Systems as well as an individualized course program in support of the completion of a Master's thesis.

## Bachelor of Science in Symbolic Systems

The program leading to a B.S. in Symbolic Systems provides students with a core of concepts and techniques, drawing on faculty and courses from various departments. The curriculum prepares students for advanced training in the interdisciplinary study of language and information, or for postgraduate study in any of the main contributing disciplines. It is also excellent preparation for employment immediately after graduation.

Symbolic Systems majors must complete a core of required courses plus a field of study consisting of five additional courses. All major courses are to be taken for letter grades unless an approved course is offered satisfactory/no credit only. All core courses must be passed with a grade of 'C-' or better. Students who receive a grade lower than this in a core course must alert the program of this fact so that a decision can be made about whether the student should continue in the major.

### Core Requirements

In order to graduate with a B.S. in Symbolic Systems, a student must complete the following requirements. Some of these courses have other courses as prerequisites; students are responsible for completing each course's prerequisites before they take it. With the exception of the advanced small seminar requirement, courses cannot be used towards more than one area of the core requirements. For additional information, see the Symbolic Systems web site ([http://symsys.stanford.edu/undergraduate\\_programs](http://symsys.stanford.edu/undergraduate_programs)).

### 1. Introductory Core Course

	Units
SYMSYS 100 Introduction to Cognitive and Information Sciences	4

### 2. Continuous Fundamentals Level 1—Single Variable Calculus

	Units
Select one of the following Series:	
<b>Series A (10)</b>	10
10 units of Advanced Placement Calculus credit	
<b>Series B (10)</b>	10
MATH 19 Calculus & MATH 20 and Calculus & MATH 21 and Calculus	
<b>Series C (10)</b>	10
MATH 41 Calculus or MATH 41A Calculus ACE	
MATH 42 Calculus or MATH 42A Calculus ACE	

### 3. Continuous Fundamentals Level 2—Multivariable Calculus

	Units
Select one of the following: <sup>1</sup>	
CME 100 Vector Calculus for Engineers	5

CME 100A	Vector Calculus for Engineers, ACE	6
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 51A	Linear Algebra and Differential Calculus of Several Variables, ACE	6
MATH 51H	Honors Multivariable Mathematics	5

<sup>1</sup> MATH 52 Integral Calculus of Several Variables and/or MATH 53 Ordinary Differential Equations with Linear Algebra, or CME 102 Ordinary Differential Equations for Engineers and/or CME 104 Linear Algebra and Partial Differential Equations for Engineers, are recommended and may be required for some optional higher level courses.

## 4. Continuous Fundamentals Level 3—Probability and Statistics

Select one of the following:

CS 109	Introduction to Probability for Computer Scientists	3-5
STATS 116	Theory of Probability	3-5
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4-5
MS&E 120	Probabilistic Analysis	5
EE 178	Probabilistic Systems Analysis	3-4
MATH 151	Introduction to Probability Theory	3
CME 106/ENGR 155C	Introduction to Probability and Statistics for Engineers	3-4

## 5. Discrete Fundamentals

**a. Computing Level 1 (3-5)** Units 3-5

CS 106A	Programming Methodology	
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**b. Computing Level 2 (3-5)** 3-5

Select one of the following:

CS 106B	Programming Abstractions	
CS 106X	Programming Abstractions (Accelerated)	

**c. Logic and Computational Theory (3-5)** 3-5

Select one of the following:

CS 103	Mathematical Foundations of Computing	
PHIL 150	Basic Concepts in Mathematical Logic	
PHIL 150E	Logic in Action: A New Introduction to Logic	

## 6. Technical Depth

Two courses chosen from the list below (from either the same or different areas), appropriate to a student's concentration. Students concentrating in HCI, AI, or Computer Music must take CS 107 Computer Organization and Systems. Other concentrations may also restrict the particular courses that can be taken to fulfill this requirement. See concentration lists at <http://symsys.stanford.edu/viewing/htmldocument/16190>

**Area A. Computer Programming (3-5)**

CS 107	Computer Organization and Systems (required for HCI, AI, or Computer Music)	3-5
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**Area B. Computational Theory (6-9)** <sup>1</sup>

CS 154	Introduction to Automata and Complexity Theory	3-4
CS 161	Design and Analysis of Algorithms	3-5

**Area C. Logic (15)**

CS 157	Logic and Automated Reasoning	3
PHIL 151	First-Order Logic	4
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4

**Area D. Decision Theory/Game Theory (14-15)**

CS 224M	Multi-Agent Systems	3
ECON 160	Game Theory and Economic Applications	5
MS&E 236/236H	Game Theory with Engineering Applications	3
MS&E 252	Decision Analysis I: Foundations of Decision Analysis	3-4

**Area E. Probability and Statistics (6-7)**

STATS 200	Introduction to Statistical Inference	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4

<sup>1</sup> CS 156 is not offered in 2012-13 but may be used to fulfill this requirement.

## 7. Philosophical Foundations Level 1

**Introductory Philosophy (3-5)** <sup>1</sup>

Select one of the following: Units 3-5

PHIL 1	Introduction to Philosophy	
PHIL 2	Introduction to Moral Philosophy	
PHIL 60	Introduction to Philosophy of Science	
PHIL 102	Modern Philosophy, Descartes to Kant	

<sup>1</sup> The following courses are no longer offered but may be used by students who completed them in fulfillment of this requirement: IHUM 10A,B, IHUM 23A,B, and IHUM 67.

## 8. Philosophical Foundations Level 2

**PHIL 80** Units 5

Mind, Matter, and Meaning

## 9. Philosophical Foundations Level 3

Select one of the following advanced undergraduate course in metaphysics/epistemology: <sup>1</sup>

PHIL 162	Philosophy of Mathematics	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 166	Probability: Ten Great Ideas About Chance	4
PHIL 180	Metaphysics	4
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 181	Philosophy of Language	4
PHIL 182	Truth	2-4
PHIL 184	Theory of Knowledge	4
PHIL 184B	Philosophy of the Body	4
PHIL 184F	Feminist Theories of Knowledge	4
PHIL 184P	Probability and Epistemology	4
PHIL 185	Memory	4
PHIL 185B	Philosophy of Perception	4
PHIL 186	Philosophy of Mind	4

PHIL 187	Philosophy of Action	4
PHIL 188	Personal Identity	4
PHIL 189	Examples of Free Will	4

<sup>1</sup> The following courses are not offered this year but may be used by students who completed them in fulfillment of this requirement: PHIL 168 and PHIL 169.

## 10. Cognition and Neuroscience

		Units
PSYCH 45	Introduction to Learning and Memory	3
PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 55	Introduction to Cognition and the Brain	4

An additional undergraduate course in cognition and/or neurosciences<sup>1</sup>

Select one of the following:

BIO 20	Introduction to Brain and Behavior
PSYCH 30	Introduction to Perception
PSYCH 45	Introduction to Learning and Memory
PSYCH 50	Introduction to Cognitive Neuroscience
PSYCH 60	Introduction to Developmental Psychology
PSYCH 70	Introduction to Social Psychology
PSYCH 131	Language and Thought
PSYCH 141	Cognitive Development
PSYCH 154	Judgment and Decision-Making

<sup>1</sup> The following course is not offered this year but may be used by students who completed them in fulfillment of this requirement: PSYCH 133

## 11. Natural Language

		Units
<b>Language and Mind (4)</b>		4

Select one of the following:

LINGUIST 1	Introduction to Linguistics
LINGUIST 106	Introduction to Speech Perception
LINGUIST 140	Language Acquisition I
PSYCH 131	Language and Thought

<b>Linguistic Theory (4)</b>		4
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Select one of the following:

LINGUIST 110	Introduction to Phonetics and Phonology
LINGUIST 120	Introduction to Syntax
LINGUIST 130A/230A	Introduction to Semantics and Pragmatics

## 12. Computation and Cognition

Select one of the following:

A course applying core technical skills to cognition	
CS 221	Artificial Intelligence: Principles and Techniques
CS 222	Rational Agency and Intelligent Interaction
CS 224M	Multi-Agent Systems
CS 227	Knowledge Representation and Reasoning
CS 228	Probabilistic Graphical Models: Principles and Techniques

CS 229	Machine Learning
LINGUIST 180/CS 124	From Languages to Information
LINGUIST 182	Computational Theories of Syntax
PSYCH 204	Computation and cognition: the probabilistic approach
PSYCH 209	Models of Cognitive Processes
PSYCH 239	Formal and Computational Approaches in Psychology and Cognitive Science

## Advanced Small Seminar Requirement

An upper-division, limited-enrollment seminar drawing on material from other courses in the core. Courses listed under Symbolic Systems Program offerings with numbers from SYMSYS 200 Symbolic Systems in Practice through SYMSYS 209 Battles Over Bits are acceptable, as are other courses which are announced at the beginning of each academic year. A course taken to fulfill this requirement can also be counted toward another requirement, as part of either the core or a student's concentration (see below), but not both.

## Fields of Study

In addition to the core requirements listed above, the Symbolic Systems major requires each student to complete a field of study consisting of five courses that are thematically related to each other. Students select concentrations from the list below or design others in consultation with their advisers. The field of study is declared on Axess; it appears on the transcript but not on the diploma.

- Applied Logic
- Artificial Intelligence
- Cognitive Science
- Computer Music
- Decision Making and Rationality
- Human-Computer Interaction
- Learning
- Natural Language
- Neurosciences
- Philosophical Foundations

## Undergraduate Research

The program encourages all SSP majors to gain experience in directed research by participating in faculty research projects or by pursuing independent study. In addition to the Symbolic Systems Honors Program (see below), the following avenues are offered.

*Summer Internships:* students work on SSP-related faculty research projects. Application procedures are announced in the winter quarter for SSP majors.

*Research Assistantships:* other opportunities to work on faculty research projects are typically announced to SSP majors as they arise during the academic year.

*Independent Study:* under faculty supervision. For course credit, students should enroll in SYMSYS 196 Independent Study.

Contact SSP for more information on any of these possibilities, or see the Symbolic Systems (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/symbolicsystems/http://symsys.stanford.edu>) web site. In addition, the Undergraduate Advising and

Research office offers grants and scholarships supporting student research projects at all levels; see [http://ual.stanford.edu/OO/research\\_opps/Grants](http://ual.stanford.edu/OO/research_opps/Grants).

## Honors Program

Seniors in SSP may apply for admission to the Symbolic Systems honors program prior to the beginning of their final year of study. Students who are accepted into the honors program can graduate with honors by completing an honors thesis under the supervision of a faculty member. Course credit for the honors project may be obtained by registering for , for any quarters while a student is working on an honors project. Juniors who are interested in doing an honors project during their senior year are advised to take SYMSYS 200 Symbolic Systems in Practice. SYMSYS 191 Senior Honors Seminar, is recommended for honors students during the senior year. Contact SSP or visit the program's web site for more information on the honors program, including deadlines and policies.

## Minor in Symbolic Systems

Students may minor in Symbolic Systems by completing either Option 1 or Option 2. For additional information see the Symbolic Systems minors web site (<http://symsys.stanford.edu/viewing/htmldocument/13635>).

### Option 1

One course in each of the following core areas (please note that several of these courses have prerequisites):

	Units
<b>a. Cognition (4)</b>	
SYMSYS 100 Introduction to Cognitive and Information Sciences	4
1	
or PSYCH 55 Introduction to Cognition and the Brain	
<b>b. Logic and Computation (3-5)</b>	
Select one of the following:	3-5
PHIL 150 Basic Concepts in Mathematical Logic	
PHIL 150E Logic in Action: A New Introduction to Logic	
PHIL 151 First-Order Logic	
CS 103 Mathematical Foundations of Computing	
<b>c. Computer Programming (3-5)</b>	
Select one of the following:	3-5
CS 106B Programming Abstractions	
CS 106X Programming Abstractions (Accelerated)	
CS 107 Computer Organization and Systems	
<b>d. Philosophical Foundations (9-10)</b>	
SYMSYS 100 Introduction to Cognitive and Information Sciences	4-5
1	
or PHIL 80 Mind, Matter, and Meaning	
PHIL 80 Mind, Matter, and Meaning	5
<b>e. Formal Linguistics (4)</b>	
LINGUIST 110 Introduction to Phonetics and Phonology	4
Select one of the following:	
LINGUIST 120 Introduction to Syntax	
LINGUIST 130A Introduction to Semantics and Pragmatics	
<b>f. Artificial Intelligence (3-4)</b>	
CS 221 Artificial Intelligence: Principles and Techniques	3-4
CS 222 Rational Agency and Intelligent Interaction	
CS 224M Multi-Agent Systems	

CS 227	Knowledge Representation and Reasoning
CS 228	Probabilistic Graphical Models: Principles and Techniques
CS 229	Machine Learning
LINGUIST 180	From Languages to Information
LINGUIST 182	Computational Theories of Syntax
PSYCH 204	Computation and cognition: the probabilistic approach
PSYCH 209	Models of Cognitive Processes
PSYCH 239	Formal and Computational Approaches in Psychology and Cognitive Science

<sup>1</sup> SYMSYS 100 Introduction to Cognitive and Information Sciences may not be counted for both areas 'a' and 'd'.

### Option 2

SYMSYS 100 Introduction to Cognitive and Information Sciences, plus an interdisciplinary SSP concentration listed on the SSP (<http://symsys.stanford.edu/viewing/htmldocument/16190>) web site. To qualify, the selection of courses used for the minor must be interdisciplinary; it must either include courses from at least three departments, or include more than one course from each of two departments.

## Coterminal Bachelor's and Master's Degrees in Symbolic Systems

Many SSP majors also complete coterminal M.S. or M.A. degrees in affiliated departments. In addition to the Symbolic Systems M.S. program, the Department of Philosophy offers a Special Program in Symbolic Systems track for interdisciplinary graduate level work leading to the Master of Arts in Philosophy (<http://www.stanford.edu/dept/registrar/bulletin/6567.htm>).

University requirements for the coterminal M.A. are described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://studentaffairs.stanford.edu/registrar/publications/#Coterm>) web site.

## Master of Science in Symbolic Systems

The University's basic requirements for the M.S. degree is discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

The M.S. degree in Symbolic Systems is designed to be completed in the equivalent of one academic year by coterminal students or returning students who already have a B.S. degree in Symbolic Systems, and in two years or less by other students depending upon level of preparation. Admission is competitive, providing a limited number of students with the opportunity to pursue course and project work in consultation with a faculty adviser who is affiliated with the Symbolic Systems Program. The faculty adviser may impose requirements beyond those described here.

Admission to the program as a coterminal student is subject to the policies and deadlines described in the "Coterminal Bachelor's and Master's Degrees (p. 36)" section of this bulletin. Applicants to the M.S. program are reviewed each Winter Quarter. Information on deadlines, procedures for applying, and degree requirements are available from the program's student services coordinator in the Linguistics Department office (460-127E)

and at the Symbolic Systems (<http://symsys.stanford.edu/viewing/htmldocument/13623>) web site.

## Degree Requirements

A candidate for the M.S. degree in Symbolic Systems must complete a program of 45 units. At least 36 of these must be graded units, passed with an average grade of 3.0 (B) or better. Any course taken as part of the 45-unit program must be taken for a letter grade unless the course is offered 'S/NC' only. Furthermore, none of the 45 units to be counted toward the M.S. degree may include units counted toward an undergraduate degree at Stanford or elsewhere. Course requirements are waived only if evidence is provided that similar or more advanced courses have been taken, either at Stanford or another institution. Courses that are waived rather than taken may not be counted toward the M.S. degree. For additional information, see the Symbolic Systems web site ([http://symsys.stanford.edu/graduate\\_programs](http://symsys.stanford.edu/graduate_programs)).

Each candidate for the M.S. degree must fulfill the following requirements:

1. Submission to the Symbolic Systems Program office and approval of the following pre-project research documents:
  - A. Project Area Statement, endorsed with a commitment from a student's prospective project adviser no later than May 1 of the academic year prior to the expected graduation year; and
  - B. Qualifying Research Paper due no later than the end of the Summer Quarter prior to the expected graduation year.
2. Completion of a coherent plan of study, to be approved by the Graduate Studies Director in consultation with the student's adviser and designed to support a student's project. An initial plan of study should be delineated on the Program Proposal Form prior to the end of the student's first quarter of study, to be modified at the time of the Project Area Statement with the approval of a student's adviser and the Graduate Studies Director. The plan of study must include courses more advanced than the Symbolic Systems undergraduate core in four main skill areas: formal, empirical, computational, and philosophical; and in at least three of the following departments: Computer Science, Linguistics, Philosophy, and Psychology. More advanced courses in each of the skill areas are defined as follows:

a) formal: a course in logic and computational theory beyond the level of PHIL 151 First-Order Logic. The courses below have been approved. Other courses may be approved if appropriate.

- PHIL 252 Computability and Logic
- PHIL 254 Modal Logic
- PHIL 350A Model Theory
- PHIL 352A Set Theory
- PHIL 355 Logic and Social Choice
- CS 154 Introduction to Automata and Complexity Theory
- CS 157 Logic and Automated Reasoning
- CS 161 Design and Analysis of Algorithms
- CS 364A Algorithmic Game Theory

b) empirical: a course drawing on experimental or observational data or methods, beyond the level of Psych 55, Ling 120, or Ling 130A. The courses below are examples of those that have been approved. Other courses may be approved if appropriate.

- COMM 268 Experimental Research in Advanced User Interfaces
- CS 224N Natural Language Processing
- CS 376 Research Topics in Human-Computer Interaction
- LINGUIST 230B Advanced Semantics and Pragmatics
- LINGUIST 241 Language Acquisition II
- LINGUIST 274C Linguistic Field Methods: Syntax

- NBIO 258 Information and Signaling Mechanisms in Neurons and Circuits
- PSYCH 204 Computation and cognition: the probabilistic approach
- PSYCH 204A Human Neuroimaging Methods
- PSYCH 252 Statistical Methods for Behavioral and Social Sciences
- PSYCH 254 Lab in Experimental Methods
- STATS 200 Introduction to Statistical Inference

c) computational: a course involving programming beyond the level of CS 107. The courses below have been approved. Other courses may be approved if appropriate.

- CS 108 Object-Oriented Systems Design
- CS 110 Principles of Computer Systems
- CS 124 From Languages to Information
- CS 142 Web Applications
- CS 143 Compilers
- CS 148 Introduction to Computer Graphics and Imaging
- CS 249A Object-Oriented Programming from a Modeling and Simulation Perspective

d) philosophical: a course in the area of Philosophy of Mind/Language/Science/Epistemology or Metaphysics at the 200 level or above, certified by the instructor as worthy of graduate credit. The courses below are examples of those that have been approved. Other courses may be approved if appropriate.

- PHIL 264 Central Topics in the Philosophy of Science: Theory and Evidence
- PHIL 267B Philosophy, Biology, and Behavior
- PHIL 280 Metaphysics
- PHIL 281 Philosophy of Language
- PHIL 285B Philosophy of Perception
- PHIL 286 Philosophy of Mind
- PHIL 287 Philosophy of Action
- PHIL 383B What's an Inference?
- CS 378 Phenomenological Foundations of Cognition, Language, and Computation
- SYMSYS 206 philosophy of neuroscience

3. Completion of three quarters of SYMSYS 291 Master's Program Seminar.

4. Completion of a substantial project appropriate to the program plan, represented by the M.S. Thesis, the last of the the M.S research documents (<http://symsys.stanford.edu/viewing/htmldocument/13678>). The project normally takes three quarters, and work on the project may account for up to 15 units of a student's program. The thesis must be read and approved for the master's degree in Symbolic Systems by two qualified readers approved by the program, at least one of whom must be a member of the academic council. A copy of the thesis must be submitted (in both print and electronic forms) to the Associate Director of Symbolic Systems, with the print version including the signatures of each reader indicating approval of the thesis for the degree of Master of Science, no later than 5 pm on the last day of finals week in the quarter of a student's graduation.

*Director:* Kenneth Taylor

*Director of Graduate Studies:* Kenneth Taylor

*Associate Director:* Todd Davies

*Program Committee:* Lera Boroditsky, Herbert Clark, Todd Davies, Daniel Jurafsky, Scott Klemmer, Daphne Koller, Krista Lawlor, Christopher Manning, James McClelland, Clifford Nass, Stanley Peters, Christopher

Potts, Eric Roberts, Ivan A. Sag, Kenneth A. Taylor, Johan van Benthem, Thomas A. Wasow, Terry Winograd

*Program Faculty:*

*Applied Physics:* Bernardo Huberman (Consulting Professor)

*Art and Art History:* Scott Bukatman (Associate Professor)

*Classics:* Reviel Netz (Professor)

*Civil and Environmental Engineering:* John Kunz (Lecturer)

*Communication:* Jeremy Bailenson (Associate Professor), Clifford J. Nass (Professor), Byron Reeves (Professor), Frederick Turner (Associate Professor)

*Computer Science:* David Dill (Professor), Michael Genesereth (Associate Professor), Jeffrey Heer (Assistant Professor), Oussama Khatib (Professor), Scott Klemmer (Associate Professor), Daphne Koller (Professor), Jean-Claude Latombe (Professor, emeritus), Marc Levoy (Professor), Christopher Manning (Professor), Andrew Ng (Associate Professor), Nils Nilsson (Professor, emeritus), Vaughan Pratt (Professor, emeritus), Eric Roberts (Professor, Teaching), Tim Roughgarden (Associate Professor), Mehran Sahami (Associate Professor, Teaching), Sebastian Thrun (Professor), Terry Winograd (Professor)

*Economics:* Muriel Niederle (Associate Professor)

*Education:* Raymond P. McDermott (Professor), Roy Pea (Professor), Daniel Schwartz (Professor)

*Electrical Engineering:* Krishna Shenoy (Professor)

*French and Italian:* Jean-Pierre Dupuy (Professor)

*Genetics:* Russ B. Altman (Professor)

*Graduate School of Business:* Baba Shiv (Professor)

*History:* Jessica G. Riskin (Associate Professor)

*Linguistics:* Arto Anttila (Associate Professor), Joan Bresnan (Professor, emerita), Eve Clark (Professor), Daniel Jurafsky (Associate Professor), Ronald Kaplan (Consulting Professor), Lauri Karttunen (Consulting Professor), Martin Kay (Professor), Beth Levin (Professor), Christopher Manning (Associate Professor), Stanley Peters (Professor, emeritus), Christopher Potts (Associate Professor), Ivan A. Sag (Professor), Meghan Summer (Assistant Professor), Thomas A. Wasow (Professor), Annie Zaenen (Consulting Professor),

*Management Science and Engineering:* Pamela Hinds (Associate Professor)

*Mathematics:* Persi Diaconis (Professor), Solomon Feferman (Professor, emeritus)

*Medicine:* Russ B. Altman (Professor), Mark Musen (Professor)

*Music:* Jonathan Berger (Professor), Christopher Chafe (Professor), Eleanor Selfridge-Field (Consulting Professor), Ge Wang (Assistant Professor)

*Neurobiology:* Ben Barres (Professor), William T. Newsome (Professor), Jennifer Raymond (Associate Professor)

*Philosophy:* Michael Bratman (Professor), Alexis Burgess (Assistant Professor), Mark Crimmins (Associate Professor), John Etchemendy (Professor), Solomon Feferman (Professor, emeritus), Dagfinn Føllesdal (Professor, emeritus), Krista Lawlor (Associate Professor), Anna-Sara Malmgren (Assistant Professor), Grigori Mints (Professor), John Perry (Professor, emeritus), Brian Skryms (Professor), Kenneth Taylor (Professor), Johan van Benthem (Professor), Thomas A. Wasow (Professor)

*Psychiatry and Behavioral Sciences:* Vinod Menon (Associate Professor, Research)

*Psychology:* Lera Boroditsky (Assistant Professor), Herbert H. Clark (Professor), Anne Fernald (Associate Professor), Michael Frank (Assistant Professor), Noah Goodman (Assistant Professor), Brian Knutson (Associate Professor), Ellen Markman (Professor), James McClelland (Professor), Samuel McClure (Assistant Professor), Barbara Tversky (Professor, emerita), Anthony Wagner (Professor), Brian Wandell (Professor)

*Statistics:* Persi Diaconis (Professor), Susan P. Holmes (Professor, Teaching)

*Symbolic Systems:* Todd Davies (Lecturer), Jeff Shrager (Consulting Professor), Paul Skokowski (Consulting Professor)

*Other Affiliates:* David Barker-Plummer (CSLI Engineering Research Associate), Keith Devlin (CSLI Senior Researcher), Daniel Flickinger (CSLI Senior Research Engineer), Stephan Oepen (CSLI Senior Research Engineer)

## Cognate Courses for the Bachelor's Degree

The following is a list of cognate courses that may be applied to the B.S. in Symbolic Systems. Click on the course or see ExploreCourses for course descriptions and General Education Requirements (GER) information.

### Core

		Units
BIO 20	Introduction to Brain and Behavior	3
CME 100	Vector Calculus for Engineers	5
CME 100A	Vector Calculus for Engineers, ACE	6
CME 106	Introduction to Probability and Statistics for Engineers	3-4
CS 103	Mathematical Foundations of Computing	3-5
CS 106A	Programming Methodology	3-5
CS 106B	Programming Abstractions	3-5
CS 106X	Programming Abstractions (Accelerated)	3-5
CS 107	Computer Organization and Systems	3-5
CS 109	Introduction to Probability for Computer Scientists	3-5
CS 124	From Languages to Information	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 157	Logic and Automated Reasoning	3
CS 161	Design and Analysis of Algorithms	3-5
CS 221	Artificial Intelligence: Principles and Techniques	3-4
CS 222	Rational Agency and Intelligent Interaction	3
CS 224M	Multi-Agent Systems	3
CS 227	Knowledge Representation and Reasoning	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
ECON 160	Game Theory and Economic Applications	5
EE 178	Probabilistic Systems Analysis	3-4
ENGR 155C	Introduction to Probability and Statistics for Engineers	3-4
ETHICSOC 20	Introduction to Moral Philosophy	5
LINGUIST 1	Introduction to Linguistics	4
LINGUIST 106	Introduction to Speech Perception	4
LINGUIST 110	Introduction to Phonetics and Phonology	4
LINGUIST 120	Introduction to Syntax	4
LINGUIST 130A	Introduction to Semantics and Pragmatics	4
LINGUIST 140	Language Acquisition I	4
LINGUIST 180	From Languages to Information	3-4
LINGUIST 182	Computational Theories of Syntax	3-4
LINGUIST 230A	Introduction to Semantics and Pragmatics	4
LINGUIST 240	Language Acquisition I	4
LINGUIST 282	Computational Theories of Syntax	3-4
MATH 19	Calculus	3
MATH 20	Calculus	3



MATH 21	Calculus	4
MATH 41	Calculus	5
MATH 41A	Calculus ACE	6
MATH 42	Calculus	5
MATH 42A	Calculus ACE	6
MATH 51	Linear Algebra and Differential Calculus of Several Variables	5
MATH 51A	Linear Algebra and Differential Calculus of Several Variables, ACE	6
MATH 151	Introduction to Probability Theory	3
MATH 162	Philosophy of Mathematics	4
MS&E 120	Probabilistic Analysis	5
MS&E 236	Game Theory with Engineering Applications	3
MS&E 236H	Game Theory with Engineering Applications	3
MS&E 252	Decision Analysis I: Foundations of Decision Analysis	3-4
PHIL 1	Introduction to Philosophy	5
PHIL 2	Introduction to Moral Philosophy	5
PHIL 60	Introduction to Philosophy of Science	5
PHIL 80	Mind, Matter, and Meaning	5
PHIL 102	Modern Philosophy, Descartes to Kant	4
PHIL 150	Basic Concepts in Mathematical Logic	4
PHIL 151	First-Order Logic	4
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4
PHIL 162	Philosophy of Mathematics	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 166	Probability: Ten Great Ideas About Chance	4
PHIL 167B	Philosophy, Biology, and Behavior	4
PHIL 180	Metaphysics	4
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 181	Philosophy of Language	4
PHIL 182	Truth	2-4
PHIL 184	Theory of Knowledge	4
PHIL 184B	Philosophy of the Body	4
PHIL 184F	Feminist Theories of Knowledge	4
PHIL 184P	Probability and Epistemology	4
PHIL 185	Memory	4
PHIL 186	Philosophy of Mind	4
PHIL 187	Philosophy of Action	4
PHIL 188	Personal Identity	4
PHIL 189	Examples of Free Will	4
PHIL 280A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 289	Examples of Free Will	4
PSYCH 30	Introduction to Perception	3
PSYCH 45	Introduction to Learning and Memory	3
PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 60	Introduction to Developmental Psychology	3
PSYCH 70	Introduction to Social Psychology	4
PSYCH 131	Language and Thought	4
PSYCH 141	Cognitive Development	3
PSYCH 154	Judgment and Decision-Making	3
PSYCH 204	Computation and cognition: the probabilistic approach	3-4
PSYCH 239	Formal and Computational Approaches in Psychology and Cognitive Science	3

PSYCH 262	Language and Thought	4
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4-5
STATS 116	Theory of Probability	3-5
STATS 200	Introduction to Statistical Inference	3

## Artificial Intelligence

		Units
CS 21N	Can Machines Know? Can Machines Feel?	3
CS 124	From Languages to Information	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 157	Logic and Automated Reasoning	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 225A	Experimental Robotics	3
CS 225B	Robot Programming Laboratory	3-4
CS 226	Statistical Techniques in Robotics	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 326A	Motion Planning	3
CS 378	Phenomenological Foundations of Cognition, Language, and Computation	3-4
ECON 160	Game Theory and Economic Applications	5
EE 263	Introduction to Linear Dynamical Systems	3
EE 364A	Convex Optimization I	3
EE 364B	Convex Optimization II	3
EE 376A	Information Theory	3
ENGR 205	Introduction to Control Design Techniques	3
ENGR 209A	Analysis and Control of Nonlinear Systems	3
LINGUIST 180	From Languages to Information	3-4
LINGUIST 188	Natural Language Understanding	3-4
LINGUIST 280	From Languages to Information	3-4
LINGUIST 284	Natural Language Processing	3-4
LINGUIST 285	Speech Recognition and Synthesis	2-4
LINGUIST 288	Natural Language Understanding	3-4
MS&E 251	Stochastic Decision Models	3
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4
STATS 315A	Modern Applied Statistics: Learning	2-3
STATS 315B	Modern Applied Statistics: Data Mining	2-3

## Applied Logic

		Units
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 157	Logic and Automated Reasoning	3
CS 222	Rational Agency and Intelligent Interaction	3
LINGUIST 230A	Introduction to Semantics and Pragmatics	4

MATH 161	Set Theory	3
MATH 292A	Set Theory	3
PHIL 154	Modal Logic	4
PHIL 155	General Interest Topics in Mathematical Logic	4
PHIL 350A	Model Theory	3
PHIL 351A	Recursion Theory	3
PHIL 354	Topics in Logic	1-3
PHIL 391	Research Seminar in Logic and the Foundations of Mathematics	1-3

## Philosophical Foundations

		Units
MATH 162	Philosophy of Mathematics	4
PHIL 9N	Philosophical Classics of the 20th Century	4
PHIL 102	Modern Philosophy, Descartes to Kant	4
PHIL 143	Quine	4
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4
PHIL 157	Topics in Philosophy of Logic	3
PHIL 162	Philosophy of Mathematics	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 165	Philosophy of Physics	4
PHIL 166	Probability: Ten Great Ideas About Chance	4
PHIL 167B	Philosophy, Biology, and Behavior	4
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 181	Philosophy of Language	4
PHIL 184	Theory of Knowledge	4
PHIL 184B	Philosophy of the Body	4
PHIL 184P	Probability and Epistemology	4
PHIL 252	Computability and Logic	4
PHIL 254	Modal Logic	4
PHIL 264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 265	Philosophy of Physics	4
PHIL 266	Probability: Ten Great Ideas About Chance	4
PHIL 267B	Philosophy, Biology, and Behavior	4
PHIL 280A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4

## Cognitive Science

		Units
BIO 20	Introduction to Brain and Behavior	3
BIO 150	Human Behavioral Biology	5
COMM 106	Communication Research Methods	4-5
CS 124	From Languages to Information	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 222	Rational Agency and Intelligent Interaction	3
CS 224N	Natural Language Processing	3-4
CS 229	Machine Learning	3-4
ECON 160	Game Theory and Economic Applications	5
EE 376A	Information Theory	3
HUMBIO 21	Introduction to Brain and Behavior	3
HUMBIO 160	Human Behavioral Biology	5
LINGUIST 105	Phonetics	4

LINGUIST 110	Introduction to Phonetics and Phonology	4
LINGUIST 140	Language Acquisition I	4
LINGUIST 180	From Languages to Information	3-4
LINGUIST 205A	Phonetics	4
LINGUIST 240	Language Acquisition I	4
LINGUIST 241	Language Acquisition II	1-4
LINGUIST 280	From Languages to Information	3-4
LINGUIST 284	Natural Language Processing	3-4
MATH 113	Linear Algebra and Matrix Theory	3
MUSIC 251	Psychophysics and Music Cognition	1-5
NBIO 206	The Nervous System	7-8
NBIO 218	Neural Basis of Behavior	5
NBIO 220	Central Mechanisms in Vision-based Cognition	2-4
PHIL 152	Computability and Logic	4
PHIL 154	Modal Logic	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 180A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 181	Philosophy of Language	4
PHIL 184	Theory of Knowledge	4
PHIL 184B	Philosophy of the Body	4
PHIL 184P	Probability and Epistemology	4
PHIL 186	Philosophy of Mind	4
PHIL 187	Philosophy of Action	4
PHIL 188	Personal Identity	4
PHIL 189	Examples of Free Will	4
PHIL 264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 280A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 289	Examples of Free Will	4
PHIL 358	Rational Agency and Intelligent Interaction	3
PSYCH 1	Introduction to Psychology	5
PSYCH 30	Introduction to Perception	3
PSYCH 45	Introduction to Learning and Memory	3
PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 55	Introduction to Cognition and the Brain	4
PSYCH 70	Introduction to Social Psychology	4
PSYCH 75	Introduction to Cultural Psychology	5
PSYCH 104	Uniquely Human	3
PSYCH 110	Research Methods and Experimental Design	5
PSYCH 131	Language and Thought	4
PSYCH 141	Cognitive Development	3
PSYCH 143	Developmental Anomalies	3
PSYCH 154	Judgment and Decision-Making	3
PSYCH 202	Cognitive Neuroscience	3
PSYCH 204A	Human Neuroimaging Methods	3
PSYCH 204B	Computational Neuroimaging: Analysis Methods	1-3
PSYCH 205	Foundations of Cognition	1-3
PSYCH 221	Applied Vision and Image Systems	1-3
PSYCH 226	Models and Mechanisms of Memory	1-3
PSYCH 232	Brain and Decision Making	3
PSYCH 250	High-Level Vision: Object Representation	1-3
PSYCH 251	Affective Neuroscience	3
PSYCH 252	Statistical Methods for Behavioral and Social Sciences	1-6
PSYCH 262	Language and Thought	4

PSYCH 272	Special Topics in Psycholinguistics	1-3
PSYCH 279	Topics in Cognitive Control	1-3
STATS 191	Introduction to Applied Statistics	3-4
STATS 200	Introduction to Statistical Inference	3

## Decision Making and Rationality

		Units
BIO 150	Human Behavioral Biology	5
BIOMEDIN 251	Outcomes Analysis	3
CME 108	Introduction to Scientific Computing	3-4
COMM 106	Communication Research Methods	4-5
COMM 172	Media Psychology	4-5
COMM 206	Communication Research Methods	4-5
COMM 272	Media Psychology	4-5
CS 47N	Computers and the Open Society	3
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 161	Design and Analysis of Algorithms	3-5
CS 181	Computers, Ethics, and Public Policy	4
CS 204	Computational Law	3
CS 207	The Economics of Software	1
CS 222	Rational Agency and Intelligent Interaction	3
CS 224M	Multi-Agent Systems	3
CS 226	Statistical Techniques in Robotics	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 261	Optimization and Algorithmic Paradigms	3
CS 364A	Algorithmic Game Theory	3
ECON 50	Economic Analysis I	5
ECON 51	Economic Analysis II	5
ECON 102B	Introduction to Econometrics	5
ECON 102C	Advanced Topics in Econometrics	5
ECON 135	Finance for Non-MBAs	3-5
ECON 136	Market Design	5
ECON 137	Decision Modeling and Information	5
ECON 138	Risk and Insurance	5
ECON 141	Public Finance and Fiscal Policy	5
ECON 150	Economic Policy Analysis	4-5
ECON 153	Economics of the Internet	5
ECON 155	Environmental Economics and Policy	5
ECON 160	Game Theory and Economic Applications	5
ECON 179	Experimental Economics	5
ECON 288	Computational Economics	2-5
ECON 289	Advanced Topics in Game Theory and Information Economics	2-5
EDUC 247	Moral Education	3
EDUC 375A	Seminar on Organizational Theory	5
ENGR 60	Engineering Economy	3
ENGR 62	Introduction to Optimization	4
MS&E 111	Introduction to Optimization	4
MS&E 120	Probabilistic Analysis	5
MS&E 121	Introduction to Stochastic Modeling	4
MS&E 180	Organizations: Theory and Management	4
MS&E 197	Ethics and Public Policy	5
MS&E 201	Dynamic Systems	3-4
MS&E 248	Economics of Natural Resources	3-4
MS&E 250A	Engineering Risk Analysis	3
MS&E 250B	Project Course in Engineering Risk Analysis	3
MS&E 251	Stochastic Decision Models	3
MS&E 252	Decision Analysis I: Foundations of Decision Analysis	3-4
MS&E 254	The Ethical Analyst	1-3
MS&E 299	Voluntary Social Systems	1-3
MS&E 352	Decision Analysis II: Professional Decision Analysis	3-4
MS&E 355	Influence Diagrams and Probabilistic Networks	3
PHIL 154	Modal Logic	4
PHIL 164	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 166	Probability: Ten Great Ideas About Chance	4
PHIL 167B	Philosophy, Biology, and Behavior	4
PHIL 170	Ethical Theory	4
PHIL 194C	Time and Free Will	4
PHIL 194R	Epistemic Paradoxes	4
PHIL 264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 266	Probability: Ten Great Ideas About Chance	4
PHIL 267B	Philosophy, Biology, and Behavior	4
PHIL 270	Ethical Theory	4
PHIL 355	Logic and Social Choice	4
PHIL 366	Evolution and Communication	4
PHIL 387	Practical Rationality	2-4
POLISCI 123	Politics and Public Policy	4-5
POLISCI 152	Introduction to Game Theoretic Methods in Political Science	3-5
POLISCI 351A	Foundations of Political Economy	4
PSYCH 45	Introduction to Learning and Memory	3
PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 70	Introduction to Social Psychology	4
PSYCH 75	Introduction to Cultural Psychology	5
PSYCH 80	Introduction to Personality and Affective Science	3
PSYCH 110	Research Methods and Experimental Design	5
PSYCH 152	Mediation for Dispute Resolution	3
PSYCH 154	Judgment and Decision-Making	3
PSYCH 158	Emotions: History, Theories, and Research	1-3
PSYCH 167	Seminar on Aggression	3
PSYCH 179	The Psychology of Everyday Morality	4
PSYCH 205	Foundations of Cognition	1-3
PSYCH 212	Social Psychology	1-3
PSYCH 215	Mind, Culture, and Society	3
PSYCH 223	Social Norms	4
PSYCH 232	Brain and Decision Making	3
PSYCH 245	Social Psychological Perspectives on Stereotyping and Prejudice	3
PSYCH 251	Affective Neuroscience	3
PSYCH 252	Statistical Methods for Behavioral and Social Sciences	1-6
PSYCH 253	Statistical Theory, Models, and Methodology	3
PSYCH 270	The Psychology of Everyday Morality	4
PSYCH 279	Topics in Cognitive Control	1-3
PUBLPOL 102	Organizations and Public Policy	4-5
PUBLPOL 202	Organizations and Public Policy	4-5

PUBLPOL 302B	Economic Analysis of Law	4
SOC 114	Economic Sociology	5
SOC 115	Topics in Economic Sociology	5
SOC 120	Interpersonal Relations	5
SOC 121	The Individual in Social Structure: Foundations in Sociological Social Psychology	5
SOC 126	Introduction to Social Networks	5
SOC 127	Bargaining, Power, and Influence in Social Interaction	5
SOC 214	Economic Sociology	5
SOC 220	Interpersonal Relations	5
SOC 226	Introduction to Social Networks	5
SOC 227	Bargaining, Power, and Influence in Social Interaction	5
STATS 200	Introduction to Statistical Inference	3
STATS 211	Meta-research: Appraising Research Findings, Bias, and Meta-analysis	3
STATS 217	Introduction to Stochastic Processes	3
STATS 218	Introduction to Stochastic Processes	3
STATS 310A	Theory of Probability	2-4
STATS 310B	Theory of Probability	2-3
STATS 310C	Theory of Probability	2-4
STS 110	Ethics and Public Policy	5

## Natural Language

		Units
CS 124	From Languages to Information	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 222	Rational Agency and Intelligent Interaction	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 229	Machine Learning	3-4
CS 276	Information Retrieval and Web Search	3
LINGUIST 105	Phonetics	4
LINGUIST 110	Introduction to Phonetics and Phonology	4
LINGUIST 116	Morphology	4
LINGUIST 124	Introduction to Lexical Function Grammar	2-4
LINGUIST 130A	Introduction to Semantics and Pragmatics	4
LINGUIST 130B	Introduction to Lexical Semantics	4
LINGUIST 140	Language Acquisition I	4
LINGUIST 180	From Languages to Information	3-4
LINGUIST 181	Grammar Engineering	1-4
LINGUIST 188	Natural Language Understanding	3-4
LINGUIST 205B	Advanced Phonetics	2-4
LINGUIST 210A	Phonology	4
LINGUIST 210B	Advanced Phonology	4
LINGUIST 221A	Foundations of English Grammar	1-4
LINGUIST 221B	Studies in Universal Grammar	1-4
LINGUIST 222A	Foundations of Syntactic Theory I	3-4
LINGUIST 224	Introduction to Lexical Function Grammar	2-4
LINGUIST 224B	Advanced Topics in Lexical Functional Grammar	1-4
LINGUIST 230A	Introduction to Semantics and Pragmatics	4
LINGUIST 230B	Advanced Semantics and Pragmatics	2-4
LINGUIST 232A	Lexical Semantics	2-4
LINGUIST 240	Language Acquisition I	4

LINGUIST 241	Language Acquisition II	1-4
LINGUIST 280	From Languages to Information	3-4
LINGUIST 281	Grammar Engineering	1-4
LINGUIST 285	Speech Recognition and Synthesis	2-4
LINGUIST 286	Information Retrieval and Web Search	3
LINGUIST 288	Natural Language Understanding	3-4
PHIL 154	Modal Logic	4
PHIL 181	Philosophy of Language	4
PHIL 358	Rational Agency and Intelligent Interaction	3
PSYCH 131	Language and Thought	4
PSYCH 134	Seminar on Language and Deception	3
PSYCH 262	Language and Thought	4

## Learning

		Units
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 377L	Learning in a Networked World: Learning Analytics in Technology-Enhanced Education	3
EDUC 124	Collaborative Design and Research of Technology-integrated Curriculum	3-4
EDUC 218	Topics in Cognition and Learning: Induction, Proof, Discovery, and Statistics	3
EDUC 298	Learning in a Networked World: Learning Analytics in Technology-Enhanced Education	3
EDUC 303X	Designing Learning Spaces	3-4
EDUC 333A	Understanding Learning Environments	3
EDUC 342	Child Development and New Technologies	1-3
EDUC 391X	Web-Based Technologies in Teaching and Learning	3
EE 376A	Information Theory	3
LINGUIST 140	Language Acquisition I	4
LINGUIST 240	Language Acquisition I	4
LINGUIST 241	Language Acquisition II	1-4
LINGUIST 284	Natural Language Processing	3-4
PSYCH 7Q	Language Understanding by Children and Adults	3
PSYCH 45	Introduction to Learning and Memory	3
PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 55	Introduction to Cognition and the Brain	4
PSYCH 141	Cognitive Development	3
PSYCH 202	Cognitive Neuroscience	3
PSYCH 204	Computation and cognition: the probabilistic approach	3-4
PSYCH 239	Formal and Computational Approaches in Psychology and Cognitive Science	3
STATS 315A	Modern Applied Statistics: Learning	2-3
STATS 315B	Modern Applied Statistics: Data Mining	2-3

## Neurosciences

		Units
BIO 20	Introduction to Brain and Behavior	3
BIO 150	Human Behavioral Biology	5
BIO 153	Cellular Neuroscience: Cell Signaling and Behavior	4

BIO 154	Molecular and Cellular Neurobiology	4
BIO 158	Developmental Neurobiology	4
BIO 163	Neural Systems and Behavior	4
BIO 222	Exploring Neural Circuits	3
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 223A	Introduction to Robotics	3
CS 229	Machine Learning	3-4
HUMBIO 21	Introduction to Brain and Behavior	3
HUMBIO 163	Neural Systems and Behavior	4
MATH 113	Linear Algebra and Matrix Theory	3
NBIO 206	The Nervous System	7-8
NBIO 218	Neural Basis of Behavior	5
NENS 220	Computational Neuroscience	4
PHIL 186	Philosophy of Mind	4
PSYCH 30	Introduction to Perception	3
PSYCH 45	Introduction to Learning and Memory	3
PSYCH 50	Introduction to Cognitive Neuroscience	4
PSYCH 55	Introduction to Cognition and the Brain	4
PSYCH 110	Research Methods and Experimental Design	5
PSYCH 120	Cellular Neuroscience: Cell Signaling and Behavior	4
PSYCH 121	Ion Transport and Intracellular Messengers	1-3
PSYCH 143	Developmental Anomalies	3
PSYCH 204A	Human Neuroimaging Methods	3
PSYCH 204B	Computational Neuroimaging: Analysis Methods	1-3
PSYCH 221	Applied Vision and Image Systems	1-3
PSYCH 226	Models and Mechanisms of Memory	1-3
PSYCH 232	Brain and Decision Making	3
PSYCH 250	High-Level Vision: Object Representation	1-3
PSYCH 251	Affective Neuroscience	3
PSYCH 252	Statistical Methods for Behavioral and Social Sciences	1-6
PSYCH 279	Topics in Cognitive Control	1-3
STATS 141	Biostatistics	3-5
STATS 191	Introduction to Applied Statistics	3-4
STATS 200	Introduction to Statistical Inference	3

## Cognate Courses for the Master's Degree

The following is a list of cognate courses that may be applied to the M.S. in Symbolic Systems. Click on the course or see ExploreCourses for course descriptions and General Education Requirements (GER) information.

		Units
BIO 153	Cellular Neuroscience: Cell Signaling and Behavior	4
BIO 154	Molecular and Cellular Neurobiology	4
BIO 222	Exploring Neural Circuits	3
BIO 250	Human Behavioral Biology	5
BIO 258	Developmental Neurobiology	4
BIO 263	Neural Systems and Behavior	4
BIOMEDIN 251	Outcomes Analysis	3
CME 100	Vector Calculus for Engineers	5
CME 100A	Vector Calculus for Engineers, ACE	6
CME 106	Introduction to Probability and Statistics for Engineers	3-4
CME 108	Introduction to Scientific Computing	3-4

COMM 206	Communication Research Methods	4-5
COMM 220	Digital Media in Society	4-5
COMM 268	Experimental Research in Advanced User Interfaces	1-5
COMM 269	Computers and Interfaces	4-5
COMM 272	Media Psychology	4-5
CS 103	Mathematical Foundations of Computing	3-5
CS 106A	Programming Methodology	3-5
CS 106X	Programming Abstractions (Accelerated)	3-5
CS 107	Computer Organization and Systems	3-5
CS 108	Object-Oriented Systems Design	3-4
CS 109	Introduction to Probability for Computer Scientists	3-5
CS 142	Web Applications	3
CS 147	Introduction to Human-Computer Interaction Design	3-4
CS 148	Introduction to Computer Graphics and Imaging	3-4
CS 154	Introduction to Automata and Complexity Theory	3-4
CS 157	Logic and Automated Reasoning	3
CS 161	Design and Analysis of Algorithms	3-5
CS 170	Stanford Laptop Orchestra: Composition, Coding, and Performance	1-5
CS 181	Computers, Ethics, and Public Policy	4
CS 204	Computational Law	3
CS 205A	Mathematical Methods for Robotics, Vision, and Graphics	3
CS 207	The Economics of Software	1
CS 221	Artificial Intelligence: Principles and Techniques	3-4
CS 222	Rational Agency and Intelligent Interaction	3
CS 223A	Introduction to Robotics	3
CS 224M	Multi-Agent Systems	3
CS 224N	Natural Language Processing	3-4
CS 224S	Speech Recognition and Synthesis	2-4
CS 224U	Natural Language Understanding	3-4
CS 225A	Experimental Robotics	3
CS 225B	Robot Programming Laboratory	3-4
CS 227	Knowledge Representation and Reasoning	3
CS 227B	General Game Playing	3
CS 228	Probabilistic Graphical Models: Principles and Techniques	3-4
CS 229	Machine Learning	3-4
CS 247	Human-Computer Interaction Design Studio	3-4
CS 261	Optimization and Algorithmic Paradigms	3
CS 270	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
CS 274	Representations and Algorithms for Computational Molecular Biology	3-4
CS 276	Information Retrieval and Web Search	3
CS 294H	Research Project in Human-Computer Interaction	3
CS 303	Designing Computer Science Experiments	3
CS 326A	Motion Planning	3
CS 364A	Algorithmic Game Theory	0
CS 376	Research Topics in Human-Computer Interaction	3-4
CS 377	Topics in Human-Computer Interaction	2-3
CS 377L	Learning in a Networked World: Learning Analytics in Technology-Enhanced Education	3
CS 378	Phenomenological Foundations of Cognition, Language, and Computation	3-4

CS 447	Software Design Experiences	3-4	LINGUIST 281	Grammar Engineering	1-4
CS 448B	Data Visualization	3	LINGUIST 282	Computational Theories of Syntax	3-4
ECON 102B	Introduction to Econometrics	5	LINGUIST 284	Natural Language Processing	3-4
ECON 102C	Advanced Topics in Econometrics	5	LINGUIST 285	Speech Recognition and Synthesis	2-4
ECON 135	Finance for Non-MBAs	3-5	LINGUIST 286	Information Retrieval and Web Search	3
ECON 136	Market Design	5	LINGUIST 288	Natural Language Understanding	3-4
ECON 137	Decision Modeling and Information	5	MATH 113	Linear Algebra and Matrix Theory	3
ECON 138	Risk and Insurance	5	MATH 151	Introduction to Probability Theory	3
ECON 141	Public Finance and Fiscal Policy	5	MATH 161	Set Theory	3
ECON 153	Economics of the Internet	5	MATH 292A	Set Theory	3
ECON 155	Environmental Economics and Policy	5	ME 115A	Introduction to Human Values in Design	3
ECON 160	Game Theory and Economic Applications	5	ME 115B	Product Design Methods	3
ECON 179	Experimental Economics	5	MS&E 111	Introduction to Optimization	4
ECON 190	Introduction to Financial Accounting	5	MS&E 120	Probabilistic Analysis	5
ECON 289	Advanced Topics in Game Theory and Information Economics	2-5	MS&E 121	Introduction to Stochastic Modeling	4
EDUC 124	Collaborative Design and Research of Technology-integrated Curriculum	3-4	MS&E 134	Organization Change and Information Systems	3
EDUC 218	Topics in Cognition and Learning: Induction, Proof, Discovery, and Statistics	3	MS&E 180	Organizations: Theory and Management	4
EDUC 247	Moral Education	3	MS&E 197	Ethics and Public Policy	5
EDUC 298	Learning in a Networked World: Learning Analytics in Technology-Enhanced Education	3	MS&E 201	Dynamic Systems	3-4
EDUC 303X	Designing Learning Spaces	3-4	MS&E 236	Game Theory with Engineering Applications	3
EDUC 333A	Understanding Learning Environments	3	MS&E 236H	Game Theory with Engineering Applications	3
EDUC 342	Child Development and New Technologies	1-3	MS&E 248	Economics of Natural Resources	3-4
EDUC 375A	Seminar on Organizational Theory	5	MS&E 250A	Engineering Risk Analysis	3
EDUC 391X	Web-Based Technologies in Teaching and Learning	3	MS&E 250B	Project Course in Engineering Risk Analysis	3
EE 263	Introduction to Linear Dynamical Systems	3	MS&E 251	Stochastic Decision Models	3
EE 364A	Convex Optimization I	3	MS&E 252	Decision Analysis I: Foundations of Decision Analysis	3-4
EE 364B	Convex Optimization II	3	MS&E 254	The Ethical Analyst	1-3
EE 376A	Information Theory	3	MS&E 299	Voluntary Social Systems	1-3
EE 278A	Probabilistic Systems Analysis	3-4	MS&E 352	Decision Analysis II: Professional Decision Analysis	3-4
ENGR 155C	Introduction to Probability and Statistics for Engineers	3-4	MS&E 355	Influence Diagrams and Probabilistics Networks	3
ENGR 205	Introduction to Control Design Techniques	3	MUSIC 128	Stanford Laptop Orchestra: Composition, Coding, and Performance	1-5
ENGR 209A	Analysis and Control of Nonlinear Systems	3	MUSIC 220A	Fundamentals of Computer-Generated Sound	2-4
LINGUIST 106	Introduction to Speech Perception	4	MUSIC 220B	Compositional Algorithms, Psychoacoustics, and Computational Music	2-4
LINGUIST 110	Introduction to Phonetics and Phonology	4	MUSIC 220C	Research Seminar in Computer-Generated Music	2-4
LINGUIST 116	Morphology	4	MUSIC 250A	Physical Interaction Design for Music	3-4
LINGUIST 120	Introduction to Syntax	4	MUSIC 251	Psychophysics and Music Cognition	1-5
LINGUIST 130B	Introduction to Lexical Semantics	4	MUSIC 253	Symbolic Musical Information	2-4
LINGUIST 205A	Phonetics	4	MUSIC 254	Music Query, Analysis, and Style Simulation	2-4
LINGUIST 205B	Advanced Phonetics	2-4	NBIO 206	The Nervous System	7-8
LINGUIST 210A	Phonology	4	NBIO 218	Neural Basis of Behavior	5
LINGUIST 210B	Advanced Phonology	4	NBIO 220	Central Mechanisms in Vision-based Cognition	2-4
LINGUIST 221A	Foundations of English Grammar	1-4	NENS 220	Computational Neuroscience	4
LINGUIST 221B	Studies in Universal Grammar	1-4	PHIL 102	Modern Philosophy, Descartes to Kant	4
LINGUIST 222A	Foundations of Syntactic Theory I	3-4	PHIL 184B	Philosophy of the Body	4
LINGUIST 224	Introduction to Lexical Function Grammar	2-4	PHIL 184P	Probability and Epistemology	4
LINGUIST 224B	Advanced Topics in Lexical Functional Grammar	1-4	PHIL 185	Memory	4
LINGUIST 230A	Introduction to Semantics and Pragmatics	4	PHIL 194C	Time and Free Will	4
LINGUIST 230B	Advanced Semantics and Pragmatics	2-4	PHIL 194R	Epistemic Paradoxes	4
LINGUIST 232A	Lexical Semantics	2-4	PHIL 243	Quine	4
LINGUIST 240	Language Acquisition I	4	PHIL 250	Basic Concepts in Mathematical Logic	4
LINGUIST 241	Language Acquisition II	1-4	PHIL 251	First-Order Logic	4
LINGUIST 280	From Languages to Information	3-4	PHIL 252	Computability and Logic	4

PHIL 254	Modal Logic	4
PHIL 257	Topics in Philosophy of Logic	3
PHIL 262	Philosophy of Mathematics	4
PHIL 264	Central Topics in the Philosophy of Science: Theory and Evidence	4
PHIL 265	Philosophy of Physics	4
PHIL 266	Probability: Ten Great Ideas About Chance	4
PHIL 267B	Philosophy, Biology, and Behavior	4
PHIL 270	Ethical Theory	4
PHIL 280	Metaphysics	4
PHIL 280A	Realism, Anti-Realism, Irrealism, Quasi-Realism	4
PHIL 281	Philosophy of Language	4
PHIL 282	Truth	2-4
PHIL 284	Theory of Knowledge	4
PHIL 284F	Feminist Theories of Knowledge	4
PHIL 286	Philosophy of Mind	4
PHIL 287	Philosophy of Action	4
PHIL 288	Personal Identity	4
PHIL 289	Examples of Free Will	4
PHIL 350A	Model Theory	3
PHIL 351A	Recursion Theory	3
PHIL 354	Topics in Logic	1-3
PHIL 355	Logic and Social Choice	4
PHIL 358	Rational Agency and Intelligent Interaction	3
PHIL 366	Evolution and Communication	4
PHIL 387	Practical Rationality	2-4
PHIL 391	Research Seminar in Logic and the Foundations of Mathematics	1-3
POLISCI 351A	Foundations of Political Economy	4
POLISCI 352	Introduction to Game Theoretic Methods in Political Science	3-5
PSYCH 104	Uniquely Human	3
PSYCH 110	Research Methods and Experimental Design	5
PSYCH 120	Cellular Neuroscience: Cell Signaling and Behavior	4
PSYCH 134	Seminar on Language and Deception	3
PSYCH 141	Cognitive Development	3
PSYCH 143	Developmental Anomalies	3
PSYCH 152	Mediation for Dispute Resolution	3
PSYCH 154	Judgment and Decision-Making	3
PSYCH 167	Seminar on Aggression	3
PSYCH 202	Cognitive Neuroscience	3
PSYCH 204	Computation and cognition: the probabilistic approach	3-4
PSYCH 204A	Human Neuroimaging Methods	3
PSYCH 204B	Computational Neuroimaging: Analysis Methods	1-3
PSYCH 205	Foundations of Cognition	1-3
PSYCH 212	Social Psychology	1-3
PSYCH 215	Mind, Culture, and Society	3
PSYCH 221	Applied Vision and Image Systems	1-3
PSYCH 223	Social Norms	4
PSYCH 226	Models and Mechanisms of Memory	1-3
PSYCH 228	Ion Transport and Intracellular Messengers	1-3
PSYCH 232	Brain and Decision Making	3
PSYCH 239	Formal and Computational Approaches in Psychology and Cognitive Science	3
PSYCH 245	Social Psychological Perspectives on Stereotyping and Prejudice	3
PSYCH 250	High-Level Vision: Object Representation	1-3
PSYCH 251	Affective Neuroscience	3
PSYCH 252	Statistical Methods for Behavioral and Social Sciences	1-6
PSYCH 253	Statistical Theory, Models, and Methodology	3
PSYCH 259	Emotions: History, Theories, and Research	1-3
PSYCH 262	Language and Thought	4
PSYCH 270	The Psychology of Everyday Morality	4
PSYCH 272	Special Topics in Psycholinguistics	1-3
PSYCH 279	Topics in Cognitive Control	1-3
PUBLPOL 201	Politics and Public Policy	4-5
PUBLPOL 202	Organizations and Public Policy	4-5
PUBLPOL 204	Economic Policy Analysis	4-5
PUBLPOL 302B	Economic Analysis of Law	4
SOC 121	The Individual in Social Structure: Foundations in Sociological Social Psychology	5
SOC 214	Economic Sociology	5
SOC 220	Interpersonal Relations	5
SOC 226	Introduction to Social Networks	5
SOC 227	Bargaining, Power, and Influence in Social Interaction	5
SOC 315	Topics in Economic Sociology	5
STATS 110	Statistical Methods in Engineering and the Physical Sciences	4-5
STATS 116	Theory of Probability	3-5
STATS 141	Biostatistics	3-5
STATS 191	Introduction to Applied Statistics	3-4
STATS 200	Introduction to Statistical Inference	3
STATS 211	Meta-research: Appraising Research Findings, Bias, and Meta-analysis	3
STATS 217	Introduction to Stochastic Processes	3
STATS 218	Introduction to Stochastic Processes	3
STATS 310A	Theory of Probability	2-4
STATS 310B	Theory of Probability	2-3
STATS 310C	Theory of Probability	2-4
STATS 315A	Modern Applied Statistics: Learning	2-3
STATS 315B	Modern Applied Statistics: Data Mining	2-3
STS 110	Ethics and Public Policy	5
STS 201	Science, Technology, and Contemporary Society	4-5

## Theater and Performance Studies

Courses offered by the Department of Theater and Performance Studies are listed on the Stanford Bulletin's ExploreCourses web site under the subject codes TAPS (<https://explorecourses.stanford.edu/search?q=TAPS&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-TAPS=on>) and DANCE (<https://explorecourses.stanford.edu/search?q=DANCE&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-DANCE=on>).

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## Mission of the Undergraduate Program in Theater and Performance Studies

The mission of the undergraduate program in Theater and Performance Studies is to provide a strong, non-conservatory program that joins the study and practice of performance within the context of a liberal arts curriculum. The department aims to provide students with a strong grasp of historical, cultural, and practical contexts in which performance develops. With close faculty contact, department majors pursue areas of interest that may include acting, directing, writing, dance, devised theater, video, installation, design, stage management, performance theory, and cultural studies. During the senior year students have the option of completing a senior project in addition to fulfilling the 60 units required for the major.

## Learning Outcomes (Undergraduate)

The department expects undergraduate majors in the program to achieve the following learning outcomes:

1. the ability to combine literary and historical analyses within the discipline
2. the ability to put aesthetic and creative skills into practice
3. the ability to find organic and meaningful ways of integrating theory and practice
4. the ability to use effective research and writing skills that compliment practical work

## Mission of the Graduate Program in Theater and Performance Studies

The graduate program in Theater and Performance Studies cultivates students who advance the field, working on the leading edge of scholarship and performance. Combining theoretical research and creative practice, the Ph.D. program includes the study of critical theory, dramatic literature, performance theory, theater history, and performance making. The program provides rich opportunities to collaborate with leading scholars, artists, faculty and visiting fellows. Faculty are committed to helping each student develop a unique portfolio of scholarly and practice-based expertise as well as mentoring students as they pursue their careers.

## Learning Outcomes (Graduate)

The Ph.D. is conferred upon candidates who have demonstrated substantial scholarship and the ability to conduct independent research and analysis in Theater and Performance Studies. Through completion of advanced course work and rigorous skills training, the doctoral program prepares students to make original contributions to the knowledge of Theater and Performance Studies and to interpret and present the results of such research.

## Institute for Diversity in the Arts and Black Performing Arts Division

The Institute for Diversity in the Arts (IDA) is an interdisciplinary program in the humanities that involves students in the study of culture, identity and diversity through artistic expression. The Committee on Black Performing Arts (CBPA) and the Institute for Diversity in the Arts (IDA) merged in Autumn 2005. The mission of IDA/CBPA is to engage artists, students, and the local community collaboratively to create performance and visual art that examine the intersections among race, diversity, and social action through programming that includes artist residencies, classes, workshops, public performances, a lecture series, and symposia. The division produces annual student productions and is a resource for student organizations promoting artistic expression through the exploration of the impact of ethnic representation in the arts, literature, media, and pop culture. The programs prepare students for work in areas including the arts and community development. Students have gone on to graduate-level critical studies, M.F.A. programs, public service, government and politics, arts administration, and teaching. Students can pursue an IDA concentration through the Comparative Studies in Race and Ethnicity major; students can also emphasize Black performance through the African and African American Studies major.

## Dance Division

The Stanford Dance Division offers a range of broadly diverse approaches to dance as a performing art, cultural practice, political act and embodiment of ideology and beliefs. All of the dimensions through which one comes to experience dance, from studying a range of dance techniques, choreographing and performing, to viewing and critically and historically assessing dance, are represented in the course offerings of the Dance Division.

## Bachelor of Arts in Theater and Performance Studies

The requirements for the B.A. degree in Theater and Performance Studies are designed to integrate the critical and historical study of drama with the study and experience of performance. A total of 60 units are required to obtain a B.A. degree in Theater and Performance Studies. The major provides aesthetic and critical opportunities for students to develop special aptitudes. Students are encouraged to declare the major in their sophomore year.

## Suggested Preparation for the Major

Prospective majors in the first two years of study at Stanford are encouraged to take part in casting opportunities in department productions or independent undergraduate performing arts groups.

*Recommended Preparatory Courses:* Two years of a college-level foreign language.

## Degree Requirements - 60 units total for the major

A course may be listed in more than one area; however, each course can only satisfy one major requirement. A course cannot be double-counted for different requirements in the major. Additionally, students may petition the department undergraduate adviser to have additional courses offered



by the department count towards requirements in areas 2, 3, and 4. All introductory courses are required with no exceptions.

## 1. Introductory Core Courses—12 units

		Units
TAPS 1	Introduction to Theater and Performance Studies	4
TAPS 30	How Theater is Designed	4
TAPS 171	Performance Making: Process (TAPS 101P, while not offered 2012-13, also satisfies the Introductory Core Course requirement)	5

## 2. Theatrical Literature/History—14 units

- Any course between TAPS 150-169, DANCE 160-161. The following courses are offered in 2012-13:

		Units
TAPS 151H	Improvisational Strategy Laboratory for Innovation through Performance	4-5
TAPS 153S	Japanese Theater: Noh to Contemporary Performance	4
TAPS 154S	Theater and Legal Regulation	4
TAPS 155T	Theatre of War	4
TAPS 158H	Proximity and Temporality in Performance	4-5
TAPS 158L	The Ethics of Storytelling: The Autobiographical Monologue in Theory, in Practice, and in the World	4
TAPS 160	Performance and History: Rethinking the Ballerina	4
DANCE 160	Performance and History: Rethinking the Ballerina	4
TAPS 161H	Dance, History and Conflict	4
TAPS 164T	Queer Art and Performance	4-5
TAPS 166H	Historiography of Theater	3-5

## 3. Theatrical Performance Courses: Acting, Dance, Design, Directing, and Playwriting—13 units

- Any course in DANCE 30-149
- Acting courses between TAPS 21-29, 103-105, 120-129, 203, 201V, 210. The following courses are offered in 2012-13:

		Units
TAPS 103	Beginning Improvising	3
TAPS 105V	Improv & Design	2
TAPS 120A	Fundamentals of Acting	1-3
TAPS 120B	Fundamentals of Acting	1-3
TAPS 120V	Vocal Production and Audition	1-3
TAPS 121C	Physical Characterization	3
TAPS 122P	Arthur Miller's "The Crucible, and Stephen Karam's "Speech and Debate,"	2-9

- Directing, Playwriting and Dramaturgy courses between TAPS 170-179. The following courses are offered in 2012-13:

		Units
TAPS 170B	Directing Workshop: The Actor-Director Dialogue	5
TAPS 171	Performance Making: Process	5
TAPS 173	SOLO PERFORMANCE	4-5
TAPS 174A	Performance Making: Production	5

TAPS 177	Writing for Performance: The Fundamentals	5
TAPS 178	Page to Stage: Playwriting and Solo Performance	3-5
TAPS 179	Chicano & Chicana Theater: Politics In Performance	3-5
TAPS 179C	Chroniclers of Desire: Creative Non-Fiction Writing Workshop	3-5
TAPS 179G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5

- Design, Stage Management, and Production courses between TAPS 28, 31, 42, 131-133, 137-139D, 140, 231-240. The following courses are offered in 2012-13:

		Units
TAPS 28	Makeup for the Stage	2
TAPS 31	Introduction to Lighting and Production	4
TAPS 131	Lighting Design	4
TAPS 132	Costume Design	4
TAPS 133	Stage Scenery Design	3-4
TAPS 137	Hand Drafting for Designers	3
TAPS 140	Projects in Theatrical Production	1-4

## 4. Theatrical Production—9 units

		Units
TAPS 34	Stage Management Techniques	4
TAPS 39	Theatre Crew	1-3
TAPS 134	Stage Management Project	2-5

## 5. Senior Project—2 units

		Units
TAPS 200	Senior Project	2-9

- All Theater and Performance Studies Majors must complete a Senior Project. The project must be a significant work in any area of theater/performance, such as: creating a performance through devising an original piece; writing, directing, and/or performing a major role; or another creative enterprise that requires an original contribution.
- The student has the option of writing an essay associated with the project.
- All majors must submit a two-page proposal to a faculty advisor of their choice area early in the junior year; details available from the undergraduate advisor. Students considering projects that include practical production should consult with the Director of Production. Practical projects are typically approved by department faculty at the end of Spring Quarter of the junior year.
- The proposal should include an outline of the courses the student has taken and grades received in the area requirements, and should describe the courses in which the student plans to enroll as part of the project.
- The proposal should describe in detail the purpose and methods involved in the project; it should include a bibliography, if appropriate, and a 1-2 page abstract of the associated essay if an essay is part of the project.
- Students receive credit for senior projects through TAPS 200; 2 units minimum are required, but additional units are available for larger projects.

## 6. Electives—10 units

- Any courses with the subject code TAPS or DANCE.

## 7. WIM—Writing in the Major.

- The following courses are offered in 2012-13:

		Units
TAPS 1	Introduction to Theater and Performance Studies	4
TAPS 160	Performance and History: Rethinking the Ballerina	4
DANCE 160	Performance and History: Rethinking the Ballerina	

## Honors Program

For a limited number of students, the department confers the degree of Bachelor of Arts with Departmental Honors in Theater and Performance Studies. To be considered for departmental honors, students must meet the following requirements in addition to the other requirements of the Theater and Performance Studies major:

1. Prospective honors students must submit a written application, including transcript, establishing the student's work to date in the department and outlining the area of research that the student wishes to pursue.
2. To be admitted to the honors program, students must have an overall minimum University GPA of 3.3, as well as a GPA of 3.5 in courses counting towards the Theater and Performance Studies major.
3. For transfer students, the same GPA requirement applies at the time of transfer.
4. Students must complete the Theater and Performance Studies core requirements by the end of the junior year. Only in exceptional circumstances can this requirement be waived. Transfer from another university, extended overseas study, or temporary withdrawal from the major due to illness might constitute extenuating circumstances.
5. Students must have completed half of the courses in their specialization by the end of the junior year.
6. Students must complete 4 units in the honors colloquia, described below, beginning in Spring Quarter of the junior year and continuing in the following three regular quarters. Each quarter's colloquium is offered for 1 unit, S/NC. In extenuating circumstances (overseas study, for example), an honors program student may substitute other equivalent work for one quarter of the colloquium, with the approval of the honors adviser.
7. By the end of the sixth week of the quarter in which they plan to graduate, students in the honors program must submit an honors thesis, described below, to be read and evaluated by their thesis committee.
8. On the basis of a student's work in the Theater and Performance Studies core, in the area of specialization, on the senior project, in the honors colloquia, and on the honors thesis, the faculty determines and confers honors on graduating students who have completed the honors program.
9. Failure to meet any of these requirements, or to make satisfactory progress on the honors thesis, leads to dismissal from the Honors program.
10. Entry into the honors program does not guarantee a degree with honors. The final decision to confer honors is made by the student's thesis committee, upon evaluating the quality of the Senior Project and the thesis.

## Honors Colloquium

The honors colloquium aims to engage honors program students in important issues in the field focusing on the students' areas of specialization and research. The honors program advisor convenes the colloquium three times per quarter and sets the agenda for meetings and discussion. Students discuss their work in the department and present and discuss their research for their Honors thesis. Students must enroll in TAPS 202 Honors Thesis.

## Honors Thesis

The honors thesis typically consists of a 40-60 page essay presenting the student's research on an important issue or subject, determined by the student. The honors program adviser, the senior project adviser, and another faculty member constitute the student's honors thesis committee. They read and evaluate the thesis, and make recommendations to the faculty at large regarding its strengths and weaknesses. Additionally, students have the option of using their own senior project as a case study. In these situations, the honors thesis must critically analyze the strengths and weaknesses of the creative work. Generally, these essays tend to be shorter (about 20-25 pages) because the creative work constitutes one-half of the honors project.

## Minor in Theater and Performance Studies

The requirements for the minor in Theater and Performance Studies are designed to integrate the critical and historical performance. A total of 30 units are required to obtain a Minor in Theater and Performance Studies. The minor provides aesthetic and critical opportunities for students to develop special aptitudes. Students are encouraged to declare a minor in their sophomore year.

### Minor Requirements—30 units total for the minor

A course may be listed in more than one area; however, each course can only satisfy one minor requirement. There is no double credit for a course. A student may petition to the department undergraduate adviser to have additional courses offered by the department count towards requirements in areas 2 and 3. All core courses must be taken for a letter grade to satisfy the requirement.

### 1. Introductory Core Courses—8 units

		Units
TAPS 1	Introduction to Theater and Performance Studies	4
TAPS 30	How Theater is Designed	4
TAPS 171	Performance Making: Process (TAPS 101P, while not offered 2012-13, also satisfies the Introductory Core Course requirement)	5

### 2. Theatrical Literature/History—4 units

- Any course between TAPS 150-169, DANCE 160-161. The following courses are offered in 2012-13:

		Units
TAPS 151H	Improvisational Strategy Laboratory for Innovation through Performance	4-5
TAPS 153S	Japanese Theater: Noh to Contemporary Performance	4
TAPS 154S	Theater and Legal Regulation	4
TAPS 155T	Theatre of War	4
TAPS 158H	Proximity and Temporality in Performance	4-5
TAPS 158L	The Ethics of Storytelling: The Autobiographical Monologue in Theory, in Practice, and in the World	4
TAPS 160	Performance and History: Rethinking the Ballerina	4
DANCE 160	Performance and History: Rethinking the Ballerina	

TAPS 164T	Queer Art and Performance	4-5
TAPS 166H	Historiography of Theater	3-5

### 3. Theatrical Performance Courses: Acting, Dance, Design, Directing, and Playwriting—4 units

- Acting courses between TAPS 21-29, 103-105, 120-129, 203, 201V, 210.
- The following courses are offered in 2012-13:

		Units
TAPS 103	Beginning Improvising	3
TAPS 105V	Improv & Design	2
TAPS 120A	Fundamentals of Acting	1-3
TAPS 120B	Fundamentals of Acting	1-3
TAPS 120V	Vocal Production and Audition	1-3
TAPS 121C	Physical Characterization	3
TAPS 122P	Arthur Miller's `The Crucible, and Stephen Karam's `Speech and Debate,"	2-9

- Directing, Playwriting and Dramaturgy courses between TAPS 170-179.
- The following courses are offered in 2012-13:

		Units
TAPS 170B	Directing Workshop: The Actor-Director Dialogue	5
TAPS 171	Performance Making: Process	5
TAPS 173	SOLO PERFORMANCE	4-5
TAPS 174A	Performance Making: Production	5
TAPS 177	Writing for Performance: The Fundamentals	5
TAPS 178	Page to Stage: Playwriting and Solo Performance	3-5
TAPS 179	Chicano & Chicana Theater: Politics In Performance	3-5
TAPS 179C	Chroniclers of Desire: Creative Non-Fiction Writing Workshop	3-5
TAPS 179G	Indigenous Identity in Diaspora: People of Color Art Practice in North America	3-5

- Design, Stage Management, and Production courses between TAPS 28, 31, 42, 131-133, 137-139D, 140, 231-240, or DANCE courses 30-149.
- The following courses are offered in 2012-13:

		Units
TAPS 28	Makeup for the Stage	2
TAPS 31	Introduction to Lighting and Production	4
TAPS 131	Lighting Design	4
TAPS 132	Costume Design	4
TAPS 133	Stage Scenery Design	3-4
TAPS 137	Hand Drafting for Designers	3
TAPS 140	Projects in Theatrical Production	1-4

### 4. Theatrical Production—2 units

		Units
TAPS 39	Theatre Crew	1-3

### 5. Electives—12 units

- Any courses in TAPS or DANCE.

## Minor in Theater and Performance Studies with Dance Concentration

A student declaring a minor in Theater and Performance Studies with a Dance Concentration must complete 30 units of course work in TAPS/DANCE. Upon declaring the minor, a proposed course of study must be submitted by each student in consultation with the Dance Director, Janice Ross, [jross@stanford.edu](mailto:jross@stanford.edu), and approved by her no later than one quarter following the declaration. Declaration of the Theater and Performance Studies/Dance Minor should also be made on-line at <http://axess.stanford.edu>. Please note that special elective dance classes are offered every year and the following lists are some, but not all of the classes that fulfill the requirements. Other classes may be substituted with adviser's consent.

### Minor Requirements —30 total units

#### 1. Technique Classes:

*Studio Classes:* Minimum of six studio dance classes (12 units)

- A concentration of at least three classes chosen from a specific dance form (e.g., Contemporary, Modern, Jazz, Hip-Hop, Ballet, Social), and the attainment of intermediate or advanced level (at least two classes) in a style other than the concentration

#### 2. Dance Studies Classes and TAPS Courses (12 units):

		Units
DANCE 161H	Dance, History and Conflict	4
DANCE 191	Independent Research	1-18
or DANCE 290	Special Research	
TAPS 1	Introduction to Theater and Performance Studies	4
TAPS 30	How Theater is Designed	4
TAPS 171	Performance Making: Process (TAPS 101P, while not offered 2012-13, also satisfies this course requirement)	5

#### 3. Choreography/Repertory/Performance Classes - 6 units including 1 unit of production crew (6 units)

		Units
DANCE 27	Faculty Choreography	1
DANCE 30	The Chocolate Heads Movement Band and Performance	1
DANCE 57	Dance Repertory: Hope Mohr/Denae Hannah	1
DANCE 103	Dance, Text, Gesture: Performance and Composition	1
TAPS 39	Theatre Crew	1-3

# Doctor of Philosophy in Theater and Performance Studies

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin. All graduate study in the Department of Theater and Performance Studies (TAPS) leads to the Ph.D. degree. The doctoral program in Theater and Performance Studies aims to integrate practical theater work with the critical and historical study of dramatic literature and theory. Candidates are expected to function both as scholars and as theater directors. The curriculum offers a two-year practical concentration in directing along with the study of critical and performance theory, aesthetics, history, and literature. The goal of the program is to give students a thorough knowledge of the field that leads to original and significant scholarly work grounded in practice as well as an inventive directorial practice that is based on solid scholarly analysis.

**Admission:** Applicants for the Ph.D. program can visit our Theater and Performance Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/taps/http://drama.stanford.edu>) web site or write directly to the Department of Theater and Performance Studies, Attention: Graduate Admissions, for information. Online graduate applications are available at the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/taps/http://gradadmissions.stanford.edu>) web site. In addition to the required statement of purpose, applicants must submit a statement detailing their practical theater experience, a sample of their written critical work, and a statement on directing. An invitation to interview may be extended by the end of January. Graduate students in the Department of Theater and Performance Studies begin study in Autumn Quarter of each academic year; there are no mid-year admissions. Graduate students must be degree candidates.

The Department of Theater and Performance Studies awards a number of fellowships to students in the Ph.D. program.

## Degree Requirements

Department requirements 2 through 9 following are in addition to the University's basic requirements for the doctorate.

### 1. Units and Course Requirements

1. A minimum of 135 units of graduate courses and seminars in support of the degree. These units are in addition to units for the doctoral dissertation.
2. Core seminars:

		Units
TAPS 300A	Critical Styles I	5
TAPS 300B	Critical Styles II	5
TAPS 301	Performance and Performativity	5
TAPS 303	Race and Performance: Art, Atrocity and Activism (or TAPS 302, not offered 2012-13)	5
TAPS 304	Historiography of Theater	3-5

3. Three additional graduate seminars within the Department of Theater and Performance Studies to be worked out with the advisor.
4. Four workshops in directing:

		Units
TAPS 371	Performance Making: Process	5
TAPS 372	Directing Workshop: The Actor-Director Dialogue	5
TAPS 374A	Performance Making: Production	5
TAPS 374B	Projects in Performance	3-5

1. Students take TAPS 374B, Production Project, to stage a more fully developed production chosen in consultation with the faculty.

In the first year, students take TAPS 371 Performance Making: Process which focuses on generating original creative work through a range of techniques. They also take TAPS 372 Directing Workshop: The Actor-Director Dialogue, which explores the relationship between acting and directing and actors and directors. In the second year they take TAPS 374A Performance Making: Production, which focuses on honing aesthetic and production skills for mounting a piece of work. This leads to TAPS 374B Projects in Performance, which is the production and performance of creative work approved by the Graduate Studies Committee (GSC) and supervised by a faculty member.

5. Students are allowed to take up to 6 units of TAPS 390 Directed Reading, to count towards their degree program and towards the 135 units requirement.

### 2. Language Requirement

The candidate must demonstrate reading knowledge of one foreign language in which there is a major body of dramatic literature. The language requirement must be met before the student can be advanced to candidacy. The language requirement may be fulfilled in any of the following ways:

1. achievement of a sufficiently high score (70th percentile) on the foreign language examination prepared by the Educational Testing Service (ETS). Latin and Greek are not tested by ETS.
2. a reading examination given each quarter by the various language departments, except for Latin and Greek.
3. pass with a grade of 'B' or higher courses in Literature/History numbered 100 or higher in a foreign language department at Stanford.

### 3. Examinations

Candidates must complete three examinations (comprehensive, qualifying, and department oral) by the end of the first three years of study at Stanford.

#### 1. First-Year Comprehensive

The first year exam has two parts based on texts given to students in advance. Preparation for the two parts will include eight tutorials with faculty over the Fall and Winter quarters. Exams will be due in the 8th week of Fall and Winter quarters.

#### 2. Second-Year Qualifying

The qualifying examination, which must be completed before advancement to candidacy at the end of the second year, consists of two 25-35-page essays. Each of these essays should demonstrate a broad knowledge of two different historical periods (pre-20th century), with emphasis on particular dramatic texts and/or performance practices. Essay topics should be designed and written up in consultation with a faculty advisor. The reading list for each period should be approved by the end of the first quarter. These essays should not duplicate any written work from seminars. After approval by the adviser, the Graduate Studies Committee reads and evaluates these essays. For the first qualifying examination, candidates must choose from the following historical periods:

- Classical
- Medieval and Renaissance
- 17th, 18th, or early 19th century

### 3. Third-Year Department Oral

The department oral examination requires three faculty members, at least two from the Department of Theater and Performance Studies, who most likely form the dissertation reading committee. This exam is based on a 2-3 page summary of the project and a 40-page review of the literature for the dissertation that the student creates in conjunction with the committee. This exam should be taken by the end of Spring Quarter in the third year.

## 4. Dissertation Prospectus

The dissertation prospectus must be approved by the candidate's advisor and by the departmental Graduate Studies Committee two quarters after taking the department oral. This should be done in the Autumn Quarter of the fourth year. Within 30 days of approval, a student should schedule a prospectus colloquium with the proposed reading committee (the dissertation director and two other faculty members). The prospectus must be prepared in close consultation with the dissertation adviser during the months preceding the colloquium. The prospectus should be approximately 15-20 pages and minimally cover three things:

1. the research question and context
2. the methodology for research
3. a lay-out of a complete chapter by chapter plan

## 5. University Oral Examination

The University oral examination is a defense of the dissertation based on a full draft submitted at least 75 days before the proposed degree conferral. The examining committee consists of four faculty members, at least two of whom must be from the Department of Theater and Performance Studies, as well as one faculty chair from outside the department who does not share an appointment with the department of any of the examiners. Thus the examining committee consists of five faculty members total.

## 6. Assistantships

### 1. Research Assistantship

Three quarters of research assistantship with faculty members are required. Generally, this requirement is fulfilled in the third year.

### 2. Teaching Assistantship

Four quarters of supervised teaching at half time are a required part of the Ph.D. program. The requirement is normally met by teaching three courses during the fourth year and one course during the fifth year.

## 7. Admission to Candidacy

By the end of the second year of residency, the following requirements or appropriate equivalents must be completed:

1. the core seminars:

		Units
TAPS 300A	Critical Styles I	5
TAPS 300B	Critical Styles II	5
TAPS 301	Performance and Performativity	5
TAPS 303	Race and Performance: Art, Atrocity and Activism (or TAPS 302, not offered 2012-13)	5
TAPS 304	Historiography of Theater	3-5

2. the directing workshop series, including the successful production of at least one work in public performance

3. a foreign language

4. successful completion of the comprehensive and qualifying exams.

Based on its evaluation of the student's progress, the Graduate Studies Committee certifies the student's qualifications for candidacy. Upon favorable action, the student files a formal application for candidacy, as prescribed by the University, by the end of Summer Quarter of the second year. By University policy, candidacy is valid for five years unless terminated by the department.

## 8. Dissertation

Normally, the Ph.D. program in Theater and Performance Studies is completed in five years. The first two years should be devoted to full-time graduate study, and the third, fourth, and fifth years to research, teaching, and writing the dissertation. A candidate taking more than five years is required to reinstate candidacy by repassing the written examinations on dramatic literature.

## 9. Satisfactory Progress, Annual Review

The program and progress of each student must be evaluated by the Graduate Studies Committee at the end of each academic year. At the end of the first year, the Graduate Studies Committee evaluates the work of each student in classes, seminars, examinations, and performance. Production planning in the Spring of each year for the following season is contingent upon students making satisfactory progress. Continuation in the program depends upon the recommendation of this faculty group. At the end of the second year, the committee reviews the student's work in consideration of being admitted to candidacy. At the end of the third year, students are expected to have developed an approved dissertation prospectus. Funding is contingent upon satisfactory progress. Failure to make satisfactory progress may result in dismissal from the program. University policy states that all requirements including dissertation must be completed before candidacy expires.

*Emeriti: (Professors)* Helen W. Schrader, Carl Weber. Alice Rayner; (*Associate Professor*) William S. Edelman; (*Senior Lecturers*) Susan Cashion, Patricia Ryan

*Chair:* Jennifer Brody

## Department of Theater and Performance Studies (TAPS)

*Professors:* Jean-Marie Apostolidès (French and Italian; TAPS), Harry J. Elam, Jr. (Vice Provost for Undergraduate Education), Peggy Phelan (TAPS; English), Alice Rayner (TAPS), Rush Rehm (TAPS; Classics), Jennifer Brody (TAPS; Center for Comparative Studies in Race and Ethnicity)

*Assistant Professors:* Branislav Jakovljevic (Undergraduate Faculty Adviser), Jisha Menon (on leave)

*Professors (Teaching):* Michael F. Ramsaur, Janice Ross

*Associate Professors (Teaching):* Helen Paris, Leslie Hill

*Senior Lecturer:* Connie Strayer

*Lecturers:* Erik Flatmo Gambatese, Daniel Klein, Kathryn Kostopoulos

*Guest Lecturers:* Linda Apperson, Jeffrey Bihl, Josh Kornbluth, Michael Hunter

*Artists in Residence:* Amy Freed, Cherrie Moraga

*Department Administrator:* Patrice O'Dwyer

*Student Services Officer:* Justin Higinbotham

## Institute for Diversity in the Arts and Black Performing Arts Division

*IDA Faculty Director:* H. Samy Alim (Education and, by courtesy, Anthropology and Linguistics)

*Executive Director:* Jeff Chang

*Director (CBPA):* Robert Moses

## Dance Division

*Director:* Janice Ross

*Lecturers:* Diane Frank, Aleta Hayes, Muriel Maffre, Richard Powers, Ronnie Reddick, Susan Cashion, Erik Wagner

*Mellon Postdoctoral Fellow:* Jason Bush

*Artist in Residence:* Robert Moses

## Overseas Studies Courses in Theater and Performance Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/taps/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/taps/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/taps/http://bosp.stanford.edu>).

OSPBER 101A Contemporary Theater

Units  
5

## Urban Studies

Courses offered by the Urban Studies Program are listed under the subject code URBANST on the (<https://explorecourses.stanford.edu/search?q=urbanst&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-urbanst=on&filter-catalognumber-urbanst=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=URBANST&filter-catalognumber-URBANST=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=URBANST&filter-catalognumber-URBANST=on>).

The Urban Studies program treats urbanism as an interdisciplinary field; it brings together students, faculty, and outside specialists concerned with cities, and the impacts of cities on society and people's lives. The Urban Studies major encourages students to inquire deeply into the nature of cities and the techniques used to modify urban environments. It prepares students to address urbanization, and gives students a knowledge base

and theoretical, analytical, and practical skills to understand urban social systems and effect social change.

## Mission of the Undergraduate Program in Urban Studies

The mission of the undergraduate program in Urban Studies is to develop students' understanding of the nature of cities and their impacts on both the individual and society at large. The program is interdisciplinary in nature drawing from fields in the social sciences, history, and education. Courses in the program focus on issues in contemporary urban society, and on the tools and concepts that can bring about change to improve urban life. Courses also address how cities have changed over time and how they continue to change today in societies around the world. Through a comprehensive program that includes course work, an internship, and independent research, a major in Urban Studies prepares students for careers and advanced academic pursuits in fields including architecture, community service, education, environmental planning, real estate development, urban design, and urban planning; many alumni have obtained graduate degrees in architecture, business, law, public policy, urban design, and urban planning from major universities across the country. Information on careers and graduate programs pursued by Urban Studies alumni is available from the Urban Studies program office.

## Learning Outcomes (Undergraduate)

The program expects its undergraduate majors to be able to demonstrate the following learning outcomes. These learning outcomes are used in evaluating students and the Program in Urban Studies. Students are expected to demonstrate ability:

1. to formulate a research question and assess its significance in relation to one or more relevant scholarly literatures and, where relevant, to theoretical writings.
2. to collect data to answer the proposed research question.
3. to analyze a problem and draw correct inferences using qualitative and/or quantitative analysis.
4. to write clearly and persuasively.

## Coterminal Programs In Urban Studies

Undergraduates in Urban Studies may enter coterminal master's degree programs in a number of departments and schools in the University. In recent years, Urban Studies majors have developed coterminal programs with the departments of Civil and Environmental Engineering, Communication, and Sociology, and with the School of Education. Information and applications for coterminal degree programs are available at Undergraduate Advising and Research. Students should discuss the coterminal program with a program director during their junior year.

For University coterminal degree program rules and University application forms, see the Publications and Online Guides (<http://registrar.stanford.edu/shared/publications.htm#Coterm>) web site.

# Bachelor of Arts in Urban Studies

The Urban Studies major requires students to complete four types of courses totaling at least 73 units:

1. 19 units in the core
2. 12 units (minimum) of skills courses (for those declaring after August 1, 2011; 8 units for those who declared earlier)
3. 25 units (minimum) in an area of concentration
4. 13 units in the capstone sequence

If units in these categories total less than 73, the remaining units may be fulfilled by courses in other concentrations or in Urban Studies courses numbered 100 or higher (except URBANST 198 Senior Research in Public Service and URBANST 199 Senior Honors Thesis).

Majors must complete one prerequisite: ECON 1A Introductory Economics A; this prerequisite course may be taken S/NC, as the units for this course do not count toward the 73 units required for the major. URBANST 198 Senior Research in Public Service, URBANST 199 Senior Honors Thesis, and prerequisites for required courses and for electives also do not count towards the 73-unit minimum.

Urban Studies students interested in graduate school in business or urban planning are advised to obtain basic quantitative skills by completing MATH 19 Calculus, MATH 20 Calculus, and MATH 21 Calculus, or MATH 41 Calculus and MATH 42 Calculus, preferably before the junior year, and to complete ECON 1B Introductory Economics B. A course in statistical methods, such as STATS 60 Introduction to Statistical Methods: Precalculus, ECON 102A Introduction to Statistical Methods (Postcalculus) for Social Scientists or SOC 181B Sociological Methods: Statistics, is recommended for students interested in business or urban planning.

Urban Studies students carry out an internship in an urban organization in the public or non-profit sector, typically by enrolling in URBANST 201B Capstone Internship Seminar during Spring Quarter of the junior year. This internship, or an appropriate substitution where necessary, should be arranged no later than Winter Quarter of the junior year, in consultation with the Urban Studies internship coordinator. Selected service learning courses may satisfy the internship requirement; consult with an advisor for details. Urban Studies majors who wish to receive academic credit for additional internship work may enroll in URBANST 194. Students may not count more than 7 units of internship, including URBANST 194 Internship in Urban Studies and URBANST 201A Capstone Internship in Urban Studies/URBANST 201B Capstone Internship Seminar, toward their major. Students can consult the Haas Center for Public Service for other courses with internship placements at community organizations.

Urban Studies students are encouraged to spend at least one quarter studying overseas to learn how cities vary across societies. Some Urban Studies concentration courses, as well as electives, can be satisfied at Stanford overseas campuses. Courses offered overseas vary from year to year, and students should check in advance with Overseas Studies and Urban Studies concerning which courses meet Urban Studies requirements. Students may arrange to fulfill the internship requirement through a placement at one of Stanford's overseas locations.

Courses counted toward the 73-unit graduation requirement for the major must be taken for a letter grade, and a minimum grade of 'C' is required. The only exceptions are Urban Studies courses numbered 100 and higher that are offered only on an S/NC basis, such as URBANST 201A Capstone Internship in Urban Studies and URBANST 201B Capstone Internship Seminar. Students may count up to three non-Stanford courses, for a maximum of 15 units, toward the major. These units must first be approved by the Office of Transfer Credit in the Registrar's Office and subsequently approved by the Urban Studies program. Transfer credit is not awarded for internship. Students may not count more than 5 units of URBANST 197 Directed Reading, toward the major without permission of the Director.

Qualified students may write a senior honors thesis and graduate with honors; see details in "Honors Program" below. Students interested in declaring Urban Studies as a major are required to meet first with the student services administrator and one of the program's advisers; they then declare the Urban Studies major on Axess.

## Urban Studies Core

Urban Studies majors should complete URBANST 110 Utopia and Reality: Introduction to Urban Studies, before Spring Quarter of the junior year. The following courses, totaling 19 units, are required:

		Units
URBANST 110	Utopia and Reality: Introduction to Urban Studies	4
URBANST 112	The Urban Underclass	5
URBANST 113	Introduction to Urban Design: Contemporary Urban Design in Theory and Practice	5
URBANST 114	Urban Culture in Global Perspective	5

## Skills

A minimum of 12 units are required (for those who declare after August 1, 2011; 8 units for those who declared before), and should be taken before the end of the junior year. The following course is recommended for most Urban Studies majors.

		Units
SOC 180A	Foundations of Social Research	5

The additional skills courses vary depending on a student's needs and interests. Student consult with an adviser to determine the best choice. Courses that fulfill the skills requirement are:

		Units
ANTHRO 91	Method and Evidence in Anthropology	5
ANTHRO 93B	Prefield Research Seminar: Non-Majors	5
ECON 102A	Introduction to Statistical Methods (Postcalculus) for Social Scientists	5
EDUC 191X	Introduction to Survey Research	3-4
HUMBIO 82A	Qualitative Research Methodology	3
HUMBIO 82B	Advanced Data Analysis in Qualitative Research	3
MED 147	Methods in Community Assessment, Evaluation, and Research	3
OSPCPTWN 22	Preparation for Community-Based Research in Community Health and Development	3
SOC 180B	Introduction to Data Analysis	5

## Concentrations

Students must complete at least 25 units in one of the following concentrations:

- Cities in Comparative and Historical Perspective,
- Urban Education,
- Urban Society and Social Change
- Self-Designed

Courses may not be double-counted. Students should consult an adviser to develop a program that meets their intellectual goals; relevant courses not listed here, including research methods courses taken in preparation for the capstone project, may be counted toward the concentration with the prior consent of an adviser.

These concentrations are declared to the department; they are not declared on Axess, and they do not appear on the transcript or the diploma.

# Cities in Comparative and Historical Perspective

Focus is on how cities have evolved over time, and how they are continuing to change today in societies around the world, drawing on disciplinary approaches including anthropology, archaeology, art history, geography, and history. By placing urban issues in perspective, students improve their comprehension of the present as well as the past.

Students in this concentration are encouraged to study off campus, and preferably overseas, for at least one quarter. Many courses offered through the Overseas Studies Program can be counted toward the concentration. Similarly, internships offered at many of Stanford's overseas locations can be used to fulfill the Urban Studies internship requirement.

The following courses may be counted toward the Cities in Comparative and Historical Perspective concentration:

		<b>Units</b>
AMELANG 177	Middle Eastern Cities in Literature and Film	4-5
ANTHRO 105	Ancient Cities in the New World	3-5
ANTHRO 112	Public Archaeology: Market Street Chinatown Archaeology Project	2-5
ANTHRO 127	City and Sounds	5
ARTHIST 3	Introduction to the History of Architecture	5
ARTHIST 107A	St. Petersburg, a Cultural Biography: Architecture, Urban Planning, the Arts	4
ARTHIST 142	Architecture Since 1900	4
ARTHIST 143A	American Architecture	4
ARTHIST 188A	The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism	4
CEE 32Q	Place: Making Space Now	3
CEE 131	Architectural Design Process	4
CLASSHIS 60	The Romans	3-5
CLASSHIS 101	The Greeks	4-5
FILMSTUD 150	Cinema and the City	4
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 110C	Introduction to Modern Europe	5
HISTORY 150C	The United States in the Twentieth Century	5
HISTORY 166	Introduction to African American History: The Modern African American Freedom Struggle	3-5
HISTORY 206	History and Geography of Contemporary Global Issues	5
HISTORY 232D	Rome: The City and the World, 1350-1750	4-5
HISTORY 260	California's Minority-Majority Cities	4-5
HISTORY 287D	Tel Aviv: Site, Symbol, City	4-5
HISTORY 291B	The City in Imperial China	3-5
ME 120	History and Philosophy of Design	3
OSPBER 30	Berlin vor Ort: A Field Trip Module	1
OSPBER 60	Cityscape as History: Architecture and Urban Design in Berlin	5
OSPCPTWN 16	South Africa Sites of Memory	2
OSPCPTWN 17	Western Cape Sites of Memory	1
OSPCPTWN 22	Preparation for Community-Based Research in Community Health and Development	3
OSPCPTWN 24A & OSPCTWN 24B	Targeted Research Project in Community Health and Development and Targeted Research Project in Community Health and Development	8
OSPCPTWN 43	Public and Community Health in Sub-Saharan Africa	4

OSPCPTWN 68	Cities in the 21st Century: Urbanization, Globalization and Security	4
OSPFLOR 58	Space as History: Urban Change and Social Vision in Florence 1059 to the Present	4
OSPFLOR 75	Florence in the Renaissance	5
OSPFLOR 115Y	The Duomo and Palazzo della Signoria: Symbols of a Civilization	4
OSPMADRD 60	Integration into Spanish Society: Service Learning and Professional Opportunities	5
OSPPARIS 92	Building Paris: Its History, Architecture, and Urban Design	4
OSPSANTG 71	Santiago: Urban Planning, Public Policy, and the Built Environment	4-5
POLISCI 110C	America and the World Economy	5
RELIGST 237	Jewish and Christian Rome, 1st to 6th Centuries	5
URBANST 115	Urban Sustainability: Long-Term Archaeological Perspectives	3-5
URBANST 150	History of San Francisco	5
URBANST 160	Environmental Policy and the City in U.S. History	5
URBANST 166	East Palo Alto: Reading Urban Change	5

## Urban Education

The purpose of this concentration is to prepare students for a career in educational policy and practice in diverse settings. This concentration is a useful basis for graduate study in educational policy, law, or business, and for students who have been admitted by the School of Education to pursue a coterminal master's degree in the Stanford Teacher Education Program (STEP) or the Policy, Organization, and Leadership Studies Program (POLS). Stanford undergraduates can apply to the Stanford Teacher Education Program (STEP) in their Junior or Senior year.

Coterminal students applying to STEP are encouraged to take EDUC 101 before applying to the program. Additionally, students interested in STEP Secondary (Single Subject) must demonstrate subject matter competency in their intended teaching area. Transcripts should reflect coursework in the intended teaching subject even if it was not a student's undergraduate major.

For additional information please contact the STEP Admissions Officer at 723-2110, or consult the STEP web site (<http://suse-step.stanford.edu>).

The following course is required for the urban education concentration:

		<b>Units</b>
EDUC 112X	Urban Education	3-4

The following courses may be counted toward the urban education concentration:

		<b>Units</b>
EDUC 101	Introduction to Teaching and Learning	3-5
EDUC 103A	Tutoring: Seeing a Child through Literacy	4
EDUC 103B	Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices	3-5
EDUC 103C	Educational Policy, Diversity, and English Learners	3-4
EDUC 104X	Conduct of Research with and in Communities	3-4
EDUC 115Q	Identities, Race, and Culture in Urban Schools	3
EDUC 123X	Contexts that Promote Youth Development: Understandings of Effective Interventions	2-4
EDUC 148X	Critical Perspectives on Teaching and Tutoring English Language Learners	3
EDUC 149	Theory and Issues in the Study of Bilingualism	3-5
EDUC 178X	Latino Families, Languages, and Schools	3-5
EDUC 179	Urban Youth and Their Institutions: Research and Practice	4-5



EDUC 201	History of Education in the United States	3-5
EDUC 202	Introduction to Comparative and International Education	4-5
EDUC 203	The Anthropology of Education	3-5
EDUC 204	Introduction to Philosophy of Education	3
EDUC 207X	School: What Is It Good For?	3-4
EDUC 216X	Education, Race, and Inequality in African American History, 1880-1990	3-5
EDUC 220A	Introduction to the Economics of Education	4
EDUC 220C	Education and Society	4-5
EDUC 220D	History of School Reform: Origins, Policies, Outcomes, and Explanations	3-5
EDUC 221A	Policy Analysis in Education	4-5
EDUC 223	Good Districts and Good Schools: Research, Policy, and Practice	3-4
EDUC 233A & EDUC 233B	Counseling Theories and Interventions from a Multicultural Perspective and Adolescent Development and Mentoring in the Urban Context	6-8
HUMBIO 142 or PSYCH 60	Adolescent Development Introduction to Developmental Psychology	3-4
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
SOC 132	Sociology of Education: The Social Organization of Schools	4

CEE 142A	Negotiating Sustainable Development	3
CEE 171	Environmental Planning Methods	3
CEE 172	Air Quality Management	3
EARTHSYS 49N	Multi-Disciplinary Perspectives on a Large Urban Estuary: San Francisco Bay	3
EARTHSYS 104	The Water Course	3
EARTHSYS 105	Food and Community: New Visions for a Sustainable Future	3-5
EARTHSYS 124	Environmental Justice: Local, National, and International Dimensions	4
EARTHSYS 133	Climate Change Law and Policy: From California to the Federal Government	3
EARTHSYS 181	Concepts of Urban Agriculture	3
ECON 150	Economic Policy Analysis	4-5
ECON 155	Environmental Economics and Policy	5
EDUC 270A	Learning to Lead in Public Service Organizations	3-5
ENGR 150	Social Innovation and Entrepreneurship	1-6
HISTORY 105	Gandhi, King, and Nonviolence	4
HISTORY 106A	Global Human Geography: Asia and Africa	5
HISTORY 206	History and Geography of Contemporary Global Issues	5
HISTORY 255	Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice	5
HISTORY 259A	Poverty and Homelessness in America	4-5
HISTORY 260	California's Minority-Majority Cities	4-5
HUMBIO 116	Controlling Climate Change in the 21st Century	3
HUMBIO 122S	Social Class, Race, Ethnicity, and Health	4
HUMBIO 127A & HUMBIO 127B	Community Health: Assessment and Planning I and Community Health: Assessment and Planning II	8
HUMBIO 128	Community Health Psychology	4
MS&E 180 or Soc 160	Organizations: Theory and Management	4
OSPCPTWN 22	Preparation for Community-Based Research in Community Health and Development	3
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	3-5
PUBLPOL 102	Organizations and Public Policy	4-5
POLISCI 236	Theories of Civil Society, Philanthropy, and the Nonprofit Sector	5
PUBLPOL 135	Regional Politics and Decision Making in Silicon Valley	3
PUBLPOL 183	Philanthropy and Social Innovation	4
SOC 118	Social Movements and Collective Action	5
SOC 119	Understanding Large-Scale Societal Change: The Case of the 1960s	5
SOC 135	Poverty, Inequality, and Social Policy in the United States	5
SOC 140	Introduction to Social Stratification	5
SOC 141	Controversies about Inequality	5
SOC 145	Race and Ethnic Relations in the USA	5
SOC 161	The Social Science of Entrepreneurship	5
SOC 166	Mexicans, Mexican Americans, and Chicanos in American Society	5
URBANST 111	Urban Politics	5
URBANST 115	Urban Sustainability: Long-Term Archaeological Perspectives	3-5
URBANST 123	Approaching Research and the Community	2-3

## Urban Society and Social Change

Focus is on issues in contemporary urban society and the tools and concepts that planners, policy makers, and citizens use to address those issues. Topics include environmental challenges, racial and class inequality, and the provision of adequate urban infrastructure. Students learn how community action, urban planning and design, and organizations in nonprofit, for-profit, and government sectors address urban social and environmental problems. This concentration prepares students to enter graduate programs concerned with urban affairs, community service, and public policy, and to work with local governmental agencies and for-profit and nonprofit organizations engaged in community service and development.

The following courses may be counted toward the urban society and social change concentration:

		Units
ANTHRO 32	Theories in Race and Ethnicity: A Comparative Perspective	5
ASNAMST 146S	Asian American Culture and Community	3-5
CEE 64	Air Pollution and Global Warming: History, Science, and Solutions	3
CEE 100	Managing Sustainable Building Projects	4
CEE 115	Goals and Methods of Sustainable Building Projects	3
CEE 124	Sustainable Development Studio	1-5
CEE 129	Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future	3
CEE 131	Architectural Design Process	4
CEE 131A	Professional Practice: Mixed-Use Design in an Urban Setting	3
CEE 141A	Infrastructure Project Development	3
CEE 141B	Infrastructure Project Delivery	3

URBANST 131	Social Innovation and the Social Entrepreneur	1
URBANST 132	Concepts and Analytic Skills for the Social Sector	4
URBANST 133	Social Entrepreneurship Collaboratory	4
URBANST 137	Innovations in Microcredit and Development Finance	4
URBANST 160	Environmental Policy and the City in U.S. History	5
URBANST 162	Managing Local Governments	0
URBANST 163	Land Use Control	0
URBANST 166	East Palo Alto: Reading Urban Change	5
URBANST 167	The Automobile and the City	4
URBANST 172	Design Approaches to Mending a City: Rethinking the 101 in East Palo Alto (Rethinking Detroit's Infrastructure)	4

## Self-Designed Concentration

Students who wish to concentrate in an area of urban studies other than one of the above concentrations must complete the Urban Studies core, skills, and capstone requirement, and design additional units to bring the total to at least 73 units. The self-designed portion of the major should concentrate on a particular area of urban study, such as urban health care or urban environmental management. Additional units must be approved by both the Director of Urban Studies and an academic adviser who is a member of the Academic Council and has expertise in the particular area of interest to the student. A proposal for a self-designed concentration should include a list of courses and a description of how each course meets the student's educational objectives. A proposal for a self-designed concentration must be accompanied by a letter to the Director of Urban Studies indicating that the academic adviser has examined and approved the student's plan.

Students pursuing a self-designed concentration must submit proposals for approval by the Director of Urban Studies by the beginning of the third quarter of the student's sophomore year. Applications received after that deadline are not considered. Students interested in designing their own concentration are strongly encouraged to meet with the Director of Urban Studies before the end of their sophomore year.

## Capstone

All majors are required to complete an internship and a sequence of two seminars, totaling 13 units, in which students participate in the work of an urban organization related to their area of interest, design a senior project, and write the results of their project. The capstone seminars can be used to satisfy the Writing in the Major requirement and to complete some work on an honors thesis. URBANST 201A Capstone Internship in Urban Studies or URBANST 201B Capstone Internship Seminar, and URBANST 202 Preparation for Senior Research, should be taken in the junior year, and URBANST 203 Senior Seminar in the senior year. Students who plan to be away during Winter Quarter of their junior year are advised to take URBANST 202 Preparation for Senior Research in the Winter Quarter of their sophomore year.

	<b>Units</b>
URBANST 201A Capstone Internship in Urban Studies or URBANST 201B Capstone Internship Seminar	3-4
URBANST 202 Preparation for Senior Research	5
URBANST 203 Senior Seminar	5

## Honors Program

The honors program offers qualified students an opportunity to conduct independent research and to write a thesis summarizing the results. Before being accepted to the honors program in Urban Studies, a student must:

1. declare a major in Urban Studies and complete at least 30 of the 73 required units including all prerequisites and core classes
2. complete URBANST 202 Preparation for Senior Research (offered Winter quarter)
3. have an overall GPA of 3.3 and a GPA of at least 3.5 in Urban Studies
4. submit an application, including a one-page abstract and the signatures of an adviser and, if applicable, a second reader. If the adviser is not a member of Stanford's Academic Council, the student must have a second reader who is an Academic Council member. The application must be submitted to the program office no later than April 30 of the junior year, and it must then be approved by the Director of the Urban Studies honors program.

Honors students are expected to complete a portion of their honors work in URBANST 203 Senior Seminar, in Autumn Quarter. Additionally, they must register for 5-10 units total in URBANST 199 Senior Honors Thesis, over the course of their senior year. The units of URBANST 199 Senior Honors Thesis are in addition to the 73-units required for the major. Honors students are required to present their theses at the Senior Colloquium in Spring Quarter of senior year.

To graduate with honors, students must receive a grade of at least 'A-' in the honors work and have a GPA of at least 3.5 in courses for the Urban Studies major at the time of graduation.

## Minor in Urban Studies

The minor in Urban Studies is designed to introduce students to several disciplinary approaches to the study of cities, and provides the opportunity to explore one of three specialized options:

- Cities in comparative and historical perspective
- Urban education
- Urban society and social change

The minor in Urban Studies requires completion of seven courses for a letter grade, including the four core courses, the required course in the student's chosen concentration area, and two additional courses in that option as listed in the "Bachelor of Arts in Urban Studies (p. 581)" section of this bulletin.

*Director:* Doug McAdam (Sociology)

*Associate Director:* Michael Kahan (Lecturer, Urban Studies)

*Executive Committee:* Prudence Carter (Education), Zephyr Frank (History), Thomas Hansen (Anthropology), Michael Rosenfeld (Sociology), Walter Scheidel (Classics), Jeff Wachtel (President's Office)

*Affiliated Faculty:* Arnetha Ball (Education), Eric Bettinger (Education), Scott Bukatman (Art and Art History), Albert Camarillo (History), Prudence Carter (Education), Samuel Chiu (Management Science and Engineering), Karen Cook (Sociology), Paula Ebron (Anthropology), Paula Findlen (History), James Fishkin (Communication), Shelley Fisher Fishkin (English), Charlotte Fonrobert (Religious Studies), Richard Ford (Law), Zephyr Frank (History), Leah Gordon (Education), Gary Griggs (Civil and Environmental Engineering), David Grusky (Sociology), Thomas Hansen (Anthropology), Allyson Hobbs (History), Ian Hodder (Anthropology), Miyako Inoue (Anthropology), Sarah Jain (Anthropology), Tomás Jiménez (Sociology), David Labaree (Education), Raymond Levitt (Civil and Environmental Engineering), Carolyn Lougee Chappell (History),

Raymond McDermott (Education), Daniel McFarland (Education), William McLennan (Office of Religious Life), Ian Morris (Classics), Clayton Nall (Political Science), Josiah Ober (Classics, Political Science), Susan Olzak (Sociology), Leonard Ortolano (Civil and Environmental Engineering), Sean Reardon (Education), Rob Reich (Political Science), Ian Robertson (Anthropology), Michael Rosenfeld (Sociology), Walter Scheidel (Classics), Gary Segura (Political Science), Michael Shanks (Classics), Jennifer Trimble (Classics), Nancy Brandon Tuma (Sociology, Hoover Institution), Fred Turner (Communication), Guadalupe Valdes (Education), Barbara Voss (Anthropology), Steve Zipperstein (History)

*Lecturers:* Rohit Aggarwala, Naseem Alizadeh, Melanie Edwards, Dennis Gale, Dehan Glanz, Clayton Hurd, Michael Kahan, Radford 'Skid' Hall, Michael Levin, Lawrence Litvak, Judith Ned, Laura Scher, Frederic Stout

## Overseas Studies Courses in Urban Studies

The Bing Overseas Studies Program (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/urbanstudies/http://bosp.stanford.edu>) manages Stanford study abroad programs for Stanford undergraduates. Students should consult their department or program's student services office for applicability of Overseas Studies courses to a major or minor program.

The Bing Overseas Studies course search site ([http://bosp.stanford.edu/cgi-bin/course\\_search.php](http://bosp.stanford.edu/cgi-bin/course_search.php)) displays courses, locations, and quarters relevant to specific majors.

For course descriptions and additional offerings, see the listings in the Stanford Bulletin's ExploreCourses (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/urbanstudies/http://explorecourses.stanford.edu>) or Bing Overseas Studies (<http://exploreddegrees.stanford.edu/schoolofhumanitiesandsciences/urbanstudies/http://bosp.stanford.edu>).

		Units
OSPBER 30	Berlin vor Ort: A Field Trip Module	1
OSPBER 60	Cityscape as History: Architecture and Urban Design in Berlin	5
OSPCPTWN 16	South Africa Sites of Memory	2
OSPCPTWN 17	Western Cape Sites of Memory	1
OSPCPTWN 22	Preparation for Community-Based Research in Community Health and Development	3
OSPCPTWN 24A	Targeted Research Project in Community Health and Development	3
OSPCPTWN 24B	Targeted Research Project in Community Health and Development	5
OSPCPTWN 32	Learning, Development, and Social Change: Service Learning in the Contemporary South African Context-	5
OSPCPTWN 43	Public and Community Health in Sub-Saharan Africa	4
OSPCPTWN 68	Cities in the 21st Century: Urbanization, Globalization and Security	4
OSPFLOR 58	Space as History: Urban Change and Social Vision in Florence 1059 to the Present	4
OSPFLOR 75	Florence in the Renaissance	5
OSPFLOR 115Y	The Duomo and Palazzo della Signoria: Symbols of a Civilization	4
OSPMADRD 60	Integration into Spanish Society: Service Learning and Professional Opportunities	5

OSPPARIS 92 Building Paris: Its History, Architecture, and Urban Design 4

OSPSANTG 71 Santiago: Urban Planning, Public Policy, and the Built Environment 4-5

## Stanford in Washington

*Director:* Adrienne Jamieson

The Bing Stanford in Washington program provides highly-qualified undergraduates with an opportunity to work and study in the nation's capital. In addition to providing students with an understanding of public policy making, the program offers an opportunity to take advantage of the city's unique cultural resources.

Central in the student's educational experience is a full-time internship. Students serve as interns at such institutions and agencies as the Senate, the House of Representatives, the Office of Management and Budget, the White House, the National Institutes of Health, the Smithsonian Institution, CNN, World Bank, the departments of State, Justice, Treasury, Education, and Health and Human Services.

In addition to the internship, students also complete an academic course of study consisting of small courses taught by policy experts, and weekly seminars taught by Stanford faculty members. Seminars are generally 3-5 units. Past topics have included congressional oversight and the press; economic growth and development patterns, policies, and prospects; critical health issues in the U.S. and abroad; policy making in the Washington community; and criminal justice policy. Speakers from the Washington policy community frequently join students and faculty for discussions. Students often write a major paper related to their internship for 3-5 units of credit. Course and seminar topics vary according to student and faculty interest.

The Bing Stanford in Washington program offers stretch quarters in the Autumn and Spring (early September to mid-December, and late March to the end of June) and a regular quarter in Winter, which focuses on environmental and health policy. The program is designed for students in their junior year or during the first or second quarter of their senior year. Applications must be completed two quarters in advance, and three quarters in advance if a student is overseas or otherwise not on campus during the qualifying quarter.

Students interested in the program should contact the campus office of the Bing Stanford in Washington program; see contact information above.

# School of Law

Courses offered by the School of Law are listed on the Stanford Bulletin's ExploreCourses (<http://explorecourses.stanford.edu>) web site under the subject codes LAW (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=LAW&filter-catalognumber=LAW=on>) and LAWGEN (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=LAWGEN&filter-catalognumber=LAWGEN=on>).

The School of Law, established in 1893, provides a legal education for students who are fitted by their maturity and academic training to pursue professional study under University methods of instruction. The curriculum leading to the first professional degree in law, the Doctor of Jurisprudence (J.D.), constitutes an adequate preparation for the practice of law in any English-speaking jurisdiction. Graduate work leading to the degrees of Master of Laws (L.L.M.), Master of the Science of Law (J.S.M.), and Doctor of the Science of Law (J.S.D.), and a non-professional degree, Master of Legal Studies (M.L.S.), is also offered. For the full curriculum, see the Course Schedule & Description on the Law School (<http://lawreg.stanford.edu/stanford>) web site. Stanford Law School offers joint or dual degree options in combination with other Stanford graduate departments and universities across the country; see the "Joint and Dual Degrees in Law" (<http://www.stanford.edu/dept/registrar/bulletin/5344.htm>) section of this bulletin.

The school is on a three-term academic calendar. For a complete list of academic dates see the Academic Calendar on the Law School (<http://www.law.stanford.edu/calendar>) web site.

For further information about admission, programs, curriculum, and faculty, see the Law School (<http://exploreddegrees.stanford.edu/schooloflaw/http://www.law.stanford.edu>) web site.

## Joint and Dual Degrees in Law

Formal admission to both the Law School and to the other cooperating school or department in accordance with the established admission standards of each school or department is required. In addition to the formal joint degree programs offered, the school considers requests for a dual program on an individually designed basis. For additional information on Law School joint or dual degree programs, see the Law School (<http://www.law.stanford.edu/program/degrees>) web site. See relevant web sites or department sections of this bulletin for degree requirements.

Formal joint degree programs at Stanford:

### School of Business

See <http://www.gsb.stanford.edu/mba>.

J.D./M.B.A. Master of Business Administration

### School of Earth Sciences

J.D./M.S. Emmett Interdisciplinary Program in Environment and Resources (E-IPER)

J.D./Ph.D. Emmett Interdisciplinary Program in Environment and Resources (E-IPER)

### School of Education

J.D./M.A. Education

### School of Engineering

J.D./M.S. Bioengineering

J.D./Ph.D. Bioengineering

J.D./M.S. Computer Science

J.D./M.S. Electrical Engineering

J.D./M.S. Management Science and Engineering (MS&E)

J.D./Ph.D. Management Science and Engineering (MS&E)

## School of Humanities and Sciences

J.D./M.A. Economics

J.D./Ph.D. Economics

J.D./M.A. History

J.D./Ph.D. History

J.D./M.A. in degree granting programs in the Division of International Comparative and Area Studies (ICA): African Studies, East Asian Studies, Latin American Studies, and Russian, East European and Eurasian Studies

J.D./M.A. in International Policy Studies

J.D./Ph.D. Philosophy

J.D./Ph.D. Political Science

J.D./Ph.D. Psychology

J.D./M.P.P. Public Policy

J.D./Ph.D. Sociology

## School of Medicine

J.D./M.S. Health Research and Policy (HRP)

## Formal joint degree programs with other universities

J.D./M.P.A. with the Woodrow Wilson School of Public and International Affairs at Princeton University

J.D./M.A. with the Paul H. Nitze School of Advanced International Studies at Johns Hopkins University

## Courses in Law

Some Law courses have special enrollment instructions and restrictions, but many Law courses are open to qualified graduate students in other departments of Stanford University with instructor consent. Non-Law students may not enroll in courses that are part of the required first-year JD curriculum. Stanford non-Law students intending to enroll in any course with a LAW subject code must consult the Office of the Law School Registrar in the Stanford Law School Administration Building, room 100, or see the Stanford Law School, Office of the Registrar (<http://www.law.stanford.edu/school/offices/registrar>) web site.

*Emeriti: (Professors)* Barbara Allen Babcock, Wayne G. Barnett, Paul Brest, Gerhard Casper, William Cohen, Lance E. Dickson, Marc A. Franklin, Jack H. Friedenthal, Robert A. Girard, William B. Gould IV, Thomas C. Grey, Thomas C. Heller, Miguel A. Méndez, John Henry Merryman, Margaret Jane Radin, Kenneth E. Scott, Byron D. Sher, William H. Simon, Michael S. Wald

*Dean:* Mary Elizabeth "Liz" Magill

*Vice Dean:* Mark G. Kelman

*Associate Dean for Curriculum:* Jane Schacter

*Associate Dean for Executive Education and Special Programs:* F. Daniel Siciliano

*Associate Dean for Graduate Studies:* Deborah R. Hensler

*Associate Dean for Public Interest and Clinical Education:* Lawrence C. Marshall

*Senior Associate Dean and Chief Financial Officer:* Frank Brucato

*Associate Deans:* Diane Chin, Faye Deal, Julia Erwin-Weiner, Catherine Glaze, Sabrina Johnson, Susan Robinson

*Professors:* Janet Cooper Alexander, Joseph Bankman, R. Richard Banks, Joshua Cohen (on leave), G. Marcus Cole, Richard Craswell, Mariano-Florentino (Tino) Cuéllar, Robert M. Daines, Michele Landis Dauber, John J. Donohue III, George Fisher, Richard T. Ford, Barbara H. Fried, Lawrence M. Friedman, Ronald J. Gilson (on leave autumn), Paul Goldstein, Robert W. Gordon (on leave autumn), Henry T. Greely, Joseph A. Grundfest, Deborah R. Hensler, Daniel E. Ho, Pamela S. Karlan (on leave winter), Mark G. Kelman, Amalia D. Kessler (on leave autumn), Daniel P. Kessler, Michael Klausner, Mark A. Lemley, Lawrence C. Marshall, Jenny S. Martinez, Michael W. McConnell (on leave autumn), Alison D. Morantz, Joan Petersilia, A. Mitchell Polinsky (on leave autumn), Robert L. Rabin, Deborah L. Rhode, Jane Schacter, Norman W. Spaulding, James F. Strnad II, Barton H. Thompson, Jr., George Triantis, Robert Weisberg

*Associate Professor:* Barbara van Schewick, Michael Wara

*Assistant Professors:* David Freeman Engstrom, Nora Freeman Engstrom, Shirin Sinnar (on leave autumn)

*Professors (Teaching):* Juliet M. Brodie, James Cavallaro, Jeffrey L. Fisher, William S. Koski, Deborah A. Sivas, Jayashri Srikantiah (on leave autumn)

*Associate Professors (Teaching):* Jay A. Mitchell, Ronald C. Tyler

*Professors of the Practice of Law:* Erik G. Jensen, David W. Mills, Dan Reicher, F. Daniel Siciliano

*Senior Lecturers:* Margaret R. Caldwell, Janet Martinez, Allen S. Weiner

*Professors (by courtesy):* Michael Genesereth, David Larcker, Jose Maldonado, Clifford Nass, Paul C. Pfeleiderer, Madhav Rajan, Jack Rakove, Frank Wolack

*Visiting Professors:* Michelle Anderson, Michael Asimow, Siegfried Fina, Michael Karayanni, Robert P. Merges, Burt Neuborne, Joost Pauwelyn, Rogelio Perez-Perdomo

*Legal Research and Writing Instructors:* Albertina Antognini, Beth Colgan, Andrew Gilden, Thea Johnson, Kaipo Matsumura, Jeanne Merino

*Lecturers:* Alvin Attles, Simao Avila, Daniel L. Barton, William Baude, Marilyn Bautista, Jeanine Becker, Byron Bland, Viola Canales, Diane Chin, Daniel Cooperman, Margaret (Maggie) Crosby, Betsy de la Vega, Michael E. Dickstein, Ron Dolin, Jared Ellias, Bonnie Eskanazi, Russ Feingold, Randee G. Fenner, Bertram Fields, Jay Finkelstein, David Forst, Simon Frankel, Laurence Franklin, Michelle Galloway, Mei Gechlik, Tracy Genesen, Marshall Goldberg, Thomas C. Goldstein, Jonathan Greenberg, Lucas Guttentag, Timothy H. Hallahan, Brad Handler, Laurie Hane, Keith Hennessey, Brooke Heymach, Ivan Humphreys, David Johnson, Danielle Jones, Julie Matlof Kennedy, Jason Kipnis, Suzanne McKechnie Klahr, Jeffery W. Kobrick, Charles Koob, Phil Levine, May Liang, Goodwin Liu, Titi Liu, Paul Lomio, Beth McLellan, Jeanne Merino, Roberta J. Morris, Linda Netsch, Thomas J. Nolan, Jessica Notini, B. Howard Pearson, Lisa M. Pearson, Sergio Puig, John Quigley, Sarah Rajec, Stephan Ray, Susan Robinson, John Rodkin, Michael Romano, Andrew Roper, Stephen Rosenbaum, Kevin Russell, Ticien Sassoubre, William (Billy) Schwartz, Rachelle Silverberg, Bryant Walker Smith, Stephanie Smith, Steven Smith, James Sonne, Stephan Sonnenberg, Kimberly Summe, Dan Torres, Adine Varah, Roland Vogl, Vaughn Walker, Erika V. Wayne, Dana Weintraub, Robert Wexler, Katherine C. Wright, James Yoon

*Affiliated Faculty:* Elizabeth (Beth) Blankespoor (GSB), Alexandria (Ali) Boehm (Civil and Environmental Engineering), Kate Bundorf (Health Research and Policy), John-Paul Ferguson (GSB), Joy Ishii (GSB), Stefan Reichelstein (GSB), Helen Stacy (FSI), Barry Weingast (Political Science)

# School of Medicine

The School of Medicine offers courses of study leading to the M.S., Ph.D., and M.D. degrees.

## Undergraduate Programs in the School of Medicine

Many courses in the School of Medicine are open to any registered Stanford student who has fulfilled the prerequisites, subject to the usual limits of course enrollment and faculty approval. The school also offers courses specifically for undergraduates, as well as graduate-level courses where advanced undergraduates with backgrounds in the life sciences are welcome. Among the undergraduate offerings are numerous Stanford Introductory Seminars for freshmen and sophomores, the Emergency Medical Technician program, Stanford Immersion in Medicine Physician Shadowing, Pre-Vet Advisory, and courses in Community Health, including participation in the Stanford Free Clinics. The school also offers several undergraduate courses through the Department of Biology and the Interdisciplinary Program in Human Biology in the School of Humanities and Sciences.

## M.S. and Ph.D. Programs in the School of Medicine

The School of Medicine is home to graduate programs covering a broad range of disciplines within biomedicine leading to Ph.D. or M.S. degrees. These programs focus on interdisciplinary training with in-depth investigation of an original problem of fundamental importance to the biosciences. Each degree program sets its own curriculum, but many courses are taught by groups of faculty from multiple programs and departments. Flexibility is a priority to ensure that all students obtain the best possible training for pursuing careers in their areas of interest. The school is dedicated to training students from diverse backgrounds, and to the promotion of diversity in graduate education. Admission is through one of about 15 home programs. These home programs enable students to carry out dissertation research and training with School of Medicine faculty, as well as investigators in the departments of Biology and Biophysics in the School of Humanities and Sciences. Detailed information on School of Medicine M.S. and Ph.D. programs, curricula, and research can be found at Stanford's School of Medicine Master's Degree Programs (<http://med.stanford.edu/ms>) and Ph.D. Programs (<http://med.stanford.edu/phd>) web site. Application information can be found at Stanford's Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofmedicine/> <http://gradadmissions.stanford.edu>) web site.

## M.D. Program in the School of Medicine

The School of Medicine seeks to attract students who are passionate about scholarship and wish to improve the health of the world's people through research, innovation, and leadership. The Stanford M.D. curriculum provides education in biomedical and clinical sciences along with study and independent research through scholarly concentrations. Emphasis is placed on interdisciplinary learning, with streamlined content and melding of basic science and clinical instruction across the curriculum. Blocks of unscheduled time allow for individual or group study, participation in elective courses, research, and reflection. Alternative pathways through the curriculum include an option of a fifth or sixth year of study as well as opportunities for pursuing a second degree, such as an M.P.H., M.B.A.,

Master's of Science in Epidemiology or Health Services Research, or a Ph.D.

Broad clinical science education occurs throughout the curriculum with exposure to patient care and the practice of medicine beginning on the first day of medical school. Students begin clinical clerkships in June of the second year. A population health course combines classroom and experiential learning to provide understanding of the socioeconomic determinants of the health of patients and communities.

Scholarly concentrations offer opportunities for developing skills that enhance basic science and clinical training in areas such as bioengineering, biomedical ethics and medical humanities, biomedical informatics, clinical research, community health, health services and policy research, and the molecular basis of medicine. Through the scholarly concentration program, these skills may be applied in clinical areas housed within centers at Stanford such as the Comprehensive Cancer Center, the Cardiovascular Institute, the Neuroscience Institute, the Institute of Immunity, Transplantation, and Infection, and Women's Health at Stanford. Study in a scholarly concentration typically includes course work and research activities. Research for scholarly concentrations is supported through the Medical Scholars program, which funds student research projects at Stanford and overseas.

Students with interests in medical research as a career are encouraged to investigate opportunities available through the Medical Scientist Training Program (MSTP). Stanford also collaborates with the University of California, Berkeley, to offer students opportunities for M.D./M.P.H. training. Details about these programs may be found at Stanford's Dual Degree and Multi-Degree Programs ([http://med.stanford.edu/combined\\_degree](http://med.stanford.edu/combined_degree)) web site.

Stanford is committed to representing the diversity of the U.S. and California populations by seeking a diverse body of students who are interested in the intellectual substance of medicine and committed to advancing the field of health care, broadly defined. Provided an applicant to the school has completed basic courses in physics, chemistry, and biology, the choice of an undergraduate major may reflect other interests, including the arts and humanities. Course work in advanced biology such as biochemistry, molecular biology, or genetics and the behavioral sciences is recommended because of their importance in understanding health care. Breadth of interests and depth of experiences play an important role in the selection of students from among those applicants having superior academic records.

The M.D. degree requires 13 quarters of registration at full Med-MD tuition; the joint M.D./Ph.D. degree requires 16 quarters. Completion of the M.D. degree must be achieved within six years, unless a petition is granted to extend this time frame. For further details on the M.D. degree, including admission requirements, see the Medical Education at Stanford (<http://med.stanford.edu/md>) web site.

## Multiple-Degree Programs in the School of Medicine

### M.D./Ph.D.

Many M.D. students undertake a Ph.D. while they are at Stanford. Popular choices are School of Medicine programs in Bioengineering, Biomedical Informatics, or one of the 13 Biosciences home departments. At the School of Engineering, the Biomechanical Engineering M.D./Ph.D. program also makes a special effort to work with M.D. students.

### Medical Scientist Training Program

The Medical Scientist Training Program (MSTP) provides medical students with an opportunity to pursue an individualized program of research and course work leading to both the M.D. and Ph.D. degrees. It is designed

to equip students for careers in academic investigative medicine, and emphasizes flexibility of curricular and research programs for each trainee. Training for a combined M.D.-Ph.D. includes the same content encountered by students who pursue each degree separately, but the total training time is less than the sum of the time normally required for each degree. The flexible curriculum at Stanford's School of Medicine allows each student, in consultation with a preceptor and other advisers, to pursue a plan of study that satisfies the requirements for the M.D. and allows performance of doctoral-level research leading to the Ph.D. Students interested in joining the MSTP are considered for admission at the time of their application to the School of Medicine M.D. program and are asked to provide supplemental information relevant to their research background. Current Stanford M.D. students may also apply for admission to the MSTP.

## M.D./M.B.A.

M.D. students interested in combining their medical training with training in business can take advantage of a dual degree M.D./M.B.A. program that allows students to obtain both degrees after completion of a 5-year curriculum. Students must apply to and be admitted by the Stanford Graduate School of Business, at the time of their admission to the medical school or after beginning their M.D. studies.

## M.D./M.P.H.

A unique collaboration with UC Berkeley allows M.D. students to pursue and obtain a Master of Public Health degree while still at the Stanford School of Medicine. This dual degree M.D./M.P.H. program is open to M.D. students who participate in the Scholarly Concentration in Community Health. Students must apply to and be admitted by the UC Berkeley program; course work is undertaken at the UC Berkeley campus.

## Ph.D./M.S.M.

The Master of Science in Medicine (<http://msm.stanford.edu>) program admits current Stanford Ph.D. students who have a commitment to translational research, but are not interested in becoming clinicians. The goal of the program is to train researchers in human biology and disease to be better equipped to translate new scientific discoveries into useful medical advances. Students offered admission into any Ph.D. program at Stanford may apply for admission to the master's program. During their first five quarters, students take basic biomedical science courses with Stanford M.D. students. The School of Medicine M.D. curriculum is presented in a succinct format that allows time for students to concurrently complete their Ph.D. course requirements and lab rotations. By early in their second year, students choose a lab for their Ph.D. thesis research and complete their medical course work. They also elect a clinical co-mentor to discuss translational research needs and help to arrange a short clinical experience. Upon completion of the Program., participating students receive an M.S. in Medicine.

## M.D./M.S. Degrees

**Health Services Research:** The Master's Degree program in Health Services Research is a research-oriented program with a concentration on economics and statistics, outcomes research, cost-effectiveness, and technology assessment. The program is designed to complement training in the medical and social sciences and prepare students for research careers in health services or health policy analysis. The program provides specialized training in selected areas of health care policy, research methodology, and the application of these skills to a specific research problem. Course work requirements allow students to design a program of study suited to their individual backgrounds and interests.

**Epidemiology:** The Graduate Interdisciplinary Program in Epidemiology is a research oriented program that offers instruction and research opportunities leading to the M.S. degree in Epidemiology - the study of the distribution and determinants of diseases in populations.

**Medical Information Sciences:** An option for anyone who wishes to either perform research in Biomedical Informatics as clinical faculty at a school of medicine or for those who wish to continue into the health care industry or government. There is high need for trained individuals who understand the practice of medicine and who are able to develop and implement applications in biomedical informatics.

**Biomechanical Engineering:** Bioengineering is a fusion of engineering and the life sciences that promotes scientific discovery and the invention of new technologies and therapies through research and education. It encompasses both the use of biology as a new engineering paradigm and the application of engineering principles to medical problems and biological systems. The discipline embraces biology as a new science base for engineering.

## M.D./M.P.P. Degree

Matriculated M.D. students from Stanford's School of Medicine may apply for admission to the joint M.P.P./M.D. degree program ([http://publicpolicy.stanford.edu/jt\\_mdmp](http://publicpolicy.stanford.edu/jt_mdmp)). Applications are accepted anytime after a student has completed one year in the M.D. program. Students must obtain the permission of the School of Medicine to participate in the joint degree program. Students are required to devote two continuous years of full-time study to the completion of the first two years of the core M.D. curriculum. Students then devote one continuous academic year of study to the completion of the M.P.P. core curriculum. At other times, the student may be enrolled in either unit and may take courses from either unit to satisfy the joint degree requirements.

## Departmental Dual Degrees

**Education:** The Individually designed M.A. in Education is designed for Stanford doctoral students enrolled outside of the School of Education. Individuals enrolled at the doctoral level at Stanford can be considered for this program.

**E-IPER:** Stanford's Emmett Interdisciplinary Program in Environment and Resources (E-IPER) gives students a focused science, engineering, and technology background, allowing them to integrate science with law and business to address critical environmental and sustainability issues. [http://e-iper.stanford.edu/admissions.jointms\\_application.php](http://e-iper.stanford.edu/admissions.jointms_application.php)

**Public Policy:** Stanford University offers two master's programs in Public Policy. A Master's of Public Policy (M.P.P.) is a two-year professional degree and the Masters of Arts in Public Policy (M.A.) is a one-year non-professional degree. Students currently enrolled in other Stanford graduate programs, and applicants to those programs, may apply for either of the Public Policy master's programs. M.D. students are eligible to apply for a dual M.A. degree program See above for the joint M.D./M.P.P. program.

*Dean:* Philip Pizzo

*Senior Associate Dean for Graduate Education and Postdoctoral Affairs:* Daniel Herschlag

*Senior Associate Dean for Medical Education:* Charles Prober

# Biochemistry

Courses offered by the Department of Biochemistry are listed under the subject code BIOC on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOC&filter-catalognumber-BIOC=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOC&filter-catalognumber-BIOC=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOC&filter-catalognumber-BIOC=on>).

Biochemistry is a department within the School of Medicine, with offices and labs located in the Beckman Center for Molecular and Genetic Medicine at the Stanford Medical Center. Courses offered by the department may be taken by undergraduates as well as graduate and medical school students.

Advanced courses offered in more specialized areas emphasize recent developments in biochemistry, cell biology, and molecular biology. These courses include the physical and chemical principles of biochemistry, enzyme reaction mechanisms, membrane trafficking and biochemistry, molecular motors and the cytoskeleton, mechanisms and regulation of nucleic acid replication and recombination, the biochemistry of bacterial and animal viruses, the molecular basis of morphogenesis, the molecular and cell biology of yeast, and the structure and function of both eukaryotic and prokaryotic chromosomes.

Opportunities exist for directed reading and research in biochemistry and molecular biology, using the most advanced research facilities, including those for light and electron microscopy, chromatography and electrophoresis, protein and nucleic acid purification, rapid kinetic analysis, synthesis and analysis, single molecule analyses using laser light traps, microarray generation and analysis, and computer graphic workstation facilities for protein and nucleic acid structural analysis. Ongoing research uses a variety of organisms from bacteria to animal cells.

## Doctor of Philosophy in Biochemistry

Requirements for the M.S. and Ph.D. degrees are described in the "Graduate Degrees (p. 38)" section of this bulletin. The department does not offer undergraduate degrees.

The Department of Biochemistry offers a Ph.D. program which begins in the Autumn Quarter of each year. The program of study is designed to prepare students for productive careers in biochemistry; its emphasis is training in research, and each student works closely with members of the faculty. In addition to the requirement for a Ph.D. dissertation based on original research, students are required to complete six advanced courses in biochemistry and related areas among the 135 total units required for the Ph.D. Selection of these courses is tailored to fit the background and interests of each student. A second requirement involves the submission of two research proposals which are presented by the student to a small committee of departmental faculty members who are also responsible for monitoring the progress of student curricular and research programs, and a journal club presentation. All Ph.D. students are expected to participate actively in the department's seminar program, and students are encouraged to attend and to present papers at regional and national meetings in cellular biochemistry and molecular biology. Teaching experience is an integral part of the Ph.D. curriculum and is required for the degree.

The Department of Biochemistry offers an M.S. degree only to students already enrolled in the Ph.D. program. Students should contact the Graduate Studies adviser for more details.

Those applying for graduate study should have at least a baccalaureate degree and should have completed work in cell and developmental biology, basic biochemistry and molecular biology, and genetics. Also required are: at least one year of university physics; differential and integral calculus; and organic, inorganic, and physical chemistry. The department is especially interested in those applicants who have research experience in biology or chemistry. Students must submit an application, including transcripts and letters of recommendation, by December for admission in the following Autumn Quarter.

Applications should be submitted at the Office of Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofmedicine/biochemistry/http://gradadmissions.stanford.edu>) web site. Applicants are notified by March 31 of decisions on their applications. Stanford University requires scores from the Graduate Record Examination (GRE) (verbal, quantitative, and

analytical), and applicants are encouraged to submit scores from the GRE Subject Test in biochemistry, biology, or chemistry. Applicants should take the October GRE exam.

All applicants are urged to compete for non-Stanford fellowships or scholarships, and U.S. citizens should complete an application for a National Science Foundation Predoctoral Traineeship. Students are provided with financial support to cover normal living expenses; Stanford tuition costs are paid. Applicants for admission to the department are considered without regard to race, color, creed, religion, sex, age, national origin, or marital status.

Postdoctoral research training is available to graduates who hold a Ph.D. or an M.D. degree. Qualified individuals may write to individual faculty members for further information.

At present, the primary research interests of the department are the structure and function of proteins and nucleic acids, the biochemistry and control of development processes, molecular motors and the cytoskeleton, the trafficking of proteins between membrane-bound organelles, the control and regulation of gene expression, bioinformatics/protein structure design, and the application of microarrays to problems in human health and disease.

*Emeriti (Professors):* Robert L. Baldwin, Paul Berg, Douglas L. Brutlag, David S. Hogness, A. Dale Kaiser, I. Robert Lehman

*Chair:* Mark A. Krasnow

*Professors:* Philip Beachy, Patrick O. Brown, Gilbert Chu, Ronald W. Davis, James E. Ferrell, Jr., Daniel Herschlag, Mark A. Krasnow, Suzanne R. Pfeffer, James A. Spudich

*Associate Professors:* Pehr A. B. Harbury, Aaron F. Straight, Julie A. Theriot

*Assistant Professors:* Rhiju Das

*Courtesy Professors:* Steven Artandi, Kerwyn C. Huang, Chaitan S. Khosla, Sharon Long, Rajat Rohatgi

## Biomedical Ethics

The Stanford University Center for Biomedical Ethics (SCBE) is dedicated to interdisciplinary research and education, and provides clinical and research ethics consultation. SCBE serves as a scholarly resource on emerging ethical issues raised by medicine and biomedical research.

SCBE offers a scholarly concentration in Biomedical Ethics and Medical Humanities (BEMH) to medical students. This program allows medical students to study in depth the moral, social, and humanistic dimensions of medicine and biomedical science. Using cross-disciplinary methods such as those from philosophy, social science, film, literature, art, and law, students examine the meaning and implications of medicine and medical research.

### Degree Requirements

Students who pursue Biomedical Ethics and Medical Humanities in conjunction with an application area, such as Immunology, are required to complete 6 units including:

		Units
INDE 212	The Human Condition: Medicine, Arts, and Humanities	2
PEDS 251A	Medical Ethics I	2

Students may select the other two core BEMH units from a wide variety of University, Medical School, and Law School courses. Students interested in completing all 12 units in the BEMH scholarly area may do the same. Students are encouraged to go through the various offerings and devise a course plan to present to the director, David Magnus, and Audrey Shafer. Additional information on requirements for the scholarly concentration, is



available at the BEMH (<http://bioethics.stanford.edu/education/bemh>) web site.

*Director:* David C. Magnus

*Director Emeritus:* Thomas A. Raffin

*Associate Director:* Mildred K. Cho

*Participating Faculty and Staff:* Clarence H. Braddock, Julie A. Collier, LaVera M. Crawley, Maren Grainger-Monsen, Henry Greely, Katrina A. Karkazis, Sandra S. Lee, Jose R. Maldonado, Kelly E. Ormond, Laura W. Roberts, Christopher T. Scott, Audrey Shafer, Abraham C. Verghese, Lawrence I. Zaroff

## Biomedical Informatics

Courses offered by the Program in Biomedical Informatics are listed under the subject code BIOMEDIN on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOMEDIN&filter-catalognumber-BIOMEDIN=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOMEDIN&filter-catalognumber-BIOMEDIN=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=BIOMEDIN&filter-catalognumber-BIOMEDIN=on>).

The program in Biomedical Informatics emphasizes research to develop novel computational methods that can advance biomedicine. Students receive training in the investigation of new approaches to conceptual modeling and to development of new algorithms that address challenging problems in the biological sciences and clinical medicine. Students with a primary interest in developing new informatics methods and knowledge are best suited for this program. Students with a primary interest in the biological or medical application of existing informatics techniques may be better suited for training in the application areas themselves.

### Graduate Programs in Biomedical Informatics

The Biomedical Informatics Program is interdepartmental and offers instruction and research opportunities leading to M.S. and Ph.D. degrees in Biomedical Informatics. All students are required to complete the core curriculum requirements, and also to elect additional courses to complement both their technical interests and their goals in applying informatics methods to clinical settings, biology, or imaging.

The core curriculum is common to all degrees offered by the program but is adapted or augmented depending on the interests and experience of the student. Deviations from the core curriculum must be justified in writing and approved by the student's Biomedical Informatics academic adviser and the chair of the Biomedical Informatics Executive Committee. It should be noted, however, that the program is intended to provide flexibility and to complement other opportunities in applied medical research that exist at Stanford. Although most students are expected to comply with the basic program of study outlined here, special arrangements can be made for those with unusual needs or those simultaneously enrolled in other degree programs within the University. Similarly, students with prior relevant training may have the curriculum adjusted to eliminate requirements met as part of prior training.

The University requirements for the M.S. degree are described in the "Graduate Degrees (p. 38)" section of this bulletin.

## Master of Science in Biomedical Informatics (Academic)

This degree is designed for individuals who wish to undertake in-depth study of biomedical informatics with research on a full-time basis. Normally, a student spends two years in the program and implements and documents a substantial project during the second year. The first year involves acquiring the fundamental concepts and tools through course work and research project involvement. All first- and second-year students are expected to devote 50 percent or more of their time participating in research projects. Research rotations are not required, but can be done with approval of the academic adviser or training program director. Graduates of this program are prepared to contribute creatively to basic or applied projects in biomedical informatics. This degree requires a written research paper to be approved by two faculty members.

## Master of Science in Biomedical Informatics (Professional/Honors Cooperative Program)

This degree is designed primarily for the working professional who already has advanced training in one discipline and wishes to acquire interdisciplinary skills. All classes necessary for the degree are available online. The professional M.S. is offered in conjunction with Stanford Center for Professional Development (SCPD), which establishes the rates of tuition and fees. The program uses the honors cooperative model (HCP), which assumes that the student is working in a corporate setting and is enrolled in the M.S. on a part-time basis. The student has up to five years to complete the program. Research projects are optional and the student must make arrangements with program faculty. Graduates of this program are prepared to contribute creatively to basic or applied projects in biomedical informatics.

## Master of Science in Biomedical Informatics (Coterminal)

The coterminal degree program allows Stanford University undergraduates to study for a master's degree while completing their bachelor's degree(s) in the same or a different department. Please refer to the "Coterminal Degrees" section in this bulletin for additional information.

The coterminal Master of Science program follows the same program requirements as the Master of Science (Professional), except for the requirement to be employed in a corporate setting. The coterminal degree is available only to current Stanford undergraduates. Coterminal students are enrolled full-time and courses are taken on campus. Research projects are optional and the student must make arrangements with program faculty. Graduates of this program are prepared to contribute creatively to basic or applied projects in biomedical informatics.

For University coterminal degree program rules and University application forms, see <http://registrar.stanford.edu/pdf/CotermAppRules.pdf>

## Core Curriculum and Program Requirements in Biomedical Informatics

### Core Curriculum in Biomedical Informatics

Students are expected to participate regularly in BIOMEDIN 201 Biomedical Informatics Student Seminar and a research Colloquium, such as BIOMEDIN 200 Biomedical Informatics Colloquium or BIOMEDIN 205 Precision Practice with Big Data. In addition, all students are expected to fulfill requirements in the following five categories:

#### 1. Core Biomedical Informatics (17 units)

Students are expected to complete the core offerings in biomedical informatics:

- A. BIOMEDIN 212 Introduction to Biomedical Informatics Research Methodology
- B. and 4 of the following:

		Units
BIOMEDIN 210	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
BIOMEDIN 214	Representations and Algorithms for Computational Molecular Biology	3-4
BIOMEDIN 215	Data Driven Medicine	3
BIOMEDIN 217	Translational Bioinformatics	4
BIOMEDIN 260	Computational Methods for Biomedical Image Analysis and Interpretation	3-4

- C. Any remaining units must be graduate level courses listed under BIOMEDIN.
- D. Note that BIOMEDIN 211 is no longer offered, however it may be used by students who completed it to fulfill a core BMI requirement.

#### 2. Computer Science, Statistics, Mathematics & Engineering (18 units)

Students are expected to create a program of study with a mixture of graduate-level courses in computer science, statistics or other technical informatics-related disciplines that allows them to achieve in-depth mastery of these areas. The programs of study may focus on aspects of these disciplines including (but not limited to): machine learning, artificial intelligence, data mining, image analysis, human-computer interaction, systems engineering, scientific and numerical computing or graphics. In general, this course of study should include no more than 9 units in courses 100-199, and the rest should be 200 or above (unless specifically approved by adviser). CS courses 106, 107 and 108 cannot be counted for this requirement, and all courses should be formal classroom-based courses, unless approved by the executive committee. Up to 6 units of this portion of the core curriculum may be taken on a pass/fail basis, but at least half of the units in this portion of the curriculum must be taken for a grade. BIOMEDIN units above 17 may also be counted for the requirements in this category. Students may petition for quantitative courses in the medical school or Humanities and Sciences to be counted in this section of the curriculum.

#### 3. Social and Ethical Issues (4 units)

Students are expected to be familiar with issues regarding ethical, legal, social, organizational and behavioral aspects of the impact of biomedical informatics technologies on society in general. They should select courses broadly from University offerings to explore one or more of these aspects more deeply. In addition, students are required to take MED 255 The Responsible Conduct of Research, or the equivalent.

#### 4. Unrestricted Electives (6 units)

Students may fulfill this requirement with any Stanford course, including courses taken to satisfy core curriculum prerequisites.

#### 5. For PhD Students only

Domain Biology/Medicine, Pedagogy, Electives (9 units): In order to reach a total of 54 units of core curriculum, PhD students should take an additional 9 units; this should include 6 units of biology or medicine classes relevant to their research interests, 2 units of BIOMEDIN 290 Biomedical Informatics Teaching Methods and one additional unit of unrestricted elective.

The core curriculum generally entails a minimum of 45 units of course work for master's students and 54 units of course work for Ph.D. students, but can require substantially more or less depending upon the courses chosen and the previous training of the student.

The following courses may be taken for satisfactory/no credit (S/NC):

		Units
BIOMEDIN 200	Biomedical Informatics Colloquium	1
BIOMEDIN 201	Biomedical Informatics Student Seminar	1
BIOMEDIN 205	Precision Practice with Big Data	1
BIOMEDIN 206	Informatics in Industry	1
BIOMEDIN 299	Directed Reading and Research	1-18
BIOMEDIN 801	TGR Master's Project	0
BIOMEDIN 802	TGR PhD Dissertation	0
MED 255	The Responsible Conduct of Research	1

The varying backgrounds of students are well recognized and no one is required to take courses in an area in which he or she has already been adequately trained; under such circumstances, students are permitted to skip courses or substitute more advanced work using a formal annual process administered by the BMI executive committee, in which students demonstrate satisfaction of core curriculum prerequisites, and request permission to receive core curriculum credit for classes taken previously in areas of the core curriculum. Students design appropriate programs for their interests with the assistance and approval of their Biomedical Informatics academic adviser. At least 27 units of formal course work are expected for the core curriculum.

### Program Requirements for the Academic M.S., Professional M.S., and Coterminal M.S. Degrees

Students enrolled in any of the M.S. degrees must complete the program requirements in order to graduate. Programs of at least 45 units that meet the following guidelines are normally approved:

1. Completion of the core curriculum with overall GPA of 3.0.
2. Students are expected to participate regularly in BIOMEDIN 201 Biomedical Informatics Student Seminar and a research colloquium, such as BIOMEDIN 200 Biomedical Informatics Colloquium or

BIOMEDIN 205 Precision Practice with Big Data. HCP professional masters candidates who are able to attend classes on campus should also participate regularly.

- Electives: additional courses to bring the total to 45 or more units taken at Stanford to fulfill the University's residency requirement.
- Masters candidates should sign up for BIOMEDIN 801 TGR Master's Project for their project units after completing their 45-unit residency requirement.

## Doctor of Philosophy in Biomedical Informatics

The University's basic requirements for the doctorate (residence, dissertation, examination, and so on) are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

Individuals wishing to prepare themselves for careers as independent researchers in biomedical informatics, with applications experience in bioinformatics, clinical informatics, or imaging informatics, should apply for admission to the doctoral program. The following are additional requirements imposed by the Biomedical Informatics Executive Committee:

- A student plans and completes a coherent program of study including the core curriculum and additional requirements as for the master's program. In the first year, two or three research rotations are encouraged. The master's requirements should be completed by the end of the second year in the program (six quarters of study, excluding summers).
- Doctoral students are generally advanced to Ph.D. candidacy after passing the qualifying exam, which takes place during the end of the second year of training. A student's academic adviser has primary responsibility for the adequacy of the program, which is regularly reviewed by the Biomedical Informatics Executive Committee.
- To remain in the Ph.D. program, each student must attain a grade point average (GPA) of 3.0 for the core curriculum. The student must fulfill these requirements and apply for admission to candidacy for the Ph.D. by the end of six quarters of study (excluding summers). In addition, reasonable progress in the student's research activities is expected of all doctoral candidates.
- During the third year of training, generally in Winter Quarter, each doctoral student is required to give a preproposal seminar that describes evolving research plans.
- By the end of nine quarters (excluding summers), each student must orally present a written thesis proposal for the written dissertation and must orally defend the proposal before a University oral examination committee that generally includes at least one member of the Biomedical Informatics Executive Committee. The committee determines whether the student's general knowledge of the field and the details of the planned thesis are sufficient to justify proceeding with the dissertation.
- After application for Terminal Graduate Registration (TGR) status, the Ph.D. candidate should register each quarter for BIOMEDIN 802 TGR PhD Dissertation so their research effort may be counted toward the degree.
- As part of the training for the Ph.D., each student is required to be a teaching assistant for two courses approved by the Biomedical Informatics Executive Committee; one should be completed in the first two years of study.
- The most important requirement for the Ph.D. degree is the dissertation. Prior to the oral dissertation proposal and defense, each student must secure the agreement of a member of the program faculty to act as dissertation adviser. The principal adviser should be

approved by the Biomedical Informatics Executive Committee, and all dissertation committees should include at least one participating BMI faculty member.

- At the completion of training, while still matriculated and shortly prior to deposit of the dissertation, the student gives a final talk describing his or her results. No official additional oral examination is required upon completion of the written dissertation. The oral defense of the dissertation proposal satisfies the University oral examination requirement.
- The student is expected to demonstrate an ability to present scholarly material and research in a lecture at a formal seminar.
- The student is expected to demonstrate an ability to present scholarly material in concise written form. Each student is required to write a paper suitable for publication, usually discussing his or her doctoral research project. This paper must be approved by the student's academic adviser as suitable for submission to a refereed journal before the doctoral degree is conferred.
- The dissertation must be accepted by a reading committee composed of the principal dissertation adviser, a member of the program faculty, and a third faculty member chosen from anywhere within the University. A fourth reader may be added at the discretion of the student and their adviser.

## Ph.D. Minor in Biomedical Informatics

For a Ph.D. minor in Biomedical Informatics (BMI), a candidate must complete a minimum of 20 unduplicated units of biomedical informatics course work, including 12 units in BMI core courses from:

		Units
BIOMEDIN 210	Modeling Biomedical Systems: Ontology, Terminology, Problem Solving	3
BIOMEDIN 212	Introduction to Biomedical Informatics Research Methodology	3
BIOMEDIN 214	Representations and Algorithms for Computational Molecular Biology	3-4
BIOMEDIN 215	Data Driven Medicine	3
BIOMEDIN 217	Translational Bioinformatics	4
BIOMEDIN 260	Computational Methods for Biomedical Image Analysis and Interpretation	3-4

The candidate must complete the one-unit MED 255 The Responsible Conduct of Research or an approved substitute.

The remaining units must be courses that would count towards the BMI master's degree, taken from these areas:

- Computer Science, Probability, Statistics, Machine Learning, Mathematics, Engineering
- Biomedicine
- Other BMI courses from the list above

Courses used for the BMI Ph.D. minor may not be double-counted to meet the requirements of a master's or Ph.D. degree.

All courses used for the BMI Ph.D. minor, except MED 255, must be taken for a letter grade and passed with an overall GPA of 3.0 or better.

Stanford students apply using the Application for Ph.D. Minor and must provide an unofficial Stanford transcript as well as a statement of purpose for adding the Ph.D. minor degree.

This degree offering became effective in Autumn Quarter 2010-11. Courses taken at Stanford prior to that date may be counted towards the BMI Ph.D.

minor degree. A minor program adviser is assigned from the Biomedical Informatics Executive Committee or advising faculty.

**Committee:** Russ B. Altman (Chair and Program Director), Mark A. Musen (Co-Director), Steven C. Bagley (Executive Director), Atul Butte, Teri Klein, David Paik, Daniel L. Rubin, Nigam Shah

**Participating Faculty and Staff by Department\***

**Biochemistry:** Douglas L. Brutlag (Professor, emeritus), Rhiju Das (Assistant Professor), Ronald Davis (Professor), James Ferrell (Professor), Hunter Fraser (Assistant Professor), Julie Theriot (Associate Professor)

**Bioengineering:** Russ B. Altman (Professor), Kwabena Boahen (Associate Professor), Markus Covert (Assistant Professor), Hunter Fraser (Assistant Professor), Ingmar Riedel-Kruse (Assistant Professor)

**Biology:** Dmitri Petrov (Professor)

**Chemistry:** Vijay Pande (Professor)

**Chemical and Systems Biology:** Joshua Elias (Assistant Professor), James Ferrell (Professor)

**Computer Science:** Serafim Batzoglou (Associate Professor), Gill Bejerano (Assistant Professor), David Dill (Professor), Leo Guibas (Professor), Daphne Koller (Professor), Terry Winograd (Professor)

**Developmental Biology:** Gill Bejerano (Assistant Professor)

**Genetics:** Russ B. Altman (Professor), Steven C. Bagley (Senior Research Engineer), Carlos Bustamante (Professor), Mike Cherry (Associate Professor, Research), Stanley N. Cohen (Professor), Ronald Davis (Professor), Teri E. Klein (Senior Research Scientist), Jin Billy Li (Assistant Professor), Stephen B. Montgomery (Assistant Professor), Gavin Sherlock (Associate Professor), Arend Sidow (Associate Professor), Michael P. Snyder (Professor), Hua Tang (Associate Professor)

**Health Research and Policy:** Richard A. Olshen (Professor), Chiara Sabatti (Associate Professor), Robert Tibshirani (Professor)

**Management Science and Engineering:** Margaret Brandeau (Professor), Ross D. Shachter (Associate Professor)

**Medicine:** Russ B. Altman (Professor), Euan Ashley (Assistant Professor), Mary Goldstein (Professor), Hanlee P. Ji (Assistant Professor), Peter D. Karp (Consulting Assistant Professor), Henry Lowe (Associate Professor, Research; Senior Associate Dean for Information Resources and Technology), Mark A. Musen (Professor), Douglas K. Owens (Professor), Daniel R. Rubin (Assistant Professor), Robert W. Shafer (Professor, Research), Nigam Shah (Assistant Professor), Samson Tu (Senior Research Scientist), P.J. Utz (Associate Professor), Michael G. Walker (Consulting Associate Professor)

**Microbiology and Immunology:** Karla Kirkegaard (Professor), Garry Nolan (Professor), Julie Theriot (Associate Professor)

**Operations, Information and Technology:** Mohsen Bayati (Assistant Professor)

**Pathology:** Stephen B. Montgomery (Assistant Professor)

**Pediatrics:** Atul Butte (Associate Professor), Chris Longhurst (Clinical Associate Professor), Henry Lowe (Associate Professor, Research; Senior Associate Dean for Information Resources and Technology), Jonathan Palma (Clinical Assistant Professor)

**Psychiatry and Behavioral Sciences:** Vinod Menon (Professor)

**Radiation Oncology:** Lei Xing (Professor)

**Radiology:** Sam Gambhir (Professor), Sandy A. Napel (Professor), David Paik (Assistant Professor), Sylvia Plevritis (Associate Professor), Daniel L. Rubin (Assistant Professor)

**Structural Biology:** Michael Levitt (Professor), Vijay Pande (Professor)

**Statistics:** Trevor J. Hastie (Professor), Susan Holmes (Professor), Art Owen (Professor), Chiara Sabatti (Associate Professor), Robert Tibshirani (Professor), Michael G. Walker (Consulting Associate Professor)

\* Research opportunities are not limited to faculty and departments listed.

# Cancer Biology

Courses offered by the Cancer Biology Program are listed under the subject code CBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CBIO&filter-catalognumber-CBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CBIO&filter-catalognumber-CBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CBIO&filter-catalognumber-CBIO=on>).

The Cancer Biology Program at Stanford University is an interdisciplinary program leading to the Ph.D. degree. During the past three decades, understanding of cancer has increased with the discovery of oncogenes, tumor suppressor genes, pathways of DNA damage and repair, chromatin remodeling, cell cycle regulation, angiogenesis, and responses to hypoxia, and recent glimpses into the molecular basis of metastasis and cancer stem cell biology. In addition, methods of parallel analysis including gene expression arrays, protein arrays, and tissue arrays have begun to refine and redefine the taxonomy of cancer diagnosis. This explosion of basic and clinical science has resulted in the first successful cancer chemotherapies and immunotherapies based on the knowledge of specific molecular targets. Stanford presents a unique environment to pursue interdisciplinary cancer research because the schools of Medicine, Humanities and Sciences, and Engineering are located on a single campus.

The goal of the Cancer Biology Ph.D. program is to provide students with education and training that enables them to make significant contributions to this field. Course work during the first year is designed to provide a broad understanding of the molecular, genetic, cell biological, and pathobiological aspects of cancer. Students also learn about the current state of the epidemiology, clinical diagnosis, treatment, and prevention of human cancers. Equally important during the first year is a series of three rotations in research laboratories chosen by each student. By the beginning of the second year, each student chooses a research adviser and begins work on the dissertation project. A qualifying examination must be completed by the end of the second year. An annual Cancer Biology conference at Asilomar in Pacific Grove, California, provides students with an opportunity to present their research to one another and to faculty. The expected time to degree is four to five years.

Students are not limited to a single department in choosing their research adviser. The Cancer Biology Ph.D. program currently has approximately 65 graduate students located in basic science and clinical departments throughout the School of Medicine and the School of Humanities and Sciences.

## Doctor of Philosophy in Cancer Biology

University requirements for the Ph.D. are described under the "Graduate Degrees (p. 38)" section of this bulletin.

A small number of applicants are admitted to the program each year. Applicants should have completed an undergraduate major in the biological sciences; applicants with undergraduate majors in physics, chemistry, or mathematics may be admitted if they complete background training in biology during the first two years of study. During the first year, each student is required to complete a minimum of three, one quarter laboratory rotations. Students must choose a dissertation adviser prior to the end of Summer Quarter, first year, but not before the end of Spring Quarter, first year.

The requirements for the Ph.D. degree are as follows:

1. Training in biology equivalent to that of an undergraduate biology major at Stanford.
2. Completion of the following courses:

		<b>Units</b>
BIOS 200	The Nucleus (For classes entering in 2012 or later. Students who entered in 2011 or earlier took GENE 203, Advanced Genetics.)	8
CBIO 241	Molecular, Cellular, and Genetic Basis of Cancer (Offered in Winter Quarter)	5
BIO 214	Advanced Cell Biology	4
Select one of the following:		
BIOMEDIN 214	Representations and Algorithms for Computational Molecular Biology	
BIOMEDIN 217	Translational Bioinformatics	
CBIO 243	Principles of Cancer Systems Biology	
CSB 210	Cell Signalling	
GENE 211	Genomics	
GENE 212	Introduction to Biomedical Informatics Research Methodology	
SBIO 241	Biological Macromolecules	
CBIO 280	Cancer Biology Journal Club (required for first- and second-year graduate students in Autumn, Winter, and Spring quarters, totaling 6 units)	1
MED 255	The Responsible Conduct of Research	1

3. At least 6 units of additional cancer biology-related, graduate-level courses. Course work taken is determined in consultation with the student's adviser and/or the Program Director.
4. Presentation of research results at the annual Cancer Biology Conference on at least three occasions, at least one being an oral presentation.
5. Completion of a qualifying examination in Cancer Biology is required for admission to Ph.D. candidacy. The exam consists of an NIH-style written grant proposal not to exceed ten pages (excluding references) and an oral examination. The examining committee consists of three faculty members from the Cancer Biology Program and does not include the student's dissertation adviser. The composition of this committee is chosen by the student and dissertation adviser and must be submitted to and approved by the program director prior to the end of Autumn Quarter, second year. The qualifying examination must be taken prior to the end of Spring Quarter, second year. If necessary, one retake is permitted prior to the end of Summer Quarter, second year. After the qualifying examination has been completed, the student is required to form a dissertation reading committee that includes the student's adviser and three other members of the Academic Council with appropriate expertise. Each student is required to arrange annual meetings (more frequently, if necessary) of the dissertation reading committee, at which time progress during the past year and a plan of study for the coming year are presented orally and discussed. Completion of each annual committee meeting must be communicated in writing to the program director by the adviser by the end of Spring Quarter each year.

The major accomplishment of each successful Ph.D. student is the presentation of a written dissertation resulting from independent investigation that contributes to knowledge in the area of cancer biology. An oral examination is also required for the Ph.D. degree. In the Cancer Biology Program, a public seminar (one hour) is presented by the Ph.D. candidate, followed by a closed-door oral examination. The oral examination committee consists of at least four examiners (the members of the doctoral dissertation reading committee) and a chair. The oral

examination chair must be from outside the Cancer Biology Program faculty and may not have a full or joint appointment in the adviser's or student's home department. However, a courtesy appointment does not affect eligibility. The oral examination chair may be from the same department as any other member(s) of the examination committee. All members of the oral examination committee are normally members of the Academic Council, as the oral examination chair must be. With the prior approval of the program director or school dean, one of the examiners may be a person who is not a member of the Academic Council if that individual contributes expertise not otherwise available. Official responsibility for selecting the oral examination chair rests with the program. Cancer Biology delegates this to the student and dissertation adviser.

*Program Director:* Amato Giaccia (Radiation Oncology)

*Committee on Cancer Biology:* Steven Artandi (Medicine, Hematology), Jeffrey Axelrod (Pathology), Katrin Chua (Medicine, Endocrinology), Max Diehn (Radiation Oncology), Edward Graves (Radiation Oncology), Ashby Morrison (Biology), Sylvia Plevritis (Radiology), Jonathan Pollack (Pathology), Alejandro Sweet-Cordero (Pediatrics), Monte Winslow (Genetics)

#### **Participating Departments and Faculty**

*Biochemistry:* Philip Beachy (Professor), Patrick O. Brown (Professor)

*Bioengineering:* Jennifer Cochran (Assistant Professor)

*Biology (School of Humanities and Sciences):* Martha Cyert (Professor), Judith Frydman (Professor), Or Gozani (Associate Professor), Ashby Morrison (Assistant Professor), W. James Nelson (Professor), Tim Stearns (Professor), Virginia Walbot (Professor)

*Chemical And Systems Biology:* James K. Chen (Associate Professor), Karlene Cimprich (Associate Professor), James E. Ferrell (Professor), Tobias Meyer (Professor), Daria Mochly-Rosen (Professor), Mary Teruel (Assistant Professor)

*Dermatology:* Howard Y. Chang (Professor), Paul A. Khavari (Professor), M. Peter Marinkovich (Associate Professor), Anthony Oro (Professor)

*Developmental Biology:* Margaret Fuller (Professor), Seung Kim (Professor), Stuart Kim (Professor), Roeland Nusse (Professor), Matthew Scott (Professor), Lucy Shapiro (Professor)

*Genetics:* Anne Brunet (Associate Professor), Michele Calos (Professor), Stanley Cohen (Professor), Monte M. Winslow (Assistant Professor)

*Medicine/Blood and Marrow Transplantation:* Robert Negrin (Professor)

*Medicine/Cardiovascular Medicine:* Ching-Pin Chang (Associate Professor)

*Medicine/Endocrinology/Gerontology/Metabolism:* Katrin Chua (Assistant Professor), Andrew R. Hoffman (Professor)

*Medicine/Gastroenterology and Hepatology:* Christine Cartwright (Professor), Anson Lowe (Associate Professor)

*Medicine/Hematology:* Steven Artandi (Professor), Linda Boxer (Professor), Calvin Kuo (Professor), Ravindra Majeti (Assistant Professor)

*Medicine/Oncology:* Ash Alizadeh (Assistant Professor), Gilbert Chu (Professor), Michael Clarke (Professor), Dean Felsher (Associate Professor), James Ford (Associate Professor), Ronald Levy (Professor), Shoshana Levy (Professor, Research), Beverly S. Mitchell (Professor; Director, Stanford Cancer Institute), Rajat Rohatgi (Assistant Professor), Branimir Sikic (Professor)

*Medicine/Pulmonary and Critical Care Medicine:* Glenn Rosen (Associate Professor)

*Microbiology and Immunology:* Helen M. Blau (Professor), Garry Nolan (Professor)

*Neurology and Neurological Sciences:* Thomas Rando (Professor)

*Neurology and Neurosurgery:* Yoon-Jae Cho (Assistant Professor)

*Neurosurgery:* Albert J. Wong (Professor)

*Obstetrics and Gynecology:* Renee A. Reijo Pera (Professor)

*Orthopaedic Surgery:* Nidhi Bhutani (Assistant Professor)

*Otolaryngology:* John Sunwoo (Assistant Professor)

*Pathology:* Jeff Axelrod (Associate Professor), Matthew Bogyo (Associate Professor), Michael Cleary (Professor), Gerald Crabtree (Professor), Edgar Engleman (Professor), Andrew Fire (Professor), Isabella Graef (Assistant Professor), Joseph Lipsick (Professor), Bingwei Lu (Associate Professor), Jonathan Pollack (Associate Professor), Arend Sidow (Associate Professor), Irving Weissman (Professor; Virginia & D.K. Ludwig Professor for Clinical Investigation in Cancer Research, Professor of Developmental Biology), Marius Wernig (Assistant Professor)

*Pediatrics/Cancer Biology:* Matthew Porteus (Associate Professor), Julien Sage (Associate Professor), Alejandro Sweet-Cordero (Assistant Professor)

*Pediatrics/Cardiology:* Marlene Rabinovitch (Professor)

*Pediatrics/Endocrinology:* Brian Feldman (Assistant Professor)

*Pediatrics/Hematology/Oncology:* Kathleen Sakamoto (Professor)

*Pediatrics/Neonatal & Developmental Medicine:* Christopher Contag (Professor)

*Radiation Oncology/Radiation Biology:* Laura Attardi (Associate Professor), J. Martin Brown (Professor), Amato Giaccia (Professor; Director, Stanford University Cancer Biology Program)

*Radiation Oncology/Radiation Physics:* Edward Graves (Associate Professor)

*Radiation Oncology/Radiation Therapy:* Max Diehn (Assistant Professor), Susan Knox (Associate Professor), Albert Koong (Associate Professor), Quynh-Thu Le (Professor)

*Radiology/Diagnostic Radiology:* Sylvia Plevritis (Associate Professor), Jianghong Rao (Associate Professor)

*Structural Biology:* William Weis (Professor)

*Urology:* Donna Peehl (Professor, Research), Zijie Sun (Associate Professor)

# Chemical and Systems Biology

Courses offered by the Department of Chemical and Systems Biology are listed under the subject code CSB on the (<https://explorecourses.stanford.edu/search?q=CSB&view=catalog&page=0&catalog=71&filter-term-Autumn=on&filter-term-Winter=on&filter-term-Spring=on&filter-term-Summer=on&filter-coursestatus-Active=on&collapse=&filter-catalognumber-CSB=on&filter-catalognumber-CSB=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CSB&filter-catalognumber-CSB=on>) ExploreCourses web site. (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=CSB&filter-catalognumber-CSB=on>)

The department emphasizes individualized training at the interface of physical science and biomedical science. The program encourages students to draw upon a variety of modern scientific techniques, ranging from recent advances in molecular biology and protein biochemistry to synthetic organic chemistry and single cell imaging. Graduate students in the department take courses in signal transduction networks, chemical biology, and other areas of importance to their research goals.

## Master of Science in Chemical and Systems Biology

Students in the Ph.D. program may apply for an M.S. degree after having satisfactorily completed the course and laboratory requirements of the first two years. The degree also requires a written thesis based on literature or laboratory research. Postdoctoral research training is available to graduates having the Ph.D. or M.D. degree.

## Doctor of Philosophy in Chemical and Systems Biology

University requirements for the Ph.D. are described in the "Graduate Degrees (<http://exploreddegrees.stanford.edu/schoolofmedicine/chemicalandsystemsbiology/%20/graduatedegrees/>)" section of this bulletin.

The Department of Chemical and Systems Biology offers interdisciplinary training to prepare students for independent careers in biomedical science. The main focus of the program is cell signaling, chemical biology, and systems biology.

The program leading to the Ph.D. degree includes formal and informal study in chemical biology, systems biology, drug discovery, biochemistry, and other areas of relevance to the interests of particular students. First-year students spend one quarter in each of three different laboratories, working closely with other graduate students, a professor, and postdoctoral fellows on various research projects. During the fourth quarter, the student chooses a faculty mentor with whom to undertake thesis research, based on available positions and the student's interest. During or before the eighth quarter of study, students must pass a qualifying exam which consists of an oral exam on general knowledge and a defense of a research proposal. Course requirements are fulfilled during the first two years of study; the later years of the four- to six-year program are devoted to full-time dissertation research. Close tutorial contact between students and faculty is stressed throughout the program.

Research opportunities also exist for medical students and undergraduates. The limited size of the labs in the department allows for close tutorial contact between students, postdoctoral fellows, and faculty.

The department participates in the four quarter Health and Human Disease and Practice of Medicine sequence which provides medical students with a comprehensive, systems-based education in physiology, pathology, microbiology, and pharmacology.

*Emeriti: (Professors)* Robert H. Dreisbach, Avram Goldstein, Dora B. Goldstein, Tag E. Mansour, Oleg Jardetzky, Richard A. Roth, James P. Whitlock

*Chair:* Tobias Meyer

*Professors:* James E. Ferrell, Jr., Tobias Meyer, Daria Mochly-Rosen  
*Associate Professors:* James K. Chen, Karlene A. Cimprich, Thomas J. Wandless

*Assistant Professors:* Joshua Elias, Mary Teruel, Joanna K. Wysocka

*Courtesy Professors:* Stuart Kim, Beverly S. Mitchell, Paul A. Wender

*Courtesy Associate Professors:* Calvin J. Kuo, Matthew Bogyo

*Courtesy Assistant Professors:* Ajay Chawla, Markus Willard Covert, Jan M. Skotheim

# Comparative Medicine

Courses offered by the Department of Comparative Medicine are listed under the subject code COMPMED on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMPMED&filter-catalognumber-COMPED=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMPMED&filter-catalognumber-COMPED=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=COMPMED&filter-catalognumber-COMPED=on>).

The Department of Comparative Medicine is a clinical department that offers residency training in laboratory animal medicine for veterinarians. Its faculty offer courses at the undergraduate and graduate levels. Clinical faculty and basic science faculty in the Department of Comparative Medicine accept students to participate in research projects.

The discipline of Comparative Medicine studies the differences and similarities among species to elucidate biological and disease mechanisms. The research interests of faculty include neuroscience, infectious diseases, neuropathology, cancer, molecular genetics, and laboratory animal science.

*Chair:* Sherril Green

*Professors:* Donna M. Bouley, Sherril Green

*Associate Professors:* Paul Buckmaster, Corinna Darian-Smith, Joseph Garner, Shaul Hestrin

*Assistant Professors:* Megan Albertelli, Stephen Felt, Jennifer Johns, Claude Nagamine, Cholawat Pacharinsak

# Developmental Biology

Courses offered by the Department of Development Biology are listed under the subject code DBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=DBIO&filter-catalognumber-DBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=DBIO&filter-catalognumber-DBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=DBIO&filter-catalognumber-DBIO=on>).

A fundamental problem in biology is how the complex set of multicellular structures that characterize an adult animal is generated from the fertilized egg. Recent advances at the molecular level, particularly with respect to the genetic control of development, have been explosive. These advances represent the beginning of a major movement in the biological sciences toward the understanding of the molecular mechanisms underlying developmental decisions and the resulting morphogenetic processes. This new thrust in developmental biology derives from the extraordinary methodological advances of the past decade in molecular genetics, immunology, and biochemistry. However, it also derives from groundwork laid by the classical developmental studies, the rapid advances in cell biology and animal virology, and from models borrowed from prokaryotic

systems. Increasingly, the work is directly related to human diseases, including oncogene function and inherited genetic disease.

The Department of Developmental Biology includes a critical mass of scientists who are leading the thrust in developmental biology and who can train new leaders in the attack on the fundamental problems of development. Department labs work on a wide variety of organisms from microbes to worms, flies, and mice. The dramatic evolutionary conservation of genes that regulate development makes the comparative approach of the research particularly effective. Scientists in the department labs have a very high level of interaction and collaboration. The discipline of developmental biology draws on biochemistry, cell biology, genetics, molecular biology, and genomics. People in the department have a major interest in regenerative medicine and stem cell biology.

The department is located in the Beckman Center for Molecular and Genetic Medicine within the Stanford University Medical Center.

## Master of Science in Developmental Biology

University requirements for the M.S. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

Students in the Ph.D. program in Developmental Biology may apply for an M.S. degree, assuming completion of their course requirements and preparation of a written proposal. The master's degree awarded by the Department of Developmental Biology does not include the possibility of minors for graduate students enrolled in other departments or programs.

Students are required to take, and satisfactorily complete, at least three lecture courses offered by the department, including DBIO 210 Developmental Biology. In addition, students are required to take three courses outside the department. Students are also expected to attend Developmental Biology seminars and journal clubs. In addition, the candidate must complete a research paper proposing a specific experimental approach and background in an area of science relative to developmental biology.

## Doctor of Philosophy in Developmental Biology

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The graduate program in Developmental Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program (MSTP) in which individuals are candidates for both the M.D. and Ph.D. degrees.

		Units
Students are required to complete at least six courses, including:		
DBIO 210	Developmental Biology	4
BIOS 200	The Nucleus	8
DBIO 215	Frontiers in Biological Research	1

An advanced molecular biology, biochemistry, or biophysics course

Students are expected to attend Developmental Biology seminars and journal clubs.

Completion of a qualifying examination is required for admission to Ph.D. candidacy. The examination consists of two parts. One proposal is on a subject different from the dissertation research and the other proposal is on the planned subject of the thesis. The final requirements of the program include presentation of a Ph.D. dissertation as the result of independent investigation and constituting a contribution to knowledge in the area of developmental biology. The student must pass the University oral

examination, taken only after the student has substantially completed research. The examination is preceded by a public seminar in which the research is presented by the candidate. The oral examination is conducted by a dissertation reading committee.

*Emeriti: (Professors)* David S. Hogness, A. Dale Kaiser

*Chair:* William Talbot

*Associate Chair:* tba

*Professors:* Ben Barres, Philip Beachy, Gerald Crabtree, Margaret Fuller, Seung Kim, Stuart Kim, David Kingsley, Roeland Nusse, Matthew Scott, Lucy Shapiro, William Talbot, Anne Villeneuve, Irving Weissman

*Assistant Professors:* Maria Barna, Gill Bejerano, Joanna Wysocka

*Associate Professor:* James Chen

*Professor (Teaching):* Ellen Porzic

*Professor (Research):* Harley McAdams

# Genetics

Courses offered by the Department of Genetics are listed under the subject code GENE on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GENE&filter-catalognumber-GENE=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GENE&filter-catalognumber-GENE=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=GENE&filter-catalognumber-GENE=on>).

An underlying theme in the department is that genetics is not merely a set of tools but a coherent and fruitful way of thinking about biology and medicine. To this end, the department emphasizes a spectrum of approaches based on molecules, organisms, populations, and genomes. It provides training through laboratory rotations, dissertation research, seminar series, didactic and interactive course work, and an annual three-day retreat of nearly 200 students, faculty, postdoctoral fellows, and research staff.

The mission of the department includes education and teaching as well as research: graduates from our program pursue careers in many different venues including research in academic or industrial settings, health care, health policy, and education. The department is especially committed to increasing diversity within the program, and to the training of individuals from traditionally underrepresented minority groups.

## Master of Science in Human Genetics

The University requirements for the M.S. are described in the "Graduate Degrees (<http://www.stanford.edu/dept/registrar/bulletin/4901.htm>)" section of this bulletin.

The Department of Genetics offers an M.S. in Human Genetics, which is accredited by the American Board of Genetic Counseling. This program prepares students to practice in the healthcare profession of genetic counseling. The program is a full time two-year program, and accepts students to begin the program only in Autumn Quarter. Students must be admitted directly into this program, and cannot automatically transfer from the Ph.D. programs within the department, or vice versa. While courses are oriented primarily towards genetic counseling students, they may also be taken by medical students, other graduate students, residents or post-doctoral fellows, and (with permission) undergraduates.

The degree requires the completion of clinical rotations and an approved research project.

Students must also complete:

- required course work:

		Units
GENE 271	Human Molecular Genetics	4
GENE 272	Introduction to Medical Genetics	2-3
GENE 273	Introduction to Clinical Genetics Testing	1
GENE 274A	A Case Based Approach to Clinical Genetics	2
GENE 274B	A Case Based Approach to Clinical Genetics	2
GENE 275	Role Play and Genetic Counseling Observations	2
GENE 276	Genetic Counseling Clinical Rotations	4-7
GENE 278	Prenatal Genetic Counseling	1
GENE 279	Pediatric and Adult Genetic Counseling	1
GENE 280	Metabolic Genetic Counseling	1
GENE 281	Cancer Genetic Counseling	1
GENE 282A	Genetic Counseling Research Seminar	1
GENE 282B	Genetic Counseling Research Seminar	1
GENE 283	Genetic Counseling Research	1-8
GENE 284	Medical Genetics Seminar	1-2
GENE 285A	Genetic Counseling Seminar	2-3
GENE 285B	Genetics Counseling Seminar	2-3
GENE 285C	Genetic Counseling Seminar	2-3
GENE 286	Advanced Genetic Counseling Seminar	2

- several additional required courses (bioethics, research ethics and developmental biology),
- and are encouraged to take 2-4 elective courses of their choice, including a research methods elective.

Faculty members include members of the Stanford faculty from Genetics, Pediatrics, Obstetrics, Pathology, Developmental Biology, Biomedical Ethics, Law, and Psychology, and practicing genetic counselors and clinical geneticists in various medical centers across the Bay Area.

Applications are due in December (see web site) for admission in the following Autumn Quarter. Applicants should demonstrate a combination of academic preparation, exposure to genetic counseling, and counseling and/or laboratory experiences. Exposure to persons with disabilities or chronic illness is also helpful. Additional information about the program is available at Stanford's Master's Program in Human Genetics (<http://www.med.stanford.edu/genetic-counseling>) web site.

## Doctor of Philosophy in Genetics

University requirements for the Ph.D. degree are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The Ph.D. program in the Department of Genetics offers graduate students the opportunity to pursue a discipline that encompasses both a set of tools and a coherent way of thinking about biology and medicine. All major areas of genetics are represented in the department, including human genetics (molecular identification of Mendelian traits and the pathophysiology of genetic disease, gene therapy, genetic epidemiology, analysis of complex traits, and human evolution), and application of model organisms such as bacteria, yeast, flies, worms, or mice to basic questions in biomedical research. The department is especially strong in genomic and bioinformatic approaches to genome biology and evolution, and includes several genome-scale databases such as the *Saccharomyces* Genome Database (SGD), the Stanford Microarray Database (SMD), and the Pharmacogenetics and Pharmacogenomics Knowledge Base (PharmGKB) and, administered through the Department of Biochemistry, the Stanford Genome Technology Center (SGTC).



Exposure to the intellectual scope of the department is provided by laboratory rotations, dissertation research, advanced courses in genetics and other areas of biomedical science, seminar series, journal clubs, and an annual three-day retreat of faculty, students, postdoctoral fellows, and staff scientists. Emphasis is placed on interactions and collaborations among students, postdoctoral students, and faculty within the department and throughout the campus.

During their first year, graduate students in the department take graduate courses and sample areas of research by doing rotations in three or four laboratories. At the end of the first three quarters, students may select a laboratory in which to do their dissertation research. While the dissertation research is generally performed in one laboratory, collaborative projects with more than one faculty member are encouraged. In addition to interacting with their faculty preceptor, graduate students receive advice regularly from other faculty members who serve as members of their dissertation committee. Study for the Ph.D. generally requires between four and five years of graduate work, most of which is focused on dissertation research.

Students are generally enrolled in the program to receive the Ph.D. degree, although a limited number of M.D. candidates can combine research training in genetics with their medical studies. Ph.D. candidates who have passed the qualifying exam in the second year can opt to receive the M.S. as a terminal degree.

There are opportunities for graduate students to teach in graduate-level and professional-school courses. In addition, students have the opportunity to participate in educational outreach activities coordinated by the department, which include opportunities to interact with secondary school students and teachers, lay groups, and local science museums.

Students who have recently received a bachelor's, master's, M.D., or Ph.D. degree in related fields may apply for graduate study. Prospective students must have a background in biology, mathematics, physics, and chemistry. Decisions for admission are based on comparison of the relative merits of all the candidates' academic abilities and potential for research and the department's interest in promoting a diverse learning environment. Interviews take place in late February or early March and successful applicants are offered admission by early spring. Students who wish to pursue a combined M.D./Ph.D. degree are considered for admission into the graduate program in the department after they have been admitted to the M.D. program in the School of Medicine.

Students begin graduate studies in Autumn Quarter. Prospective students are encouraged to start the application process early to ensure that they are able to submit a complete application by the December deadline. All students accepted into the Ph.D. program in the Department of Genetics are provided with full tuition and a stipend. Two training grants from the National Institutes of Health provide major support for the graduate training program in the department. Other student support is provided by departmental funds and from research grants, both federal and private, of the faculty. In addition, a number of graduate students are funded by fellowships, including those from the National Science Foundation and the Stanford Graduate Fellows program.

*Emeritus:* (Professor) Greg Barsh, Leonard Herzenberg, Uta Francke

*Chair:* Michael Snyder

*Professors:* Russ Altman, Carlos Bustamante, Michele Calos, Stanley Cohen, Ronald Davis, Andrew Fire, Margaret Fuller, Mark Kay, Stuart Kim, Joseph Lipsick, John Pringle, Matthew Scott, Tim Stearns, Anne Villeneuve

*Associate Professors:* Laura Attardi, Julie Baker, Anne Brunet, James Ford, Gavin Sherlock, Aaron Gitler, Arend Sidow, Julien Sage, Zijie Sun, Hua Tang, Douglas Vollrath

*Assistant Professors:* William Greenleaf, Jin Billy Li, Stephen Montgomery, Monte Winslow

*Professor (Research):* Leonore Herzenberg

*Associate Professor (Research):* J. Michael Cherry

*Associate Professor (Teaching):* Kelly Ormond

*Courtesy Professor:* Hank Greely, Alexander Urban

*Lecturer:* Andrea Kwan

## Health Research and Policy

Courses offered by the Department of Health Research and Policy are listed under the subject code HRP on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HRP&filter-catalognumber-HRP=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HRP&filter-catalognumber-HRP=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=HRP&filter-catalognumber-HRP=on>).

The Department of Health Research and Policy has three principal areas of scholarly interest:

1. Biostatistics deals with scientific methodology in the medical sciences, emphasizing the use of statistical techniques.
2. Epidemiology is the study of the distribution and determinants of illness and impairment in human populations. Epidemiology training provides analytic tools for clinical and translational research, including studies of disease etiology, prevention, and therapy.
3. Health Services Research is concerned with many aspects of health policy analysis in the public and private sectors

### Graduate Programs in Health Research Policy

The Program in Epidemiology and the Program in Health Services Research are housed in the Department of Health Research and Policy. These programs offer M.S. degrees in Epidemiology and in Health Services Research. Students with an interest in pursuing advanced degrees with an emphasis on biostatistics can do so through programs offered by the Department of Statistics. Division of Biostatistics faculty participate in these programs.

For additional information, address inquiries to the Educational Coordinator, Department of Health Research and Policy, Stanford University School of Medicine, HRP Redwood Building, Room T-152F, Stanford, California 94305-5405.

### Master of Science in Health Services Research

The master's degree program in Health Services Research seeks to train students in the quantitative analysis of issues in health and medical care. The program emphasizes an individually designed program of course work and completion of a master's project under the mentorship of a faculty member. The typical student in the program is either a physician who has completed residency training and is preparing for a research career, or a student with a strong background in policy analysis who wishes to focus on problems in health or medical care. Faculty interests include outcomes research, health economics, health care organization, health care access, quality of care, decision analysis, clinical guidelines, and assessment of patient preferences and quality of life.

To receive the degree, students are expected to demonstrate knowledge of issues in health services research and the quantitative skills necessary for research in this area. Students must take at least 45 units of course work and write a University thesis. The course work requirements are:

1. At least 8 units from the following group of Health Research and Policy (HRP) core courses:
 

		Units
HRP 256	Economics of Health and Medical Care	5
HRP 391	Health Care Regulation, Finance and Policy	3
HRP 392	Analysis of Costs, Risks, and Benefits of Health Care	4
Total Units		12
2. At least 6 units of graduate-level statistics courses.
 

		Units
HRP 261 & HRP 262	Intermediate Biostatistics: Analysis of Discrete Data and Intermediate Biostatistics: Regression, Prediction, Survival Analysis (strongly recommended)	6
Total Units		6
3. At least 3 units of:
4. At least 15 units:
 

		Units
HRP 283	Health Services Research Core Seminar	1
Total Units		1
5. At least 15 units:
 

		Units
HRP 299	Directed Reading in Health Research and Policy	1-18
or HRP 399	Graduate Research	1-18
Total Units		1-18
6. An additional set of approved elective courses to complete the program total of at least 45 units.

For additional information, address inquiries to the Educational Coordinator, Department of Health Research and Policy, Stanford University School of Medicine, HRP Redwood Building, Room T138C, Stanford, California 94305-5405.

## Master of Science in Epidemiology

The Graduate Program in Epidemiology offers instruction and interdisciplinary research opportunities leading to the M.S. degree in Epidemiology. Epidemiology is the study of the distribution and determinants of illness and impairment in human populations. It is important in its own right, and epidemiologic methods are used by clinical investigators and by other scientists who conduct observational and experimental research on the identification, prevention, and treatment of human disorders.

Core and affiliated faculty come from the Department of Health Research and Policy; other Stanford University departments, and notable Bay Area research facilities. The Program has particular strengths in cancer epidemiology, cardiovascular disease epidemiology, infectious disease epidemiology, musculoskeletal disease epidemiology, neuroepidemiology, and aspects of epidemiologic methods, genetic epidemiology, and reproductive epidemiology and women's health.

The mission of the Stanford University School of Medicine is to be a premier research-intensive medical school that improves health through leadership and collaborative discoveries and innovation in patient care, education and research. With support from a NIH Clinical and Translational

Science Award, the graduate program in Epidemiology fosters this mission through the training of physician investigators in techniques of clinical research. The department also considers students from other disciplines who would benefit from formal training in epidemiologic methods.

A typical student has the M.D. degree and is in the fellowship stage of his or her postgraduate training, or in an early stage of faculty development. Other students may not have prior clinical training. These may include behavioral, social, and life scientists; law students; and students with the baccalaureate degree. They may wish to bring an epidemiologic orientation to their research or practice, or they may be considering careers in epidemiology or a related discipline.

To receive the M.S. degree, students are expected to obtain a grounding in epidemiologic methods and applied biostatistics and to demonstrate research skills through the completion of a thesis. Students must complete at least 45 units of course work:

1. Epidemiologic methods:
 

		Units
HRP 225	Design and Conduct of Clinical and Epidemiologic Studies	3-4
HRP 226	Advanced Epidemiologic and Clinical Research Methods	3-4
HRP 251	Design and Conduct of Clinical Trials	3
2. Biostatistics:
 

		Units
HRP 259	Introduction to Probability and Statistics for Epidemiology	3-4
HRP 261	Intermediate Biostatistics: Analysis of Discrete Data	3
HRP 262	Intermediate Biostatistics: Regression, Prediction, Survival Analysis	3
3. Research seminars:
 

		Units
HRP 236	Epidemiology Research Seminar (at least 3 units)	1
4. Research:
 

		Units
HRP 399	Graduate Research (at least 12 units)	1-18
5. Research conduct:
 

		Units
MED 255	The Responsible Conduct of Research	1
Attend a Human Subjects Institutional Review Board meeting.		
6. Additional approved selective and elective courses to complete the program total of at least 45 units.

Students are assigned a methodology mentor from the Department of Health Research and Policy, and they also select a research mentor, who may be from another department. For physicians, the research mentor is often an affiliated faculty member from the department of the student's clinical specialty.

University requirements for the M.S. degree are described in the "Graduate Degrees (p. 38)" section of this bulletin. Other programmatic requirements are in Graduate Program in Epidemiology, Information and Guidelines, available from the educational coordinator in the Department of Health Research and Policy.

## Health Research and Policy

*Emeriti: (Professors) Dan Bloch, John Farquhar, Victor R. Fuchs*

*Chair:* Phil Lavori

*Co-Chair:* Robert Tibshirani

*Professors:* Laurence Baker, Bradley Efron, Trevor Hastie, Victor W. Henderson, Mark Hlatky, John Ioannidis, Iain M. Johnstone, Abby C. King, Philip W. Lavori, Ying Lu, Yvonne Maldonado, Richard A. Olshen, Julie Parsonnet, Robert Tibshirani, Alice S. Whittemore, Dee W. West, Wing Wong

*Associate Professor:* M. Kate Bundorf, Lorene M. Nelson, Chiara Sabatti

*Assistant Professors:* Marc Coram, Allison Kurian, Mei-Chiung Shih, Weiva Sieh, Lu Tian

*Assistant Professors (Clinical):* Rita Papat, Kristin Sainani

*Courtesy Professors:* Mary Goldstein, Paul Heidenreich, Daniel Kessler, Alex Macario, Douglas Owens, Paul Wise

*Courtesy Associate Professors:* Jay Bhattacharya, David R. Rogosa

*Courtesy Assistant Professors:* Grant Miller

*Senior Lecturer:* Irene Corso

*Lecturers:* Raymond Balise, Scarlett Gomez, Laurel Habel, De Kun Li, David Lilienfeld, Cynthia O'Malley, Caroline Tanner, Stephen Van Den Eeden

*Consulting Professors:* Gary Friedman, Elizabeth Holly, Marion Lee, George Lundberg, Peggy Reynolds

*Consulting Associate Professors:* Paul Barnett, Sally Glaser, Pamela Horn-Ross, Esther John, Ciaran Phibbs

*Consulting Assistant Professors:* Ellen Chang, Christina Clarke-Dur, Theresa Keegan, Bang Nguyen, Ingrid Oakley-Girvan, Rudy Rull, Todd Wagner

## Health Services Research

*Director:* Mark Hlatky (Professor, Health Research and Policy, and Medicine)

*Executive Committee:* Laurence Baker (Professor, Health Research and Policy), M. Kate Bundorf (Associate Professor, Health Research and Policy), Mary Goldstein (Professor, Medicine), Mark Hlatky (Professor, Health Research and Policy, and Medicine), Douglas Owens (Professor, Medicine)

*Participating Faculty and Staff by Department:*

*Anesthesia:* Alex Macario (Professor)

*Business:* Alain Enthoven (Professor, emeritus)

*Health Research and Policy:* Laurence Baker (Professor), Paul Barnett (Consulting Associate Professor), M. Kate Bundorf (Associate Professor), Victor Fuchs (Professor, emeritus), Trevor Hastie (Professor), Mark Hlatky (Professor), Philip Lavori (Professor), Richard Olshen (Professor), Ciaran Phibbs (Consulting Associate Professor), Joseph Selby (Consulting Professor), Robert Tibshirani (Professor)

*Law:* Henry Greely (Professor), Daniel Kessler (Professor)

*Management Science and Engineering:* Margaret Brandeau (Professor)

*Medicine:* Jay Bhattacharya (Associate Professor), Jeremy Goldhaber-Fiebert (Assistant Professor), Mary Goldstein (Professor), Michael Gould (Associate Professor), Paul Heidenreich (Associate Professor), Mark Hlatky (Professor), Grant Miller (Assistant Professor), Douglas Owens (Professor), Wolfgang Winkelmayr (Associate Professor)

*Pediatrics:* Paul Wise (Professor)

*Psychiatry:* Rudolph Moos (Professor, emeritus)

*Sociology:* Richard Scott (Professor, emeritus)

## Epidemiology

*Director:* Victor W. Henderson (Professor, Health Research and Policy, and Neurology and Neurological Sciences)

*Core Faculty and Academic Teaching Staff:* Raymond R. Balise (Lecturer, Health Research and Policy), Gary D. Friedman (Consulting Professor, Health Research and Policy), Victor W. Henderson (Professor, Health Research and Policy, and Neurology and Neurological Sciences), Abby C. King (Professor, Health Research and Policy, and Medicine), Allison Kurian (Assistant Professor, Medicine, and Health Research and Policy), Philip Lavori (Professor, Health Research and Policy), Yvonne A. Maldonado (Professor, Pediatrics), Lorene M. Nelson (Associate Professor, Health Research and Policy), Julie Parsonnet (Professor, Medicine, and Health Research and Policy), Rita A. Papat (Clinical Assistant Professor, Health Research and Policy), Kristin L. Sainani (Clinical Assistant Professor, Health Research and Policy), Weiva Sieh (Assistant Professor, Health Research and Policy), Dee W. West (Professor, Health Research and Policy), Alice S. Whittemore (Professor, Health Research and Policy)

## Immunology

Courses offered by the Immunology Program are listed under the subject code IMMUNOL on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=IMMUNOL&filter-catalognumber=IMMUNOL=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=IMMUNOL&filter-catalognumber=IMMUNOL=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=IMMUNOL&filter-catalognumber=IMMUNOL=on>).

Stanford Immunology is home to faculty, students, postdocs, and staff who work together to produce internationally recognized research in many fields of immunology. The long tradition of collaboration among the immunology laboratories at Stanford fosters productive interdisciplinary research, with an emphasis on the application of molecular approaches to problems in cellular and clinical immunology. Faculty research interests include both bench-to-bedside approaches and basic science research. Graduate students and postdoctoral scholars receive outstanding training through their participation in research, teaching, seminars, journal clubs, and the annual Stanford Immunology Scientific Conference.

## Mission of the Graduate Program in Immunology

The Immunology graduate program offers instruction and research opportunities leading to a Ph.D. in Immunology. The goal of the program is to develop investigators who have a strong foundation in Immunology and related sciences in order to carry out innovative research. The program features a flexible choice of courses and seminars combined with extensive research training in the laboratories of participating Immunology faculty. Specifically, immunology graduate students:

1. acquire a fundamental, broad, and comprehensive body of knowledge and skills through an extensive curriculum.
2. identify important scientific questions, design and conduct experiments using the most appropriate methods.
3. read and critically analyze current literature in immunology and other relevant fields.
4. present research findings and communicate ideas effectively to a variety of audiences.

- prepare manuscripts that will be published in leading journals.
- learn to teach effectively.

## Master of Science in Immunology

Students in the Ph.D. program in Immunology may apply for an M.S. degree in Immunology only under special circumstances, assuming completion of appropriate requirements. Students must complete:

- At least 45 units of academic work, all of which must be in courses at or above the 100 level, 36 units of which must be at or above the 200 level.
- 3 quarters of graduate research (IMMUNOL 399 Graduate Research), consisting of rotations in the labs of three faculty members.
- Participation in the Immunology journal club (IMMUNOL 305 Immunology Journal Club), and attendance at the Immunology seminar series and at the annual Stanford Immunology Scientific Conference.
- First Year Rotations Presentations and General Advising Sessions, June. Students present on one out of three lab rotations.
- Students must submit a master's thesis paper on one of their rotations. This requirement may be waived under special circumstances.

Course work in Immunology as follows:

		Units
Track: Cellular, Molecular and Translational Immunology		
BIO 200	Advanced Molecular Biology	5
BIO 230A	Molecular and Cellular Immunology Literature Review	1
IMMUNOL 201	Advanced Immunology I	3
IMMUNOL 202	Advanced Immunology II	3
IMMUNOL 203	Advanced Immunology III	2
IMMUNOL 311	Seminar in Immunology	1
IMMUNOL 311A	Discussions in Immunology	1
IMMUNOL 305	Immunology Journal Club	1
IMMUNOL 215	Principles of Biological Technologies	3
IMMUNOL 399	Graduate Research	1-15
MI 210	Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites	4
BIO 141	Biostatistics	4-5
MED 255	The Responsible Conduct of Research	1
Total Units		30-45
Track: Computational Immunology		
BIOS 200	The Nucleus	8
BIO 230A	Molecular and Cellular Immunology Literature Review	1
IMMUNOL 201	Advanced Immunology I	3
IMMUNOL 202	Advanced Immunology II	3
IMMUNOL 206A	Systems Immunology	3-4
IMMUNOL 206B	Directed Projects in Systems Immunology	3-10
IMMUNOL 209	Translational Immunology	1
BIOMEDIN 212	Introduction to Biomedical Informatics Research Methodology	3

BIOMEDIN 214	Representations and Algorithms for Computational Molecular Biology	3-4
BIOMEDIN 217	Translational Bioinformatics	4
IMMUNOL 399	Graduate Research	1-15
MED 255	The Responsible Conduct of Research	1
Total Units		34-57

## Doctor of Philosophy in Immunology

Courses offered by the Stanford Graduate Program in Immunology are listed under the subject code IMMUNOL on the Stanford Bulletin's ExploreCourses website.

### Admissions

Students seeking admissions to the Immunology Graduate Program typically have an undergraduate major in biological sciences, but majors from other areas are acceptable if the applicants have sufficient coursework in biology, chemistry, general physics, and mathematics (through calculus). Applications are evaluated by the Immunology Graduate Program committee based upon: GRE scores; grades; evidence of research experience; letters of recommendation, including letters from research sponsor(s); and commitment to a career in biomedical research. The GRE Subject test is not required. Applicants should plan on taking the GRE at least one month prior to the application deadline of December 2nd to ensure that official scores are available when applications are evaluated. Interested Stanford medical students are welcome to apply to the program and should also submit a formal application by December 2.

Prospective graduate students must apply via Stanford's online graduate application.

The Immunology graduate program offers two tracks:

- Track 1: Molecular, Cellular, and Translational Immunology
- Track 2: Computational and Systems Immunology

### Financial Aid

Students admitted to the program are offered financial support for tuition, a living stipend, insurance coverage, and a small allowance for books/travel. Applicants are urged to apply for independent fellowships such as from the National Science Foundation or National Defense Science and Engineering Graduate Fellowships. NSF Fellowship applications are due in November of the year prior to matriculation in the graduate program, but Immunology graduate students may continue to apply for outside fellowships after matriculation. Admitted students are typically offered financial support in the form of Stanford Graduate Fellowships, NIH traineeships, or research assistantships.

### General Requirements

#### Immunology Startup and the First-Year Advising Process

Since students enter with differing backgrounds, each student is assisted by the first-year adviser in selecting courses and lab rotations in the first year and in choosing a lab for the dissertation research. In addition, the *Immunology Startup*, a four-day long introduction to immunology in the third week of September, exposes incoming Immunology Ph.D. students to a variety of techniques and concepts. Students learn basic laboratory techniques in immunology and participate in in-depth discussions with faculty.

All students must be enrolled in exactly 10 units during Autumn, Winter, Spring, and Summer quarters until reaching TGR status in the summer

quarter of their fourth year. Students are required to pass all courses in which they are enrolled; required and elective courses must be taken for a letter grade. Students must earn a grade of 'B-' or better in all courses applicable to the degree that are taken for a letter grade. Satisfactory completion of each year's general and track specific requirements listed below is required. During the first year, degree progress is monitored closely by the first-year adviser in quarterly meetings and by the Stanford Graduate Program Committee in a final advising session in June.

First-year students are required to do three rotations in at least two immunology labs. In the spring quarter, two mini-rotations of six weeks each may be arranged.

A specific program of study for each student is developed individually with the first-year adviser.

All students in the two tracks, Molecular, Cellular, and Translational Immunology (MCT) and Computational and Systems Immunology (CSI) are required to enroll in the following core courses:

		Units
BIOS 200	The Nucleus	8
BIO 230A	Molecular and Cellular Immunology Literature Review	1
IMMUNOL 201	Advanced Immunology I	3
IMMUNOL 202	Advanced Immunology II	3
IMMUNOL 305	Immunology Journal Club	1
IMMUNOL 311	Seminar in Immunology	1
IMMUNOL 311A	Discussions in Immunology	1
IMMUNOL 399	Graduate Research	1-15
IMMUNOL 290	Teaching in Immunology	1-15
MED 255	The Responsible Conduct of Research	1

In the third week of June, first-year immunology graduate students are required to give a presentation on one of their three rotations to the Immunology Graduate Program Committee. After the rotation presentation, the first-year student will meet with the Stanford Graduate Program Committee in a one-on-one advising session to review degree progress and choice of a PhD thesis lab. The first-year graduate student is asked to complete a "Big Picture" advising document, which takes stock of the first year student's accomplishments in the past year, discusses near- and long-term plans, and develops a strategy for realizing those plans.

Once a dissertation adviser has been selected, a dissertation committee, including the dissertation adviser and two additional Immunology faculty, is constituted to guide the student during the dissertation research. The student must meet with the dissertation committee at least once a year. In addition, a secondary adviser is assigned who can provide additional advice on issues such as career path choices and other non-academic issues.

## Qualifying Exam and Admission to Candidacy

Second-year students are required to pass a general orals examination and write and orally present a dissertation proposal which is evaluated by a committee of three faculty (the dissertation advising committee). All students must be admitted to candidacy by the end of their second year. This is contingent upon satisfactory completion of course work, all first and second year requirements, the dissertation proposal, and the University's requirements for candidacy outlined in the Candidacy section of this bulletin. If a student does not meet the requirements for admission to candidacy by the end of the second year, the student is subject to dismissal from the PhD program.

Candidates for Ph.D. degrees at Stanford must satisfactorily complete a program of study that includes 135 units of graduate course work and research. At least 3 units must be taken with each of four different Stanford

faculty members. All core course requirements must be completed by the end of the second year.

## Immunology Journal Club

Students are required to attend the IMMUNOL 305 Immunology Journal Club for their first through third years. Attendance is optional for fourth year and above graduate students.

## Immunology Seminar Series

Graduate seminars are an important means of attaining a broad and comprehensive exposure to all areas in immunology as well as gaining a professional perspective and competence in the field. First-year students are required to attend all immunology seminars (IMMUNOL 311 Seminar in Immunology, Tuesdays, 4:15 pm) and the companion immunology seminar discussions course (IMMUNOL 311A Discussions in Immunology, Mondays, 10:00 am); in the latter, first-year the seminar speakers' papers are discussed. Students in their second year and above are required to attend 50% of the seminar series each academic year.

## Immunology Scientific Retreat

The annual Retreat is held at the Asilomar Conference Grounds, Pacific Grove, CA, and is attended by students, staff, postdocs and faculty of the Stanford immunology community. All immunology graduate students are required to attend. In the third through fifth years, students will present a poster and give a talk on their graduate research.

## Teaching Assistantships

Teaching experience and training are part of the graduate curriculum. Each student assists in teaching two courses in the immunology core or electives.

## Doctoral Dissertation

A substantial draft of the dissertation must be turned in to the student's oral examination committee at least one month before the oral exam is scheduled to take place. The oral examination committee must be comprised of at least five faculty members, at least 3 of whom should be immunology program faculty. In addition, the final written dissertation must be approved by the student's reading committee (a minimum of three approved faculty), and submitted to the Registrar's Office. Upon completion of this final requirement, a student is eligible for conferral of the degree.

## Track Specific Requirements

In addition to the general requirements listed above, students must also complete requirements within their track. Written petitions for exemptions to core curriculum and lab rotation requirements are considered only in the first year by the advising committee and the chair of the graduate program committee. Approval is contingent upon special circumstances and is not routinely granted.

## Molecular, Cellular, and Translational Immunology

MCT first-year students are required to take the following courses in their first year for a letter grade:

	Units
IMMUNOL 203 Advanced Immunology III	2
1 out of possible two courses:	
MI 210 Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites	4

BIO 214	Advanced Cell Biology	4
One elective (see elective list below)		
Electives:		
		<b>Units</b>
IMMUNOL 260	HIV: The Virus, the Disease, the Research	3-4
IMMUNOL 275	Tumor Immunology	3
IMMUNOL 285	Brain and the Immune System	3
CSB 210	Cell Signalling	4
SBIO 241	Biological Macromolecules	3-5
DBIO 210	Developmental Biology	4
CBIO 241	Molecular, Cellular, and Genetic Basis of Cancer	5
IMMUNOL 204	Innate Immunology	3
IMMUNOL 205	Immunology in Health and Disease	4
IMMUNOL 209	Translational Immunology	1
IMMUNOL 231	Medicine for Innovators and Entrepreneurs	3-4
IMMUNOL 206A	Systems Immunology	3-4
IMMUNOL 206B	Directed Projects in Systems Immunology	3-10
CS 106X	Programming Abstractions (Accelerated)	3-5
CS 145	Introduction to Databases	3-4
CS 448B	Data Visualization	3
MS&E 220	Probabilistic Analysis	3-4
STATS 116	Theory of Probability	3-5
STATS 300	Advanced Topics in Statistics	2-3

## Computational and Systems Immunology

CSI students are required to take the following courses in their first or second years:

		<b>Units</b>
IMMUNOL 206A	Systems Immunology	3-4
IMMUNOL 206B	Directed Projects in Systems Immunology	3-10
IMMUNOL 209	Translational Immunology	1
BIOMEDIN 212	Introduction to Biomedical Informatics Research Methodology	3
BIOMEDIN 214	Representations and Algorithms for Computational Molecular Biology	3-4
BIOMEDIN 217	Translational Bioinformatics	4
One elective (see elective list below)		
Electives:		
		<b>Units</b>
CS 106X	Programming Abstractions (Accelerated)	3-5
STATS 116	Theory of Probability	3-5
CS 145	Introduction to Databases	3-4
CS 448B	Data Visualization	3
MS&E 220	Probabilistic Analysis	3-4
STATS 300	Advanced Topics in Statistics	2-3
Other		

*Chair, Executive Committee for the Immunology Program:* Patricia Jones (Professor, Biology)

*Director for Immunology Program:* Olivia Martinez (Professor, Research, Surgery, Transplantation)

## Participating Departments and Faculty (Cellular, Molecular, Translational Immunology):

*Biology:* Patricia P. Jones (Professor)

*Genetics:* Leonard A. Herzenberg (Professor, emeritus), Leonore A. Herzenberg (Professor, Research)

*Medicine/Blood and Bone Marrow Transplantation Program:* Robert Negrin (Professor), David Miklos (Assistant Professor), Judith Shizuru (Associate Professor)

*Medicine/Cardiovascular Medicine:* Joseph Wu (Associate Professor, and Radiology and Institute for Stem Cell and Regenerative Medicine)

*Medicine/Gastroenterology and Hepatology:* Aida Habtezion (Assistant Professor)

*Medicine/Hematology:* Calvin Kuo (Professor, and Chemical Systems Biology), Ravi Majeti (Assistant Professor, and Institute for Stem Cell and Regenerative Medicine)

*Medicine/Immunology and Rheumatology:* C. Garrison Fathman (Professor), Jorg Goronzy (Professor), William Robinson (Associate Professor), Samuel Strober (Professor), Paul J. Utz (Associate Professor), Cornelia Weyand (Professor)

*Medicine/Infectious Diseases:* Catherine Blish (Assistant Professor), Robert Shafer (Associate Professor, Research, and Pathology)

*Medicine/Oncology:* Ash Alizadeh (Assistant Professor), Gilbert Chu (Professor, and Biochemistry), Dean Felsher (Associate Professor, and Pathology), Ronald Levy (Professor), Shoshana Levy (Professor, Research)

*Medicine/Pulmonary and Critical Care Medicine:* Mark Nicolls (Associate Professor)

*Microbiology and Immunology:* John Boothroyd (Professor), Chang-Zheng Chen (Assistant Professor), Yueh-Hsiu Chien (Professor), Mark M. Davis (Professor, and Director, Institute for Immunity, Transplantation and Infection), Holden Maecker (Associate Professor, Research), Hugh McDavitt (Professor,emeritus), Denise Monack (Assistant Professor), Garry P. Nolan (Professor), David Schneider (Associate Professor)

*Molecular and Cellular Physiology:* K. Christopher Garcia (Professor, and Structural Biology), Richard S. Lewis (Professor)

*Neurology and Neurological Sciences:* May Han (Assistant Professor), Lawrence Steinman (Professor, and Pediatrics), Tony Wyss-Coray (Professor)

*Neurosurgery:* Theo Palmer (Associate Professor)

*Otolaryngology/Head and Neck Surgery (ENT):* John B. Sunwoo (Assistant Professor)

*Pathology:* Eugene C. Butcher (Professor), Michael Cleary (Professor), Gerald R. Crabtree (Professor, and Developmental Biology), Edgar G. Engleman (Professor, and Medicine/Immunology and Rheumatology), Magali Fontaine (Assistant Professor, and Associate Director, Transfusion Service), Stephen Galli (Professor and Chair), Sara Michie (Professor), Raymond A. Sobel (Professor), Irving Weissman (Professor, and Director, Stem Cell Institute)

*Pediatrics:* Ann Arvin (Professor, and Microbiology and Immunology), Atul Butte (Associate Professor, Immunology and Rheumatology, and Computer Science), Manish Butte (Assistant Professor), Christopher Contag (Professor, Research, and Microbiology and Immunology, and Radiology), David B. Lewis (Professor), Elizabeth Mellins (Professor), Kari Nadeau (Associate Professor)

*Psychiatry and Behavioral Sciences:* Firdaus Dhabhar (Associate Professor), Emmanuel Mignot (Professor)

*Structural Biology:* Peter Parham (Professor, and Microbiology and Immunology)

*Surgery/Multi-Organ Transplantation:* Sheri Krams (Associate Professor, Research), Olivia Martinez (Professor, Research)

*Urology:* Michael Hsieh (Assistant Professor)

## Participating Departments and Faculty (Computational Immunology):

*Bioengineering:* Stephen Quake (Professor, and Applied Physics and Physics)

*Genetics:* Leonore Herzenberg (Professor, Research)

*Health and Research Policy - Biostatistics:* Richard Olshen (Professor)

*Med/Oncology:* Ash Alizadeh (Assistant Professor)

*Microbiology and Immunology:* Mark M. Davis (Professor, and Director, Institute for Immunity, Transplantation and Infection), Holden Maecker (Associate Professor, Research), Garry Nolan (Professor)

*Pathology:* Scott Boyd (Assistant Professor), Andrew Fire (Professor, and Genetics)

*Pediatrics-Systems Medicine:* Atul Butte (Associate Professor, Immunology and Rheumatology, and Computer Science)

Affiliate Members:

*Biochemistry:* Ron Davis (Professor, and Genetics)

*Bioengineering:* Russ Altman (Professor, and Genetics and Computer Science)

*Computer Science:* Daphne Koller (Professor, and Pathology)

*Health and Research Policy - Biostatistics:* Robert Tibshirani (Professor, and Statistics)

# Microbiology and Immunology

Courses offered by the Department of Microbiology and Immunology are listed under the subject code MI on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MI&filter-catalognumber-MI=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MI&filter-catalognumber-MI=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MI&filter-catalognumber-MI=on>).

## Graduate Programs in Microbiology and Immunology

The Department of Microbiology and Immunology offers a program of training leading to the Ph.D. degree, as well as research training, courses, and seminars for medical students and postdoctoral fellows. Research interests focus on two broad areas: host/parasite interactions, and the function of the immune system. Laboratories investigate mechanisms of pathogenesis and the physiology of viruses, bacteria, and protozoan parasites, as well as the lymphocyte function in antigen recognition, immune response, and autoimmunity.

## Master of Science

A regular M.S. program is not offered, although this degree is awarded under special circumstances. Candidates for master's degrees are expected to have completed the preliminary requirements for the B.S. degree, or the equivalent. In addition, the candidate is expected to complete 45 quarter

units of work related to microbiology; at least 25 of these units should concern research devoted to a thesis. The thesis must be approved by the student's committee.

## Doctor of Philosophy in Microbiology and Immunology

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

## Application, Admission, and Financial Aid

Prospective Ph.D. candidates should have completed a bachelor's degree in a discipline of biology or chemistry, including course work in biochemistry, chemistry, genetics, immunology, microbiology, and molecular biology. The deadline for receipt of applications with all supporting materials is December 3.

Applicants must file a report of scores on the general subject tests of the Graduate Record Examination (GRE). It is strongly recommended that the GRE be taken before October so that scores are available when applications are evaluated.

In the absence of independent fellowship support, entering predoctoral students are fully supported with a stipend and tuition award. Highly qualified applicants may be honored by a nomination for a Stanford Graduate Fellowship. Successful applicants have been competitive for predoctoral fellowships such as those from the National Science Foundation.

## Program for Graduate Study

The Ph.D. degree requires course work and independent research demonstrating an individual's creative, scholastic, and intellectual abilities. On entering the department, students meet an advisory faculty member; together they design a timetable for completion of the degree requirements. Typically, this consists of first identifying gaps in the student's undergraduate education and determining courses that should be taken. Then, a tentative plan is made for two to four lab rotations (one rotation per quarter). During the first year of graduate study in the department, each student also takes six or seven upper-level (200-series) courses.

Course requirements:

		Units
BIOS 200	The Nucleus	8
BIO 214	Advanced Cell Biology	4
MED 255	The Responsible Conduct of Research	1
MI 204	Innate Immunology	3
MI 210	Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites	4
MI 215	Principles of Biological Technologies	3
MI 250	Frontiers in Microbiology and Immunology (Taken once in the first year and once in the second year for a total of 2 units.)	1

Recommended courses:

		Units
BIO 230	Molecular and Cellular Immunology	4
BIO 214/BIOC 224	Advanced Cell Biology	4

In Autumn Quarter of the second year, a research proposal based on the student's own thesis topic is defended to the thesis committee. In Spring Quarter of the second year, each student defends orally a formal research proposal on a topic outside the intended thesis project. This qualifying examination proposal is due to the graduate program steering committee by May 1. Based on successful performance on this proposal, the student is admitted to candidacy. Teaching experience and training are also part of the graduate curriculum. Graduate students are required to act as teaching assistants for two courses. In addition, first- and second-year graduate students are required to participate in a bi-weekly journal club.

*Emeriti: (Professors)* Stanley Falkow, Hugh O. McDevitt, Edward S. Mocarski, Sidney Raffel

*Chair:* Peter Sarnow

*Associate Chair:* David Schneider

*Professors:* Ann Arvin, Helen Blau, John C. Boothroyd, Yueh-Hsiu Chien, Christopher Contag, Mark M. Davis, Stephen J. Galli, Harry B. Greenberg, Karla Kirkegaard, A. C. Martin, Garry Nolan, Peter Parham, Phillip Pizzo, Charles Prober, David Relman, Peter Sarnow, Gary K. Schoolnik, Lucy S. Tompkins

*Associate Professors:* Manuel Amieva, Matthew Bogoyo, Jeffrey Glenn, David Schneider, Upinder Singh, Julie Theriot

*Assistant Professors:* Chang-Zheng Chen, Shirin Einav, K.C. Huang, Denise Monack, Justin Sonnenburg

*Assistant Professor:* Jan Carette

*Associate Professor (Teaching):* Robert D. Siegel

*Institute for Immunity, Transplantation and Infection*

*Director, Human Immune Monitoring Center and Associate Professor (Research):* Holden Maecker

# Molecular and Cellular Physiology

Courses offered by the Department of Molecular and Cellular Physiology are listed under the subject code MCP on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MCP&filter-catalognumber-MCP=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MCP&filter-catalognumber-MCP=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MCP&filter-catalognumber-MCP=on>).

The Department of Molecular and Cellular Physiology is located in the Beckman Center for Molecular and Genetic Medicine.

A central goal of physiology in the post-genomic era is to understand how thousands of encoded proteins serve to bring about the highly coordinated behavior of cells and tissues. Research in the department approaches this goal at many levels of organization, ranging from single molecules and individual cells to multicellular systems and the whole organism. The faculty share common interests in the molecular mechanisms of cell signaling and behavior, with a special focus on structure/function analysis of ion channels and G-protein coupled receptors, and their roles at the cellular, organ, and whole-organism levels; the molecular basis of sensory transduction, synaptic transmission, plasticity and memory; the role of ion channels and calcium in controlling gene expression in neural and immune cells; and the regulation of vesicle trafficking and targeting, cell polarity, and cell-cell interactions in the nervous system and in epithelia. Research programs employ a wide range of approaches, including molecular and cell biology, biochemistry, genetics, biophysics, x-ray crystallography and

solution NMR, electrophysiology, and in vitro and in vivo imaging with confocal and multi-photon microscopy.

## Graduate Programs in Molecular and Cellular Physiology

The department offers required and elective courses for students in the School of Medicine and is also open to other qualified students with the consent of the instructor. Training of medical, graduate, and postdoctoral students is available. The program offers a course of study leading to the Ph.D. degree. No B.S. is offered, and an M.S. is offered only in the unusual circumstance where a student completes the course work, rotation, and the written section of the qualifying exam, but is unable to complete the requirements for the Ph.D.

## Doctor of Philosophy in Molecular and Cellular Physiology

Students with undergraduate or master's degrees who have completed a year each of college chemistry (including lectures in organic and physical chemistry), physics, calculus, and biology are considered for admission to graduate study. Applicants submit a report of scores from the Graduate Record Examination (verbal, quantitative, analytical, and an advanced subject test in one of the sciences) as part of the application. Students who do not speak English as their native language must submit scores from TOEFL unless waived by Graduate Admissions.

Study toward the Ph.D. is expected to occupy five years, including summers. A minimum of six quarter-long courses is required, including:

- MCP 221 Advanced Cell Biology or MCP 256 How Cells Work: Energetics, Compartments, and Coupling in Cell Biology
- BIOS 200 The Nucleus
- two graduate-level courses (200-300 series)
- a choice of two out of these three courses:

		Units
MCP 216	Genetic Analysis of Behavior	4
MCP 202	Advanced Immunology II	3
MCP 222	Imaging: Biological Light Microscopy	3

Students are also required to participate in the Molecular and Cellular Physiology Seminar Series and attend Department Scientific Meeting. Grades for course work must be a minimum of 'B', and at least two grades equal to 'A-' or above are necessary but not sufficient for continuation in the program. In addition, students in the program must maintain a grade point average of at least 3.3 for their required courses as a whole.

## Qualifying Examination

At the beginning of the second year in residence as a graduate student, each Ph.D. candidate presents a written thesis proposal to be defended at an oral comprehensive examination. The examination should be taken prior of all course work completed by the required standard. Students undertake individual research studies as early as possible after consultation with their preceptor. Upon passing this exam, the student is advanced to candidacy for the Ph.D.

## Dissertation and University Oral Examination

The results of independent, original work by the students are presented in a dissertation. The oral examination is largely a defense of the dissertation.



## Advisers and Advisory Committees

A graduate advisory committee, currently professors Kobilka, Lewis, Nachury and Madison, advises students during the period before the formation of their qualifying committees.

## Financial Aid

Students may be funded by their advisers' research grants, by training grants, by department funds, or by extramural funds. Students are encouraged to obtain funding from outside sources such as NIH and NSF.

*Chair:* Brian K. Kobilka

*Professors:* Axel T. Brunger, K. Christopher Garcia, Brian K. Kobilka, Richard S. Lewis, W. James Nelson, Stephen J. Smith, Thomas C. Sudhof, William Weis

*Associate Professors:* Miriam B. Goodman, V. Daniel Madison, Merritt C. Maduke

*Assistant Professors:* Liang Feng, Maxence V. Nachury, Lucy E. O'Brien (WTR 13')

*Courtesy Professors:* Stefan Heller, John Huguenard, Anthony J. Ricci

*Courtesy Associate Professor:* Richard J. Reimer

## Neurobiology

Courses offered by the Department of Neurobiology are listed under the subject code NBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NBIO&filter-catalognumber-NBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NBIO&filter-catalognumber-NBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NBIO&filter-catalognumber-NBIO=on>).

## Graduate Program in Neurobiology

Graduate students in the Department of Neurobiology obtain the Ph.D. degree through the interdepartmental Neurosciences Ph.D. program. Accepted students receive funding for tuition and a living stipend. Applicants should familiarize themselves with the research interests of the faculty and, if possible, indicate their preference on the application form which is submitted directly to the Neurosciences Program.

Medical students also are encouraged to enroll in the Ph.D. program. The requirements of the Ph.D. program are fitted to the interests and time schedules of the student. Postdoctoral training is available to graduates holding Ph.D. or M.D. degrees, and further information is obtained directly from the faculty member concerned.

Research interests of the department include information processing in vertebrate retina; structure, function, and development of auditory and visual systems; development and regeneration in the central and peripheral nervous system; neural mechanisms mediating higher nervous system functions, including perception, learning, attention and decision making.

*Emeritus:* Denis Baylor, Uel J. McMahan, Eric Shooter, Lubert Stryer

*Chair:* Ben Barres

*Professors:* Eric I. Knudsen, William T. Newsome

*Associate Professors:* Thomas Clandinin, Ricardo Dolmetsch, Tirin Moore, Jennifer Raymond

*Assistant Professor:* Stephen Baccus

## Neurosciences

Courses offered by the Neurosciences Program are listed under the subject code NEPR on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NEPR&filter-catalognumber-NEPR=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NEPR&filter-catalognumber-NEPR=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NEPR&filter-catalognumber-NEPR=on>).

## Doctor of Philosophy in Neurosciences

University requirements for the Ph.D. are described in the "Graduate Degrees (<http://exploreddegrees.stanford.edu/graduatedegrees/>)" section of this bulletin.

The interdepartmental Neurosciences Program offers instruction and research opportunities leading to a Ph.D. in Neurosciences. The requirements for a Ph.D. degree follow those of the University and in addition are tailored to fit the background and interests of the student. Accepted students receive an award covering tuition, a basic health plan, and a living stipend. Qualified applicants should, where possible, apply for the predoctoral fellowships in open competition, especially those from the National Science Foundation. December 2 is the deadline for receipt in the Neurosciences Program office of applications with all supporting material. Applicants should familiarize themselves with the research interests of the faculty and indicate their preferences clearly on the application form.

Since students enter with differing backgrounds, and the labs in which they may elect to work cover several different disciplines, the specific program for each student is developed individually with an advisory committee. All students are required to complete the basic introduction to neurobiology (NBIO 206 The Nervous System or equivalent). All students must complete nine quarters of Professional Development and Integrity in Neuroscience (NBIO 300 Professional Development and Integrity in Neuroscience). Lastly, students must also take five courses within (and at least one course in each of) the following three areas:

1. Molecular, Cellular and Developmental Neuroscience
2. Systems, Computational, Cognitive and Behavioral Neuroscience
3. Translational Neuroscience

Courses from outside the neuroscience core can satisfy the elective requirement.

Students usually rotate through several labs during their first year, although they may choose to begin thesis research on entry. After the first rotation, students may rotate both within and outside the Neurosciences Program. Required course work should be completed by the end of the second year. Passing of a comprehensive oral preliminary examination given by the student's advisory committee is required for admission to Ph.D. candidacy. This examination is usually taken by the end of the second year. The student is required to present a Ph.D. dissertation, which is the result of independent investigation contributing to knowledge in an area of neuroscience, and to defend his or her dissertation in a University oral examination, which includes a public seminar.

Medical students may participate in this program provided they meet the prerequisites and satisfy all the requirements of the graduate program as listed above. The timing of the program may be adjusted to fit their special circumstances.

**Director:** John R. Huguenard (Professor, Neurology and Neurological Sciences)

**Steering Committee:** Katrin Andreasson, Paul S. Buckmaster, Thomas Clandinin, John R. Huguenard, Fei-Fei Li, Merritt Maduke, Samuel McClure, Michelle Monje-Deisseroth, Giles Plant, Anthony Ricci, Carla Shatz, Thomas Sudhof

**Participating Faculty:**

**Anesthesia:** Rona Giffard (Professor), Sean Mackey (Associate Professor), David Yeomans (Associate Professor)

**Applied Physics:** Surya Ganguli (Assistant Professor), Mark Schnitzer (Associate Professor)

**Bioengineering:** Kwabena Boahen (Associate Professor), Karl Deisseroth (Associate Professor), Michael Lin (Assistant Professor), Matthew Scott (Professor)

**Biology:** Russell D. Fernald (Professor), H. Craig Heller (Professor), Ron Kopito (Professor), Liqun Luo (Professor), Susan McConnell (Professor), Robert M. Sapolsky (Professor), Mark Schnitzer (Associate Professor), Carla Shatz (Professor), Kang Shen (Associate Professor),

**Comparative Medicine:** Paul S. Buckmaster (Associate Professor), Corinna Darian-Smith (Associate Professor), Shaul Hestrin (Associate Professor)

**Computer Science:** Fei-Fei Li (Assistant Professor)

**Developmental Biology:** Ben Barres (Professor), Seung Kim (Professor), David Kingsley (Professor), Matthew P. Scott (Professor)

**Electrical Engineering:** Krishna Shenoy (Associate Professor)

**Genetics:** Anne Brunet (Associate Professor), Aaron Gitler (Associate Professor, Acting), Matthew Scott (Professor)

**Microbiology and Immunology:** Helen Blau (Professor)

**Molecular and Cellular Physiology:** Axel Brunger (Professor), Miriam B. Goodman (Associate Professor), Brian Kobilka (Professor), Richard S. Lewis (Professor), Daniel V. Madison (Associate Professor), Merritt C. Maduke (Associate Professor), Stephen Smith (Professor), Thomas Sudhof (Professor)

**Neurobiology:** Stephen Baccus (Assistant Professor), Ben Barres (Professor), Tom Clandinin (Associate Professor), Ricardo Dolmetsch (Associate Professor), Eric I. Knudsen (Professor), Tirin Moore (Assistant Professor), William T. Newsome (Professor), Jennifer Raymond (Associate Professor), Carla Shatz (Professor)

**Neurology and Neurological Sciences:** Katrin Andreasson (Associate Professor), Ben Barres (Professor), Paul Buckmaster (Associate Professor), Marion Buckwalter (Assistant Professor), Yoon-Jae Cho (Assistant Professor), May Han (Assistant Professor), Ting-Ting Huang (Associate Professor, Research), John R. Huguenard (Professor), Jin Hyung Lee (Assistant Professor, Acting), Frank Longo (Professor), Michelle Monje-Deisseroth (Assistant Professor), Josef Parvizi (Assistant Professor), Kathleen Poston (Assistant Professor), Thomas A. Rando (Professor), Richard Reimer (Associate Professor), Robert M. Sapolsky (Professor), Tony Wyss-Coray (Associate Professor, Research), Yanmin Yang (Associate Professor)

**Neurosurgery:** Marion Buckwalter (Assistant Professor), Theo Palmer (Associate Professor), Giles Plant (Associate Professor), Gary K. Steinberg (Professor), Xinnan Wang (Assistant Professor), Heng Zhao (Assistant Professor, Research)

**Ophthalmology:** Yaping Joyce Liao (Assistant Professor)

**Otolaryngology:** Mirna Mustapha (Assistant Professor), Anthony Ricci (Professor)

**Pathology:** Bingwei Lu (Associate Professor), Marius Wernig (Assistant Professor)

**Pediatrics:** Michael Lin (Assistant Professor), Anna Penn (Assistant Professor)

**Philosophy:** Patrick Suppes (Professor, emeritus)

**Psychiatry and Behavioral Sciences:** Lu Chen (Associate Professor), Luis de Lecea (Associate Professor), Karl Deisseroth (Associate Professor), Firdaus Dhabhar (Associate Professor), Amit Etkin (Assistant Professor), Craig Garner (Professor), David Lyons (Associate Professor, Research), Robert C. Malenka (Professor), Vinod Menon (Professor, Research), Karen Parker (Assistant Professor), Allan L. Reiss (Professor), Jamie Zeitler (Assistant Professor)

**Psychology:** Ian Gotlib (Professor), Kalanit Grill-Spector (Associate Professor), James J. Gross (Professor), Brian Knutson (Associate Professor), James McClelland (Professor), Samuel McClure (Assistant Professor), Anthony Norcia (Professor), Anthony Wagner (Associate Professor), Brian Wandell (Professor)

**Radiology:** Gary H. Glover (Professor)

## Obstetrics and Gynecology

Courses offered by the Department of Obstetrics and Gynecology are listed under the subject code OBGYN on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OBGYN&filter-catalognumber-OBGYN=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OBGYN&filter-catalognumber-OBGYN=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=OBGYN&filter-catalognumber-OBGYN=on>).

The Department of Obstetrics and Gynecology does not offer degrees; however, qualified medical, graduate, or undergraduate students with an interest in basic research in reproductive biology may apply to arrange individual projects under the supervision of the faculty. The focus for the Division of Reproductive Biology is the study of the molecular and cellular biology of male and female reproductive organs.

**Chair:** Jonathan S. Berek

## Pathology

Courses offered by the Department of Pathology are listed under the subject code PATH on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PATH&filter-catalognumber-PATH=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PATH&filter-catalognumber-PATH=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=PATH&filter-catalognumber-PATH=on>).

## Programs of Study in Pathology

The Department of Pathology offers advanced courses in aspects of pathology. The department does not offer advanced degrees in pathology, but qualified graduate students who are admitted to department-based or interdepartmental graduate programs may elect to pursue their thesis requirements in the department's research laboratories. The discipline of pathology has served as a bridge between the preclinical and clinical sciences and is concerned with the application of advances in the basic

biological sciences, both to the diagnosis of human disease and the elucidation of the mechanisms of normal molecular, cellular, and organ structure and function that manifest themselves in clinical disease. Accordingly, the department's research interests extend from fundamental molecular biology to clinical-pathological correlations, with an emphasis on experimental oncology.

Investigation in the department includes basic studies in areas using molecular biological, biochemical, and genetic cell biological techniques: DNA replication in yeast and cultured eukaryotic cells, cell cycle control in animal cells and yeast, identification and pathogenetic role of chromosomal aberrations in human malignancies and mechanisms of activation of oncogenes in human and animal cells, lymphocyte and neutrophil-interactions with endothelial cells, cell type specification and signal transduction pathways leading to specific gene expression or modulation of cytoskeletal behavior; cytoskeletal architecture, cell-matrix interaction, developmental biology of hematopoietic stem cells and thymus, regulation of the immune system, mechanisms of immune and other responses in the central nervous system, and neuro-degenerative diseases. Various studies focus on the development of novel diagnostic and immunotherapeutic treatment modalities and techniques for solid tumors, lymphomas, HIV, and genetic diseases. Research training in all of these areas is available for qualified medical and graduate students by individual arrangement with the appropriate faculty member. A summary of the research interests of the department faculty is available at Sanford's School of Medicine (<http://exploreddegrees.stanford.edu/schoolofmedicine/pathology/http://pathology.stanford.edu>) web site.

*Emeriti:* (Professor) Ellen Jo Baron, Michael Hendrickson, Richard L. Kempson, Lawrence F. Eng, Luis Fajardo, F. Carl Grumet, Jon Kosek, Theresa Wang, Roger Warnke; (Associate Professor) P. Joanne Cornbleet

*Chair:* Stephen J. Galli

*Professors:* Daniel Arber, Ellen Jo Baron, Gerald J. Berry, Eugene C. Butcher, Athena Cherry, Michael L. Cleary, Gerald R. Crabtree, Edgar G. Engleman, Dean Felsner, Marcelo Fernandez-Vina, Andrew Fire, Steven Fong, Stephen J. Galli, Lawrence Tim Goodnough, Teri Longacre, Joseph S. Lipsick, Sara Michie, Yasodha Natkunam, Donald P. Regula, Robert V. Rouse, Richard K. Sibley, Raymond Sobel, Howard H. Sussman, Dolly Tyan, Matt van de Rijn, Hannes Vogel, Irving L. Weissman, James Zehnder

*Associate Professors:* Jeffrey D. Axelrod, Matt Bogyo, Andrew Connolly, Tina Cowan, Susan A. Galel, Sharon M. Geaghan, John P. Higgins, Neeraja Kambham, Christina Kong, Bingwei Lu, Jonathan R. Pollack, Iris Schrijver, Arend Sidow, Robert West

*Assistant Professors:* Matt Anderson, Niaz Banaei, Raffick Bowen, Scott Boyd, Magali Fontaine, Tracy George, Isabella Graef, Dita Gratzinger, F. Kim Hazard, Kristin Jensen, Jinah Kim, Stephen Montgomery, Benjamin Pinsky, Ed Plowey, Jesse McKenney, Erich Schwartz, Uma Sundram, Marius Wernig

*Courtesy Professors:* Donna Bouley, John Day, Bertil Glader, Daphne Koller, Lucy Tompkins

*Courtesy Associate Professor:* Robert Shafer

*Clinician Educators:* Jennifer Andrews, Susan Atwater, David Bingham, Brittney De Clerck, James Faix, Ann Folkins, Christopher Gonzales, Terri Haddix, Steven Long, Melanie Manning, Moravid Moayari, Marcelo Pando, Kerri Rieger, Run Shi, Brent Tan

*Instructors:* Jason Kurzer, Jason Merker, Franklin Mullins, Ellen Yeh

*Adjunct Clinical Faculty:* Robert Archibald, Jerome S. Burke, Glenn Cockerham, Seth Haber, Maie K. Herrick, Paul W. Herrmann, Michelle Jordan, Charles Lombard, Gregory Moes, Joseph O'Hara, Girish Putcha, Mahendra Ranchod, Thomas W. Rogers

# Radiation Oncology

Courses offered by the Department of Radiation Oncology are listed under the subject code RADO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RADO&filter-catalognumber-RADO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RADO&filter-catalognumber-RADO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RADO&filter-catalognumber-RADO=on>).

Radiation Oncology focuses on the use of radiation for cancer therapy and research. The department does not offer degrees; however, its faculty teach courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Graduate students in Biophysics and Cancer Biology may perform their thesis research in the department. Undergraduates may arrange individual research projects under supervision of faculty.

At the present time, the major areas of basic research investigation in the department include: DNA repair in mammalian cells after ionizing irradiation; studies of the mechanism of tumor hypoxia in animal tumors; development of new anti-cancer drugs to exploit tumor hypoxia; cytogenetic and molecular methods of predicting the sensitivity of individual tumors to cancer therapy; radiolabeled monoclonal antibodies for cancer detection and treatment; studies of oxygen levels in human tumors using polarographic electrodes; clinical trials of a new hypoxic cytotoxic agent (tirapazamine); studies of the late effects of cancer therapy; and techniques of conformal and intensity modulated radiation therapy.

*Emeriti:* Malcolm A. Bagshaw, Peter Fessenden, Don R. Goffinet, George M. Hahn, Kendric Smith

*Chair:* Richard T. Hoppe

*Professors:* J. Martin Brown, Sarah S. Donaldson, Amato J. Giaccia, Steven L. Hancock, Richard T. Hoppe, Quynh-Thu Le, Daniel S. Kapp, Steven A. Liebel

*Associate Professors:* Iris C. Gibbs, Paul Keall, Christopher R. King, Susan J. Knox, Gary Luxton, Lei Xing

*Assistant Professors:* Laura Attardi, Daniel Chang, Nicholas Denko, Edward Graves, Albert C. Koong

*Consulting Professor:* Robert M. Sutherland

# Radiology

Web Site: <http://www-radiology.stanford.edu>

Courses offered by the Department of Radiology are listed under the subject code RAD on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RAD&filter-catalognumber-RAD=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RAD&filter-catalognumber-RAD=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=RAD&filter-catalognumber-RAD=on>).

The Department of Radiology does not offer degrees; however, its faculty teach courses open to medical students, graduate students, and undergraduates. The department also accepts students in other curricula as advisees for study and research. Undergraduates may also arrange individual research projects under the supervision of the department's faculty. This discipline focuses on the use of radiation, ultrasound, and magnetic resonance as diagnostic, therapeutic, and research tools. The

fundamental and applied research within the department reflects this broad spectrum as it relates to anatomy, pathology, physiology, and interventional procedures. Original research and development of new clinical applications in medical imaging is supported within the Radiological Sciences Laboratory.

*Emeriti: (Professors)* Herbert L. Abrams, Malcolm Bagshaw, Ronald Castellino, Barton Lane, Gerald Friedland, David A. Goodwin, Henry H. Jones, William Marshall, I. Ross McDougall, Robert E. Mindelzun, William H. Northway, Bruce R. Parker, Lewis Wexler, Leslie M. Zatz

*Chair:* Gary M. Glazer

*Professors:* Scott W. Atlas, Richard A. Barth, Christopher F. Beaulieu, Michale Federle, Sanjiv Sam Gambhir, Gary M. Glazer, Gary H. Glover, Michael L. Goris, Robert J. Herfkens, Dave Hovsepian, Debra M. Ikeda, R. Brooke Jeffrey, Ann Leung, Michael Marks, Michael Moseley, Sandy Napel, Matilde Nino-Murcia, Norbert J. Pelc, Allan Reiss, Geoffrey Rubin, Brian Rutt, George Segall, F. Graham Sommer, Daniel Spielman

*Professors (Research):* R. Kim Butts-Pauly

*Associate Professors:* Francis Blankenberg, Frandics P. Chan, Bruce Daniel, Terry Desser, Huy M. Do, Nancy Fischbein, Dominik Fleischmann, Garry E. Gold, Lawrence Hofmann, Beverley Newman, Eric W. Olcott, Kathryn J. Stevens, Daniel Y. Sze

*Associate Professors (Research):* Roland Bammer, Rebecca Fahrig, Sylvia Plevritis

*Assistant Professors:* Sandip Biswal, Robert Dodd, Gloria Hwang, Aya Kamaya, Nishita Kothary, William Kuo, Jafi Lipson, Andrew Quon, Jianghong Rao, Daniel Rubin, Lewis Shin, Shreyas Vasanawala, Juergen Willmann, Joseph Wu, Kristen Yeom, Greg Zaharchuk

*Assistant Professors (Research):* Zhen Cheng, Brian Hargreaves, David Paik, Ramasamy Paulmurugan

# Stem Cell Biology and Regenerative Medicine

Courses offered by the Program in Stem Cell Biology and Regenerative Medicine are listed under the subject code STEMREM on the Stanford Bulletin's Explore Courses web site.

## Graduate Program in Stem Cell Biology and Regenerative Medicine

The Stanford Stem Cell Biology and Regenerative Medicine (SCBRM) program is dedicated to doctoral education that translates basic science to clinical applications, typically referred to as Translational Science, and of intense interest internationally in medical schools and universities. Our doctoral program provides exceptional didactic education and research experience in the basic sciences underlying stem cell biology. In addition, program participants will receive specialized training in the development and clinical application of discoveries in the basic sciences to achieve regenerative therapies. Thus, our graduates will be uniquely positioned to develop successful translational careers in Stem Cell Biology and Regenerative Medicine, and will emerge prepared to deliver on their passion to improve the human condition. The core curriculum is combined with unique research and clinical/professional immersion rotations to provide opportunities for doctoral students to specialize in

the broad subject of translational medicine and yet focus specifically on fundamentals of SCBRM. The curriculum combines education in genetics and developmental biology with an introductory laboratory-based stem cell course, an advanced course in stem cell biology and regenerative medicine, and a clinical rotation with alternative opportunities in law, business and/or engineering.

The mission of the SCBRM graduate program is to produce future leaders in translational science through a combination of basic science and clinical/professional immersion. The program aims to be innovative and to change the landscape for graduate education in the biomedical sciences by having the immersion tailored to each student's translational goals. The program accommodates students who wish to focus primarily at the basic science level alongside those who wish to focus specifically on innovation such as a new device to solve a clinical problem. In the former case, the student might seek out a primary mentor affiliated with the basic sciences and take electives that reflect the more basic interest. In the latter case, the student might select an elective with an engineering focus and seek out primary mentorship with a more clinically or engineering focused mentor. In this way, graduates from our doctoral program receive exceptional didactic education and research experience and are well positioned to develop successful translational careers in SCBRM, in line with their passion to improve human health via applications of their knowledge of human health.

## Master of Science in Stem Cell Biology and Regenerative Medicine

University requirements for the M.S. degree are described in the "Graduate Degree (p. 38)s" section of this bulletin.

Students in the Ph.D. program in SCBRM may apply for an M.S. degree in SCBRM, assuming completion of appropriate requirements. The program does not accept applications for a standalone M.S. degree.

To receive an M.S. in Stem Cell Biology and Regenerative Medicine, Students must complete the following:

1. Four full-tuition quarters of residency as a graduate student at Stanford.
2. At least 45 units of academic work, all of which must be in courses at or above the 100 level, 16 units of which must be at or above the 200 level.
3. Four quarters of graduate research, consisting of rotations in the labs of at least three SCBRM faculty members.
4. Course work in Stem Cell Biology and Regenerative Medicine as well as other core requirements:
  - A. STEMREM 201A Stem Cells and Human Development: From Embryo to Cell Lineage Determination and STEMREM 201B Stem Cells and Human Development Laboratory develop a fundamental understanding of introductory stem cell principles in human development, aging, and disease accompanied by a laboratory-based module with immersion in stem cell-based methods (embryology, embryonic stem cells, reprogramming, adult stem cells).
  - B. STEMREM 202 Stem Cells and Translational Medicine, advanced topics related to individual organ systems, cancer stem cells, translational principles of medicine and immunology as related to regenerative medicine, as well as bioengineering and bioinformatics as related to stem cell biology.
  - C. STEMREM 203 Stem Cells Immersion: Applications in Medicine, Business and Law, students specialize and choose a clinical immersion, rotation in a biotechnology company or

venture firm, or further delve into cutting edge technologies, bioinformatics, materials and/or engineering approaches for stem cell applications in industry, diagnostics and medicine.

- D. STEMREM 250 Regenerative Medicine Seminar Series, a forum for researchers to meet and discuss Stem Cell Biology and Regenerative Medicine and to spark collaborations.
- E. STEMREM 280 Stem Cell Biology and Regenerative Medicine Journal Club, review and discussion of current literature in both basic and translational medicine as it relates to stem cell biology and/or regenerative medicine.

		Units
STEMREM 201A	Stem Cells and Human Development: From Embryo to Cell Lineage Determination	2
STEMREM 201B	Stem Cells and Human Development Laboratory	3
STEMREM 202	Stem Cells and Translational Medicine	5
STEMREM 203	Stem Cells Immersion: Applications in Medicine, Business and Law	3
STEMREM 250	Regenerative Medicine Seminar Series	1
STEMREM 280	Stem Cell Biology and Regenerative Medicine Journal Club	2
BIO 214	Advanced Cell Biology	4
DBIO 210	Developmental Biology	4
MED 255	The Responsible Conduct of Research	1
STEMREM 399	Graduate Research	1-18
Total Units		26-43

- F. Students may also take two courses (6 units) of elective course work

5. Participation and attendance at the annual SCBRM Retreat.
6. The qualifying examination process in SCBRM before admission to Ph.D. candidacy has two parts:
- Part I: a comprehensive written exam in the form of a 5-page NIH grant proposal
  - Part II: a 15-minute oral presentation of the proposal to the thesis committee followed by open questions from the qualifying exam committee on the proposal or encompassing areas of research/academic scholarship that are deemed relevant to the proposal.

Students who do not pass the qualifying exam may retake the full qualifying exam, be retested in a sub-area, or be asked to redo their presentation. Those students who fail the qualifying exam twice may be awarded a master's degree based on completion of course work and rotations. In addition, students who choose to voluntarily leave the program are also awarded a master's degree based on completion of the qualifying exam.

## Doctor of Philosophy in Stem Cell Biology and Regenerative Medicine

University requirements for the Ph.D. are discussed in the "Graduate Degrees (p. 38)" section of this bulletin.

The Stem Cell Biology and Regenerative Medicine curriculum, combined with the research and rotation opportunities, provides a flexible educational opportunity for doctoral students to specialize in the broad subject of

translational medicine while being focused more specifically on the fundamentals of Stem Cell Biology and Regenerative Medicine while training in the laboratories of participating SCBRM faculty. The goal of the SCBRM program is to provide an avenue for graduate education to translate the best of basic research into a clinical setting.

## Application and Admission

Applications are made through the Graduate Admissions (<http://exploreddegrees.stanford.edu/schoolofmedicine/stemcellbiologyandregenerativemedicine/http://gradadmissions.stanford.edu>) web site.

Applicants will be assessed based on their undergraduate transcripts, test scores, research experience, statement of purpose and letters of recommendation that document exceptional potential, ability, or achievements.

Students admitted to the program are offered financial support covering tuition, a living stipend, insurance coverage, and an allowance for books/travel. Applicants are urged to apply for independent fellowships such as from the National Science Foundation. Fellowship applications are due in November of the year prior to matriculation in the graduate program, but SCBRM graduate students may continue to apply for outside fellowships after matriculation. Because of the small number of department-funded slots, students who have been awarded an outside fellowship have an improved chance of acceptance into the program. On matriculation, each student is assisted by a first-year advising committee in selecting courses and lab rotations in the first year and in choosing a lab for the dissertation research. Once a dissertation adviser has been selected, a dissertation committee including the dissertation adviser and two additional SCBRM faculty, is constituted to guide the student during the dissertation research. The student must meet with the dissertation committee at least once a year.

## Degree Requirements

Candidates for Ph.D. degrees at Stanford must satisfactorily complete a program of study that includes 135 units of graduate course work and research.

Requirements for the Ph.D. degree in SCBRM include:

1. Completion of at least 3 research rotations (STEMREM 399 Graduate Research) in the labs of SCBRM faculty members.
2. Completion of the following courses:
  - A. STEMREM 201A Stem Cells and Human Development: From Embryo to Cell Lineage Determination and STEMREM 201B Stem Cells and Human Development Laboratory develop a fundamental understanding of introductory stem cell principles in human development, aging, and disease accompanied by a laboratory-based module with immersion in stem cell-based methods (embryology, embryonic stem cells, reprogramming, adult stem cells).
  - B. STEMREM 202 Stem Cells and Translational Medicine, advanced topics related to individual organ systems, cancer stem cells, translational principles of medicine and immunology as related to regenerative medicine, as well as bioengineering and bioinformatics as related to stem cell biology.
  - C. STEMREM 203 Stem Cells Immersion: Applications in Medicine, Business and Law, students specialize and choose a clinical immersion, rotation in a biotechnology company or venture firm, or further delve into cutting edge technologies, bioinformatics, materials and/or engineering approaches for stem cell applications in industry, diagnostics and medicine.
  - D. STEMREM 250 Regenerative Medicine Seminar Series, a forum for researchers to meet and discuss Stem Cell Biology and Regenerative Medicine and to spark collaborations.

E. STEMREM 280 Stem Cell Biology and Regenerative Medicine Journal Club, review and discussion of current literature in both basic and translational medicine as it relates to stem cell biology and/or regenerative medicine.

3. Students have the option to select from the following courses in the first year:

		Units
STEMREM 201A	Stem Cells and Human Development: From Embryo to Cell Lineage Determination	2
STEMREM 201B	Stem Cells and Human Development Laboratory	3
STEMREM 202	Stem Cells and Translational Medicine	5
STEMREM 203	Stem Cells Immersion: Applications in Medicine, Business and Law	3
STEMREM 250	Regenerative Medicine Seminar Series	1
STEMREM 280	Stem Cell Biology and Regenerative Medicine Journal Club	2
BIO 214	Advanced Cell Biology	4
DBIO 210	Developmental Biology	4
MED 255	The Responsible Conduct of Research	1
STEMREM 399	Graduate Research	1-18
Total Units		26-43

4. Students have the option to select two electives in the second year.

5. Biochemistry proficiency is required by the end of the second year, as well as a total of 80 units and completed qualifying examinations. Students who do not pass the qualifying examination may retake a full qualifying exam, be retested in a few areas, or be asked to redo their presentation.

6. STEMREM 802 TGR Dissertation.

Students unable to meet Ph.D. milestones after remediation are offered a M.S. degree if they have completed all requirements.

*Program Director:* Renee A. Reijo Pera

*Program Co-Directors:* Theo D. Palmer, Michael T. Longaker, Irving L. Weissman

*Teaching Faculty:*

Philip A. Beachy (Professor, Institute for Stem Cell Biology and Regenerative Medicine, Department of Biochemistry and Developmental Biology)

Michael F. Clarke (Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Medicine-Oncology and Member of Bio-X and Stanford Cancer Institute)

Maximilian Diehn (Assistant Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Radiation Oncology/Radiation Therapy and Member of Stanford Cancer Institute)

Sarah C. Heilshorn (Assistant Professor, Materials Science and Engineering, Professor (By courtesy), Chemical Engineering and Bioengineering and Member of Bio-X)

Michael T. Longaker (Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Surgery/Plastic and Reconstructive Surgery, Professor (By courtesy), Bioengineering and Materials Science and Engineering/Engineering Materials and Science and Member of Bio-X and Stanford Cancer Institute)

Ravindra Majeti (Assistant Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Medicine/Hematology and Member of Bio-X and Stanford Cancer Institute)

Michelle Monje-Deisseroth (Assistant Professor, Institute for Stem Cell Biology and Regenerative Medicine and Neurology and Neurological Sciences and Member of Bio-X and Child Health Research Institute)

Roeland Nusse (Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Developmental Biology and Member of Bio-X and Stanford Cancer Institute)

Theo D. Palmer (Associate Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Neurosurgery and Member of Bio-X and Stanford Cancer Institute)

Renee A. Reijo Pera (Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Obstetrics & Gynecology and Member of Bio-X and Stanford Cancer Institute)

Irving L. Weissman (Professor, Institute for Stem Cell Biology and Regenerative Medicine, Department of Pathology and Developmental Biology, Professor (By courtesy) Department of Biology and Member of Bio-X and Stanford Cancer Institute)

Marius Wernig (Assistant Professor, Institute for Stem Cell Biology and Regenerative Medicine and Department of Pathology and Member of Bio-X)

Joanna Wysocka (Assistant Professor, Institute for Stem Cell Biology and Regenerative Medicine, Department of Chemical and Systems Biology and Developmental Biology and Member of the Stanford Cancer Institute)

## Structural Biology

Courses offered by the Department of Structural Biology are listed under the subject code SBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SBIO&filter-catalognumber=SBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SBIO&filter-catalognumber=SBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=SBIO&filter-catalognumber=SBIO=on>).

The department offers course work and opportunities for research in structural biology. Courses fall into two categories: (1) a series of one quarter courses that treat topics of current interest in structural biology and biophysics at an advanced level; and (2) INDE 216 Cells to Tissues, a course for medical students that includes lectures on structure-function relationships of mammalian cells and tissues and a lab on medical histology.

The emphasis of research in the department is on understanding fundamental cellular processes in terms of the structure and function of biological macromolecules and their assemblies. Techniques used include standard methods of biochemistry, cell culture, single-molecule fluorescence spectroscopy, genetic engineering, and three dimensional structure determination by x-ray diffraction, nuclear magnetic resonance spectroscopy and electron microscopy, coupled with the development of computational methods.

## Doctor of Philosophy in Structural Biology

University requirements for the Ph.D. are described in the "Graduate Degrees (p. 38)" section of this bulletin.

The graduate program in Structural Biology leads to the Ph.D. degree. The department also participates in the Medical Scientists Training Program (MSTP) in which individuals are candidates for both Ph.D. and M.D. degrees.

The graduate program is intended to prepare students for careers as independent investigators in cell and molecular biology. The principal

requirement of a Ph.D. degree is the completion of research constituting an original and significant contribution to the advancement of knowledge. The requirements and recommendations for the Ph.D. degree include:

1. Training in a major with connections to biophysics (e.g., physics, chemistry, or biology, with a quantitative background equivalent to that of an undergraduate physics or chemistry major at Stanford).
2. Completion of the following background courses or their equivalents at other institutions:
3.

		<b>Units</b>
CHEM 131	Organic Polyfunctional Compounds	3
CHEM 171	Physical Chemistry	3
CHEM 173	Physical Chemistry	3
CHEM 175	Physical Chemistry	3
BIOC 200	Applied Biochemistry	1
4. Completion of the following courses or their equivalents:
  - A.

		<b>Units</b>
SBIO 241	Biological Macromolecules	3-5
or BIOE 300A	Molecular and Cellular Bioengineering	
SBIO 242	Methods in Molecular Biophysics	3
MED 255	The Responsible Conduct of Research	1
  - B. At least four additional graduate-level courses in physical or biological science, with at least one in physical science and one as a literature-based biological science course
5. Opportunities for teaching are available during the first nine quarters at the discretion of the advising committee.
6. The student must prepare a dissertation proposal defining the research to be undertaken including methods of procedure. This proposal should be submitted by Winter Quarter of the third year, and it must be approved by a committee of at least three members including the principal research adviser and at least one member from the Department of Structural Biology. The candidate must defend the dissertation proposal in an oral examination. The dissertation reading committee normally evolves from the dissertation proposal review committee.
7. The student must present a Ph.D. dissertation as the result of independent investigation and expressing a contribution to knowledge in the field of structural biology.
8. The student must pass the University oral examination, taken only after the student has substantially completed the research. The examination is preceded by a public seminar in which the research is presented by the candidate.

Applicants to the program should have a bachelor's degree and should have completed at least a year of course work in biology, mathematics, organic chemistry, physical chemistry, and physics. Application forms must be received by the department before December 15 for notification by April 15. Application to the National Science Foundation for fellowship support is also encouraged. Remission of fees and a personal stipend are available to graduate students in the department. Prospective applicants should contact the Department of Structural Biology for further information.

Current topics of research in the department lie in the areas of gene expression; theoretical, crystallographic, and genetic analysis of protein structure; and cell-cell interaction. See Stanford's School of Medicine (<http://www.med.stanford.edu/school/structuralbio>) web site for further information.

*Chair:* Joseph D. Puglisi

*Associate Chair:* Michael Levitt

*Professors:* K. Christopher Garcia, Theodore Jardetzky, Roger D. Kornberg, Michael Levitt, Peter Parham, Joseph D. Puglisi, Soichi Wakatsuki, William I. Weis

*Associate Professor (Research):* Yahli Lorch

*Assistant Professor:* Adam de la Zerda

*Assistant Professor (Research):* Elizabetta Viani Puglisi

*Courtesy Professor:* Axel Brunger, Vijay Pande

*Courtesy Assistant Professor:* Zev Bryant

# Other Offices

These pages list various offices, centers, laboratories, and institutes of direct relevance to study at Stanford. The listings are not all-inclusive. Click on the "Expand Menus" link at the top of the right hand menu to show a broad selection of other sites at Stanford University. A comprehensive list of Stanford offices is available on the University's A to Z Index page (<http://www.stanford.edu/atoz>).

## Student Affairs

Web Site: <http://studentaffairs.stanford.edu/>

The Student Affairs division encompasses a broad range of programs and services for undergraduates and graduate students, including the Office of Residential Education, University Registrar, Student Life, Educational Resources, Vaden Health Center, Career Development Center, Office of Accessible Education, Graduate Life Office, Haas Center for Public Service, Judicial Affairs, Bechtel International Center, Asian American Activities Center, Black Community Services Center, El Centro Chicano, LGBT Community Resources Center, Native American Cultural Center, Women's Community Center, Office of Student Activities and Leadership, Diversity and First Gen Programs, Office of Sexual Assault and Relationship Abuse Education and Response, and the Office of Alcohol Policy and Education.

The Vice Provost for Student Affairs reports directly to the Provost and is responsible for providing leadership, policy direction, and administrative support for budget, personnel, facilities, and development, as well as oversight of the efficiency and effectiveness of each of the division's units. The Vice Provost interacts with the President, the Provost, the Vice Provosts, faculty, schools, department representatives, students, and parents. The Vice Provost is a member of the Stanford University Cabinet, and ex officio member of the Stanford Alumni Association Board of Directors, Stanford Athletic Board, and Haas Center for Public Service National Advisory Board. The Vice Provost also attends the Senate meetings of the Academic Council.

## Student Services Center

Office: Tresidder Memorial Union, 2nd floor

Contact via HelpSU: <https://remedyweb.stanford.edu/helpsu/helpsu?pcat=StuAcct&dtag=10772>

Phone: (650) 723-7772 or (866) 993-7772 (toll-free)

Web Site: <http://studentservicescenter.stanford.edu>

The AskJane Online Answers Resource: <http://askjane.stanford.edu>

The Student Services Center (SSC) is committed to providing a single point of friendly, professional service for answers to questions concerning administrative and financial issues. The center strives to resolve 90% of students' issues upon first contact. The SSC represents Student Financial Services, the Office of the University Registrar, the University Cashier's Office, the Financial Aid Office, and Stanford ID Card Services, and is able to assist students with questions including those related to University billing, financial aid disbursements, refunds, payroll deductions, payment plan, enrollment, Stanford degree policies and procedures, Stanford ID card, and forms pickup and submission.

## Dean of Student Life

Dean of Student Life: Chris Griffith

Office: Old Union

Phone: (650) 723-2733

Web Site: <http://studentaffairs.stanford.edu/studentlife>

The Dean of Student Life has responsibility for overseeing the development, implementation, and monitoring of comprehensive student life programs. The unit consists of the Graduate Life Office, Office of Student Activities and Leadership, Judicial Affairs, Organization Conduct Board, Office of Sexual Assault and Relationship Abuse Education & Response, Old Union, and 5-SURE. The Dean reports to the Vice Provost for Student Affairs and is a member of his executive group.

## Dean of Educational Resources

Dean of Educational Resources: Sally Dickson

Office: Old Union

Phone: (650) 721-4037

Web Site: <http://studentaffairs.stanford.edu/educationalresources>

The Dean of Educational Resources is responsible for overseeing the development, implementation, and monitoring of comprehensive programs relating to ethnic, gender, career, and learning needs and interests of student groups. The unit is comprised of the Asian American Activities Center, Black Community Services Center, El Centro Chicano, LGBT Community Resources Center, Native American Cultural Center, Women's Community Center, Diversity and First Gen Programs, Bechtel International Center, Career Development Center, and the Office of Accessible Education. The Dean also has oversight responsibility for the Haas Center for Public Service, as well as responsibility for the Acts of Intolerance Protocol. The Dean reports to the Vice Provost for Student Affairs and serves as a member of his executive group.

## Office of Accessible Education (OAE)

Offices: 563 Salvatierra Walk

Phone: (650) 723-1066; TDD (650) 723-1067

Web Site: <http://studentaffairs.stanford.edu/oae>

The Office of Accessible Education (OAE) is the campus office designated to work with students, faculty, and staff to put in place appropriate accommodations for all Stanford students with disabilities, at both the undergraduate and graduate levels (including the professional schools). The OAE provides a wide array of support services, accommodations, and programs to remove barriers to full participation in the life of the University.

In reaching its determinations about appropriate accommodations, the OAE considers factors such as the documentation from professionals specializing in the area of the student's diagnosed disability, the student's functional limitations, and the student's input and accommodation history in regard to particular needs and limitations. The OAE then works with the student and relevant faculty and staff through an interactive process designed to achieve an accommodation that meets the needs of all parties.

## Office of Alcohol Policy and Education (OAPE)

Offices: Rogers House, 581 Capistrano Way

Phone: (650) 723-5947

Web Site: <http://studentaffairs.stanford.edu/alcohol>

<http://studentaffairs.stanford.edu/alcohol>

The Office of Alcohol Policy and Education (OAPE) empowers students to make healthy decisions about drinking behaviors that not only affect them as individuals, but ultimately impact the campus community as a whole. OAPE is focused on reducing the harm of high-risk behaviors while increasing safe, legal, responsible actions. Services offered include individual consultation, educational workshops and seminars, and academic



coursework. OAPE also sponsors Cardinal Nights, a program of weekly events that allow students to socialize in an environment free of alcohol.

## Career Development Center

Offices: 563 Salvatierra Walk

Web Site: <http://studentaffairs.stanford.edu/cdc>

*Counseling Services*—Monday through Friday, 9 a.m. to 12 noon, 1 p.m. to 5 p.m.; (650) 725-1789.

*Employment Services*—Monday through Friday, 8:15 a.m. to 4:30 p.m.; (650) 723-9014.

The Career Development Center (CDC) offers services such as counseling, workshops, presentations, on-campus recruiting, job/internship databases, library resources, and alumni networking, to help students make informed decisions and to plan for life after Stanford.

Services are available to undergraduates and graduate students, and all students are encouraged to visit in person or via the web. Programs and services are free to students; limited services are available to first-year alumni and student spouses/domestic partners.

The following suggestions may assist students in getting the most out of the CDC:

- Visit early in a Stanford career.
- Register with the CDC's Cardinal Career (<http://studentaffairs.stanford.edu/cdc/jobs-internships>) online system to access internships, part-time, and full-time opportunities.
- Gather general career information through the career resource library, jobs, and internship database, handouts, and alumni network.
- Inquire about individual counseling for all stages of career planning and development.
- Participate in workshops and other programs to clarify career goals.

## Community Centers

There are six ethnic and community centers that support students who seek services associated with a particular group or community. Each center has its own site and professional staff who advise and counsel students. In addition, the centers sponsor programs throughout the year that foster intellectual, personal, and cultural growth. Detailed information is available on the following web sites:

- Asian American Activities Center (<http://stanford.edu/group/a3c>)
- Black Community Services Center (<http://stanford.edu/dept/BCSC>)
- El Centro Chicano (<http://studentaffairs.stanford.edu/elcentro>)
- LGBT Community Resources Center (<http://studentaffairs.stanford.edu/lgbtcrcc>)
- Native American Cultural Center (<http://studentaffairs.stanford.edu/nacc>)
- Women's Community Center (<http://studentaffairs.stanford.edu/wcc>)

## Diversity and First Gen Programs

Office: Old Union, 520 Lasuen Mall, Suite 206

Phone: (650) 723-2733

Email: [tlw@stanford.edu](mailto:tlw@stanford.edu)

Web Site: <http://studentaffairs.stanford.edu/diversityandfirstgen>

Established in 2010 to serve first generation and low-income students and help them be successful, the Office of Diversity and First Gen Programs provides:

- a Thrive Guide to publicize the abundance of support available
- contact information for student groups, staff, faculty, and alumni for networking and mentoring
- signature programs and special events to build community
- administrative support and advocacy for diversity programs, especially those highlighting socioeconomic issue

## Graduate Life Office

Graduate Life Office: Escondido Village Office, 859 Comstock Circle  
Graduate Life Office, Graduate Community Center: 750 Escondido Road  
Phone: (650) 736-7078

Email: [graduatelife@stanford.edu](mailto:graduatelife@stanford.edu)

Web Site: <http://glo.stanford.edu>

The Graduate Life Office (GLO) works with students on and off campus and with student groups, including Community Associates (student residence staff), the Graduate Student Programming Board, and the Graduate Student Council, to create an inclusive environment through programs in the residences and campus-wide. The Graduate Community Center (GCC) serves as a focal point for meetings and activities in the graduate community.

The GLO staff also works with individual students who need information and support or who may be experiencing personal difficulties. Staff members are knowledgeable about and have access to support and resources available throughout the University. Staff work closely with student services administrators in academic departments to provide consultation and services to students in need.

## Graduate Student Residence Program

The University's philosophy of graduate student housing is based on the premise that supporting high quality graduate scholarship and research is central to the mission of the University. By providing affordable housing in proximity to academic resources, the University creates an environment conducive to research and intellectual dialogue among students, their peers, and faculty members. The Community Associate (CA) program in the residences serves as a supportive resource for residents and to connect student neighbors through social events and activities to build a sense of community in the residences.

## Haas Center for Public Service

Center Offices: 562 Salvatierra Walk

Mail Code: 8620

Phone: (650) 723-0992

Web Site: <http://haas.stanford.edu>

The Haas Center for Public Service connects academic study with public service to strengthen communities and develop effective public leaders. The center aspires to develop aware, engaged, and thoughtful citizens who contribute to the realization of a more just and humane world.

To accomplish these objectives, the center collaborates with associated units at Stanford to implement programs in the following areas of work.

- Through the center's fellowship programs, undergraduates perform summer internships in nonprofit organizations, foundations, and government agencies locally, nationally, and internationally. Postgraduate fellowships allow graduating seniors to work with a mentor in a nonprofit or public agency for a year.

- The Public Service Leadership Fellows Program provides an opportunity for students who want to be intentional about their leadership development. Center staff also provides leadership development through training, advising, and resources to Stanford in Government, Alternative Spring Break, and other student groups engaged in service.
- With support from the center, Stanford faculty members have created service-learning courses that involve Stanford students in providing direct service and community-based research efforts in collaboration with local schools and other partner agencies. The center's Public Service Scholars Program supports seniors writing honors theses that combine academic research with service to communities.
- Faculty from Stanford's School of Education collaborate with center staff to provide curriculum guidance and training for tutors and mentors at nearby schools. Another program trains Stanford students to bring results of scientific research to neighborhood programs. The federally supported Community Service Work-Study program, administered in conjunction with the University's Financial Aid Office, allows students to satisfy work-study obligations year-round by working in community organizations and public agencies.
- The postgraduate and alumni programs help students, particularly graduating seniors, identify opportunities to assist in launching their public service careers in nonprofit and government agencies, and in the private sector in service-related positions. The Haas Center houses the Center on Philanthropy and Civil Society, a program of the Institute for Research in the Social Sciences (IRISS).

Students interested in public service fellowships, service-learning courses, community-based research, public and community service internships for youth and education, or service organization leadership development should contact the center.

## Bechtel International Center

Office: 584 Capistrano Way  
Web Site: <http://icenter.stanford.edu>

The Bechtel International Center (I-Center) is a meeting place for students and senior research scholars at Stanford from throughout the world and for internationally oriented U.S. students, faculty, and short-term visitors on the campus. Through a variety of social, cultural, and educational programs, I-Center facilities are used to acquaint students and scholars with the life of the University and the community, and to bring them together in activities of mutual interest.

The Center believes that international educational exchange nurtures a lifelong global perspective, and plays a key role in supporting Stanford's standing as a truly international university in the following ways:

- Provides information about and assistance with obtaining and maintaining legal status in the U.S. to foreign students, scholars, and Stanford departments.
- Advises U.S. students who are pursuing scholarships for study and research abroad.
- Enables foreign students, scholars, and their family members at Stanford to receive maximum academic, cultural, and personal benefit from their stays in the U.S.
- Contributes to international activities at Stanford by helping to create a welcoming and supportive environment that is responsive to the needs of the international community.
- Facilitates professional meetings between visiting international delegations and their Stanford counterparts.

- Provides opportunities for Stanford students, faculty, staff, and members of the local community to broaden their horizons by interacting with people from different cultures through programs to increase international awareness and understanding.

## Judicial Affairs and Student Conduct

Office: Tresidder Memorial Union, 2nd floor  
Mailing Address: 459 Lagunita Drive, Suite 9  
Mail Code: 94305-3010  
Phone: (650) 725-2485  
Fax: (650) 736-0247  
Web Site: <http://judicialaffairs.stanford.edu>  
Email: [judicial.affairs@stanford.edu](mailto:judicial.affairs@stanford.edu)

The primary codes of conduct for students are the Fundamental Standard and Honor Code. Cases of alleged violations of the University's Honor Code, Fundamental Standard, and other student conduct or University policies now proceed through an established student judicial process based upon the Student Judicial Charter of 1997, which can be found in its entirety at the University's Office of Judicial Affairs (<http://exploreddegrees.stanford.edu/studentaffairs/http://judicialaffairs.stanford.edu>) web site. The web site also contains the policies, rules, and interpretations, as well as the University's Student Conduct Penalty Code, applicable to those students found responsible for violating the Honor Code, the Fundamental Standard, or other University policy or rule.

Allegations of sexual misconduct, sexual harassment, stalking, or dating violence proceed through the Dean's Alternate Misconduct Review Process (<http://studentaffairs.stanford.edu/judicialaffairs/process/alternate-review>).

When a violation of the Fundamental Standard, Honor Code, or other University policy or rule governing student conduct is alleged, or whenever a member of the University community believes such a violation has occurred, he or she should contact the Office of Judicial Affairs.

## Fundamental Standard

Students at Stanford are expected to know, understand, and abide by the Fundamental Standard, which is the University's basic statement on behavioral expectations articulated in 1896 by Stanford's first President, David Starr Jordan, as follows:

Students are expected to show both within and without the University such respect for order, morality, personal honor, and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University.

Actions that have been found to be in violation of the Fundamental Standard include:

- Physical assault
- Property damage
- Forgery
- Theft
- Sexual harassment or other sexual misconduct
- Misrepresentation in seeking financial aid, University housing, University meals, or other University benefits
- Driving on campus while under the influence of alcohol
- Misuse of computer equipment or email
- Sending threatening messages

There is no standard penalty that applies to violations of the Fundamental Standard. Penalties range from a formal warning to expulsion. Each case is fact specific; considerations include the nature and seriousness of the

offense, the motivation underlying the offense, and precedent in similar cases.

## Honor Code

The Honor Code is the University's statement on academic integrity. It is essentially the application of the Fundamental Standard to academic matters. Provisions of the Honor Code date from 1921, when the honor system was established by the Academic Council of the University Faculty at the request of the student body and with the approval of the President. The Honor Code reads:

1. The Honor Code is an undertaking of the students, individually and collectively:
  - A. that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;
  - B. that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.
2. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.
3. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions for honorable academic work.

Examples of conduct that has been found to be in violation of the Honor Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper
- Unpermitted collaboration
- Plagiarism
- Revising and resubmitting a quiz or exam for regrading without the instructor's knowledge and consent
- Representing as one's own work the work of another
- Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid was not permitted

For more information, see the Interpretations and Applications of the Honor Code at the Judicial Affairs (<http://stanford.edu/dept/vpsa/judicialaffairs/guiding/honorcode>) web site. The standard penalty for a first offense is a one quarter suspension from the University and 40 hours of community service. In addition, many faculty members issue a 'No Pass' for the course in which the violation occurred.

## Old Union

Stanford's student union, known as the Old Union, serves as a hub for student activities on campus. The central structure in a three-building complex, the Old Union has administrative offices for ASSU, Office of Student Activities and Leadership (SAL), Dean of Student Life, and Dean of Educational Resources. It also houses a multifaith center known as CIRCLE (Center for Inter-Religious Community, Learning, and Experiences), meeting rooms for student use, and the Axe and Palm which offers casual dining. Adjoining the Old Union, the Nitery houses a black-box theater and El Centro Chicano, and the Clubhouse is home to the Asian American Activities Center and the Native American Cultural Center.

## Office of Residential Education

Office: Tresidder Memorial Union

Phone: (650) 725-2800

Web Site: <http://studentaffairs.stanford.edu/resed>

The Office of Residential Education is responsible for developing the policies, programs, and staffing which support the intellectual, educational, and community-building activities in student residences. The conviction behind the Stanford residence program is that formal teaching, informal learning, and personal support in residences play an important role in a Stanford education.

## Residential Education Program

The Residential Education program provides Stanford undergraduates with a small community experience within a large research university. Residential Education programs extend the classroom into the residences and complement the academic curriculum with activities and experiences that contribute to students' preparation for a life of leadership, intellectual engagement, citizenship, and service. An extensive network of staff, including many who live in the residence halls, supports students during their undergraduate careers.

## Residence Deans

Residence Deans provide assistance to on- and off-campus undergraduate students. They can advise students about personal matters, occasionally intervene directly in behavioral problems or mental health concerns, and assist with personal emergencies. Advice is also available on issues of academic probation or suspension, leaves of absence, special concerns of students, and administrative matters. Residence Deans work closely with the Dean of Student Life and other University offices. They are assigned to specific residences and to off-campus students. For further information, undergraduates should call Residential Education at (650) 725-2800. For assistance, graduate students can consult Assistant Deans in the Graduate Life Office at (650) 736-7078.

## Sexual Assault and Relationship Abuse Education and Response

Office: Mariposa House, 585 Capistrano Way, Room 209

Phone: (650) 725-9129

Email: [saraoffice@stanford.edu](mailto:saraoffice@stanford.edu)

Web Site: <http://studentaffairs.stanford.edu/sara>

The Office of Sexual Assault and Relationship Abuse Education and Response (SARA) addresses policies, programs, protocols, and services related to interpersonal relationship violence on campus. The office is designed to coordinate response to reports of sexual assault, relationship abuse, and stalking to ensure the delivery of compassionate, comprehensive, and consistent services. The office also assists with educational outreach and training to increase awareness, sensitivity, and community accountability in the prevention of these acts. Questions and concerns can be addressed to [saraoffice@stanford.edu](mailto:saraoffice@stanford.edu).

## Student Activities and Leadership

Office: Old Union, 520 Lasuen Mall, Suite 206

Web Site: <http://studentaffairs.stanford.edu/sal>

The Office of Student Activities and Leadership (SAL), located in Old Union, supports student activities, over 600 student organizations and the ASSU through publications, workshops, one-on-one consultation, advising and major event planning support.

## Voluntary Student Organizations

There are over 600 different Voluntary Student Organizations (VSOs) at Stanford. VSOs are those organizations:

1. in which membership is not mandatory and is nondiscriminatory,
2. in which membership is both open and limited to current Stanford students registered in a degree-granting program,
3. in which students make all organizational decisions, and
4. whose purposes and procedures are consistent with the goals and standards of the University. In order to use University facilities, the Stanford name, or to receive ASSU funding, all voluntary student organizations must register with the University through the Office of Student Activities, Old Union, room 206.

As a condition of registration, each voluntary student organization must file and have approved each of the following:

1. A statement of purpose and organizational constitution.
2. A statement about membership eligibility.
3. Clear procedures for officer elections.
4. Identification of the authorized representatives of the group, who must be a currently registered student, and at least five active members in the organization who are currently registered students.

Each voluntary student organization must renew its registration with the University annually, early in Autumn Quarter, by submitting new registration materials.

If a voluntary student organization that is registered with the University seeks to use University facilities for meetings open to more than its own members and to specifically invited guests, such meetings shall be subject to the policies of the Committee on Public Events. All organization events held in University facilities must receive event approval from the Student Activities and Leadership and Stanford Events.

A voluntary student religious organization may hold open meetings in University facilities only with the approval of the Office of the Dean for Religious Life (as the delegatee of Student Activities and Leadership).

A registered voluntary student organization may advocate publicly a position on a public issue, provided the organization clearly identifies itself, and provided such an organization in any public statement makes clear it does not represent or speak for the University or for the Associated Students.

No student group or individual student(s) may use University space or facilities or receive other University support for purposes of supporting candidates for public office. Groups may use White Plaza for tables, speeches, and similar activities and may request to reserve auditoriums and similar space for public events including speeches by political candidates as long as all University guidelines are followed.

## Tresidder Memorial Union

Tresidder Memorial Union (TMU) is a center of community activity on the Stanford campus. It houses a variety of restaurants and meeting rooms, a ticket office and campus information center, a convenience store, banking and credit union offices with ATMs, a fitness center, FedEx/Kinkos and a hair salon.

TMU is also the home of several administrative offices: Meeting Services, Judicial Affairs, Residential Education, Student Services Center, Stanford Catering, Stanford Dining (Meal Card program), the LAIR computer center and the Office of the Vice Provost for Student Affairs.

## Vaden Health Center

Center Office: 866 Campus Drive  
Web Site: <http://vaden.stanford.edu>

The Allene G. Vaden Health Center strictly protects the confidentiality of information obtained in medical care and counseling.

### Medical Services

Medical Services (650-498-2336, ext. 1) is the first stop for diagnosis and treatment of illness, injury, and ongoing conditions, as well as preventive counseling and education. Services available without additional charge for students who have paid the Campus Health Service fee include:

- Medical appointments in general medicine and sports medicine.
- Medical advice for routine concerns throughout the day. When Medical Services is closed, advice for urgent conditions is available from the on-call physician.
- Referral to specialists, primarily at Stanford Hospital and Clinics and Menlo Medical Clinic.

### Additional services (fees apply):

- Allergy injections, immunizations, travel services, physical exams for employment and scholarships, HIV testing, laboratory, X-rays, drug screening (academic year only).
- Pharmacy (650-498-2336, ext. 3) and physical therapy (650-723-3195) are available on site.

### Counseling and Psychological Services (CAPS)

CAPS (650-723-3785) helps students who experience a wide variety of personal, academic, and relationship concerns. Services available without additional charge for students who have paid the Campus Health Service Fee include:

- Evaluation and brief counseling, including personal, couples and group therapy. Students requesting or requiring longer, ongoing therapy incur fees.
- Workshops and groups that focus on students' social, personal and academic effectiveness.
- Crisis counseling for urgent situations 24 hours a day.
- Consultation and outreach to faculty, staff, and student organizations.

### YWCA Sexual Assault Hotline

Stanford has contracted with the YWCA to assist students, staff, faculty and other Stanford campus affiliates who are victims of sexual assault. The YWCA also can be reached at its 24-hour campus telephone line (650) 725-9955.

### Health Promotion Services

Health Promotion Services (650-723-0821) educates and supports students to help them make informed, healthy decisions about their lifestyle. Services include:

- Individual preventive counseling and resource referral concerning nutrition, weight management, eating and body image, alcohol, tobacco and other drug use, sexual assault and harassment, relationships, intimacy and gender issues, and sexual health.
- Health education speakers, programs, and events and workshops at student residences, community centers, student organizations, and for new students (such as Real World: Stanford).
- Academic courses and internships.

- Student groups and volunteer opportunities including Peer Health Educators, HIV Peer Anonymous Counseling and Testing (HIV\*PACT), Sexual Health Peer Resource Center (SHPRC), and CPR/First Aid classes.

## Health Insurance

All registered students are required to have health insurance. Call (650) 723-2135 for more information. Cardinal Care (<http://vaden.stanford.edu/insurance>), the University-sponsored plan for students, fulfills this requirement. Insured by Aetna Student Health (medical), and ValueOptions (mental health), Cardinal Care features comprehensive, worldwide coverage, services by referral at Stanford University Medical Center and Menlo Medical Clinic, and lowest costs when one initiates care at Vaden Health Center. Stanford does not sponsor a health insurance plan for dependents; for available options, see the Dependent Health Insurance (<http://vaden.stanford.edu/insurance/dependent.html>) web site. Options for voluntary dental insurance are also offered.

Under certain circumstances, students with their own health insurance may waive Cardinal Care coverage. Domestic students who choose not to participate in Cardinal Care only have to waive once each academic year and must waive coverage before the first quarter in which they are enrolled for that academic year. At that time, and that time only, they will be able to waive Cardinal Care for the rest of the year by documenting equivalent health insurance in Axess (<http://exploreddegrees.stanford.edu/studentaffairs/http://axess.stanford.edu>) by the applicable deadline listed on Vaden's web site ([http://vaden.stanford.edu/insurance/using\\_your\\_own.html#wave](http://vaden.stanford.edu/insurance/using_your_own.html#wave)). International students must have coverage that meets or exceeds minimum standards established by the university in order to opt out of Cardinal Care; for more information see Vaden's web site ([http://vaden.stanford.edu/insurance/using\\_your\\_own.html#international](http://vaden.stanford.edu/insurance/using_your_own.html#international)).

*Vice Provost for Student Affairs:* Greg Boardman

*Associate Vice Provost and Dean of Student Life:* Chris Griffith

*Associate Vice Provost and Dean of Educational Resources:* Sally Dickson

*Associate Vice Provost and Director of Vaden Health Center:* Ira Friedman

*Associate Vice Provost and University Registrar:* Thomas C. Black

*Associate Vice Provost and Dean of Residential Education:* Deborah Golder

# Centers, Laboratories, and Institutes

Independent research laboratories, centers, and institutes perform multidisciplinary research that extends beyond the scope of any one of the University's organized schools. The listings are not all-inclusive. Click on the "Expand Menus" link at the top of the right hand menu to show a broad selection of other sites at Stanford University. A comprehensive list of Stanford offices is available on the University's A to Z Index page (<http://www.stanford.edu/atoz>).

The following tabs contain information on programs for undergraduates:

- Freeman Spogli Institute for International Studies (FSI) (p. 621)
- Woods Institute for the Environment (p. 622)

## Office of Vice Provost and Dean of Research

*Vice Provost and Dean of Research and Dean of the Independent Laboratories, Centers, and Institutes:* Ann M. Arvin

Office: 450 Serra Mall, Main Quadrangle, Building 60

Mail Code: 94305-2064

Phone: 650-723-8789 / Fax 650-723-0662

Web Site: <http://stanford.edu/dept/DoR>

Office Fax: 650-723-0662

The following independent Laboratories, Centers, and Institutes report to the Vice Provost and Dean of Research:

## Biological and Life Sciences

- Bio-X, the interdisciplinary program related to bioengineering, biomedicine, and biosciences, <http://biox.stanford.edu>
- Spectrum (formerly the Stanford Center for Clinical and Translational Education and Research), <http://spectrum.stanford.edu>

## Environmental Sciences

- Precourt Institute for Energy, <http://pie.stanford.edu/>
  - Precourt Energy Efficiency Center, <http://peec.stanford.edu>
  - Global Climate and Energy Project (G-CEP), <http://gcep.stanford.edu>
- Woods Institute for the Environment, <http://woods.stanford.edu>

## Humanities and Social Sciences

- Center for Advanced Study in the Behavioral Sciences (CASBS), <http://www.casbs.org>
- Center for the Study of Language And Information (CSLI), <http://www-csli.stanford.edu>
- Freeman Spogli Institute for International Studies (FSI), <http://fsi.stanford.edu>
  - Center on Democracy, Development, and the Rule of Law (CDDRL), <http://cddrl.stanford.edu>
  - Stanford Health Policy (Center for Health Policy/Center for Primary Care and Outcomes Research), <http://healthpolicy.stanford.edu>
  - Center for International Security and Cooperation (CISAC) <http://cisac.stanford.edu>
  - Walter H. Shorenstein Asia-Pacific Research Center (Shorenstein APARC), <http://aparc.stanford.edu>
  - The Europe Center, <http://fce.stanford.edu>
  - Program on Food Security and the Environment, <http://fse.stanford.edu>
  - Inter-University Center for Japanese Language Studies (IUC), <http://www.stanford.edu/dept/IUC>
  - Program on Energy and Sustainable Development (PESD), <http://pesd.stanford.edu>
  - Stanford Program on International and Cross-Cultural Education (SPICE), <http://spice.stanford.edu>
- Human-Sciences and Technologies Advance Research Institute (H-STAR), <http://hstar.stanford.edu>
  - Media-X, <http://mediax.stanford.edu>
  - Stanford Center for Innovations in Learning (SCIL), <http://scil.stanford.edu>
- Stanford Center on Longevity (SCL), <http://longevity.stanford.edu>
- Stanford Humanities Center, <http://shc.stanford.edu>

- Stanford Institute for Economic Policy Research (SIEPR), <http://siepr.stanford.edu>

## Physical Sciences

- Edward L. Ginzton Laboratory, <http://stanford.edu/group/ginzton>
- Geballe Laboratory for Advanced Materials (GLAM), <http://stanford.edu/group/glam>
- Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), <http://www-group.slac.stanford.edu/kipac>, operated jointly with SLAC National Accelerator Laboratory
- Photon Ultrafast Laser Science and Engineering (PULSE), <http://pulse.slac.stanford.edu>, operated jointly with SLAC National Accelerator Laboratory
- Stanford Institute for Materials and Energy Sciences (SIMES), <http://simes.slac.stanford.edu>, operated jointly with SLAC National Accelerator Laboratory
- W. W. Hansen Experimental Physics Laboratory (HEPL), <http://hepl.stanford.edu>

## Centers Reporting to the Dean of Humanities and Sciences

- Center for Space Science and Astrophysics, <http://www.stanford.edu/group/CSSA>
- Institute for Research in the Social Sciences (IRiSS), <http://iriss.stanford.edu>
  - Stanford Center for Population Research (SCPR), <http://iriss.stanford.edu/scpr>
  - Stanford Center for the Study of Poverty and Inequality (CPI), <http://iriss.stanford.edu/CPI>
  - Stanford Center for American Democracy (SCAD) (web site in development)
  - Stanford Center on Philanthropy and Civil Society (PACS), <http://pacscenter.stanford.edu>
- Michelle R. Clayman Institute for Gender Research, <http://gender.stanford.edu>
- Morrison Institute for Population and Resource Studies, <http://www.stanford.edu/group/morrinst>

## Center for Space Science and Astrophysics

*Emeriti:* (Professors) Robert Cannon, (Professors, Research) Donald L. Carpenter, Aldo V. daRosa, Daniel B. DeBra, W. Gary Ernst, Von R. Eshleman, Antony Fraser-Smith, Robert A. Helliwell, Bruce B. Lusignan, Ronald J. P. Lyon, Laurence A. Manning, Bradford W. Parkinson, J. David Powell, Peter A. Sturrock, G. Leonard Tyler, Robert V. Wagoner

*Director:* Roger W. Romani

*Associate Directors:* Umrans S. Inan, Philip H. Scherrer

*Professors:* Roger Blandford (Physics, SLAC), Elliot Bloom (SLAC), Lambertus Hesselink (Electrical Engineering), Umrans S. Inan (Electrical Engineering), Steven Kahn (Physics, SLAC), Tune Kame (SLAC), Peter F. Michelson (Physics), Vahé Petrosian (Physics), Roger W. Romani (Physics), Norman H. Sleep (Geophysics), Guenther Walthert (Statistics), Howard Zebker (Electrical Engineering, Geophysics)

*Associate Professors:* Tom Abel (Physics, SLAC), Steve Allen (Physics, SLAC), Sarah Church (Physics),

*Assistant Professors:* Stefan Funk (Physics, SLAC), Chao-Lin Kuo (Physics, SLAC), Risa Wechsler (Physics, SLAC)

*Professors (Research):* C-W. Francis Everitt (HEPL), Philip H. Scherrer (Physics)

*SLAC Staff Physicist:* Grzegorz Madejski

Center Offices: Varian, Room 340

Mail Code: 94305-4060

Phone: (650) 723-1439

Email: [danav@stanford.edu](mailto:danav@stanford.edu)

Web Site: <http://www.stanford.edu/group/CSSA>

The Center for Space Science and Astrophysics is an interdepartmental organization coordinating research in space science and astrophysics. Its members are drawn from the Department of Geological and Environmental Sciences in the School of Earth Sciences; the departments of Aeronautics and Astronautics, Electrical Engineering, and Mechanical Engineering in the School of Engineering; the departments of Applied Physics, Physics, and Statistics in the School of Humanities and Sciences; the W. W. Hansen Experimental Physics Laboratory; and the SLAC National Accelerator Laboratory. Its membership also includes all faculty and appropriate staff at the Kavli Institute for Particle Astrophysics and Cosmology, located at SLAC and the Physics department.

The facilities of the center are available to any interested and qualified student, who must be admitted by and registered in a department.

The departments of Aeronautics and Astronautics, Applied Physics, Electrical Engineering, Mechanical Engineering, and Physics offer opportunities leading to an M.S. or Ph.D. degree for work in space science or astrophysics. The center also offers opportunities to undergraduates who may, for instance, participate in research projects in their junior or senior years, on a part-time basis during the school year or on a full-time basis during the summer. The Astronomy Course Program operates a small student observatory where students may gain practical experience in astronomical observing.

## Freeman Spogli Institute for International Studies (FSI)

The Freeman Spogli Institute for International Studies (FSI) provides opportunities for undergraduate research through the CISAC Interschool Honors Program in International Security Studies and the CDDRL Undergraduate Honors Program. For information on the institute that manages student fellowship programs, see the Fellowship (<http://fsi.stanford.edu/fellowships>) web site.

## Interschool Honors Program in International Security Studies

*Co-Directors:* Martha Crenshaw, Joseph Felter

The Center for International Security and Cooperation (CISAC) coordinates a University-wide Interschool Honors Program in International Security Studies. Students chosen for the honors program intern with a security-related organization, attend the program's honors college in Washington, D.C., in September, attend a year-long core seminar on international security research, and produce an honors thesis with policy implications. Upon fulfilling individual department course requirements and completing the honors program, students graduate in their major with a certificate in Honors in International Security Studies. To be considered for the program, students must demonstrate sufficient depth and breadth of international security course work. Successful applicants to the program are expected to have taken:

POLISCI 114S International Security in a Changing World

Units

5

MS&E 193	Technology and National Security	3
and at least one related course such as		4-5
ECON 150/ PUBLPOL 104	Economic Policy Analysis	
STS 110/ MS&E 197/ PUBLPOL 103B	Ethics and Public Policy	
PUBLPOL 102/SOC 166	Organizations and Public Policy	
POLISCI 110D	War and Peace in American Foreign Policy	
POLISCI 116/ HISTORY 103E	History of Nuclear Weapons	
POLISCI 123/ PUBLPOL 101	Politics and Public Policy	

Students in the program enroll in IIS 199 Interschool Honors Program in International Security Studies, in Autumn, Winter, and Spring quarters. Information about and applications to this program may be obtained from the Center for International Security and Cooperation, C206-7 Encina Hall Central, telephone (650) 725-9132 or <http://cisac.stanford.edu>.

## Interschool Honors Program in Democracy, Development, and the Rule of Law

*Directors:* Francis Fukuyama

The Center on Democracy, Development, and the Rule of Law (CDDRL) Undergraduate Senior Honors Program provides students majoring in any Stanford academic department the opportunity to conduct an independent research project focused on the fields of democracy, development, and the rule of law under CDDRL faculty guidance. Students are required to complete a year-long honors research seminar that begins autumn quarter of the junior year. They will spend the last quarter of the senior year working independently with their faculty advisor to complete and submit their honors thesis ahead of their formal defense in mid-May. Upon fulfilling individual department course requirements and completing the honors program, students graduate with a certificate in Honors in Democracy, Development, and the Rule of Law.

Students interested in the program consult with their prospective honors advisers in their junior year to determine the tentative thesis topic, which should have some degree of policy relevance. Prerequisites for the program include; a 3.5 grade-point average at the time they apply; a strong overall academic record; sufficient depth and breadth in the fields of democracy, economic and social development, rule of law, and human rights course work; and demonstrated skills in writing and conducting independent research.

Students are required to attend honors college in Washington, D.C. in September before autumn quarter classes begin. Applicants are discouraged from studying abroad during the duration of the CDDRL Undergraduate Honors program.

Required course work includes:

- CDDRL's flagship undergraduate lecture course taught during Autumn Quarter, which ideally should be completed before the student enters the honors program.

•	INTNLREL 114D	Democracy, Development, and the Rule of Law	5	<b>Units</b>
•	or POLISCI 114D	Democracy, Development, and the Rule of Law		

- DDRL Honors Research Methods Seminars: Students meet their peers and faculty on a weekly basis to present their project theses and receive feedback.

•	<b>Spring Quarter, Junior Year (0)</b>			<b>Units</b>
	<b>Autumn Quarter, Senior Year (0)</b>			
	<b>Winter Quarter, Senior Year (0)</b>			

- Two additional courses that relate to the fields of democracy, development, and the rule of law (please see the program application for a list of examples).

Admitted students must be able to fulfill all course requirements in their individual majors by the time they graduate, in addition to the units required for the honors program.

For more information, contact Sarina Beges, CDDRL Program Manager at [sbeges@stanford.edu](mailto:sbeges@stanford.edu) or see the CDDRL (<http://exploreddegrees.stanford.edu/centerslaboratoriesandinstitutes/http://cddl.stanford.edu>) web site.

## Woods Institute for the Environment

### Goldman Interschool Honors Program in Environmental Science, Technology, and Policy

The Woods Institute for the Environment (<http://woods.stanford.edu>) coordinates a University-wide interschool honors program in environmental science, technology, and policy. Undergraduates planning to participate in the honors program are required to pursue studies in environmental sciences, technology, and policy, with a concentration in a single discipline. After completion of the prerequisite units, students join small group honors seminars to work with faculty members in the environmental field on an honors thesis that incorporates both scientific principles and policy aspects of environmental issues.

Courses in environmental studies appear under the course listings of the schools of Earth Sciences, Engineering, and Humanities and Sciences. Information about and applications to this program may be obtained by phoning (650) 723-5697 and at Goldman Honors Program (<http://woods.stanford.edu/education/goldman>) web site.

The Woods Institute provides support for student group projects focusing on the environment and sustainability. For details, see the Mel Lane Student Program (<http://woods.stanford.edu/students/projects.html>) web site.

The Woods Institute also sponsors a weekly series of talks on a broad range of energy topics under the rubric of:

•	CEE/ENERGY 301	The Energy Seminar	1	<b>Units</b>
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For more information, see the Energy Seminar (<http://woods.stanford.edu/cgi-bin/energyseminar.php>) web site.

## Other Academic Programs and Centers, and Independent Research Laboratories, Centers, and Institutes

- Hoover Institution on War, Revolution and Peace, <http://www.hoover.org>
- SLAC National Accelerator Laboratory (SLAC), <http://www.slac.stanford.edu>
- Stanford Synchrotron Radiation Laboratory (SSRL), <http://ssrl.slac.stanford.edu>

# Libraries and Computing Resources

## Stanford University Libraries and Academic Information Resources

University Librarian and Director of Academic Information Resources:  
Michael A. Keller  
Web Site: <http://library.stanford.edu>

Stanford University Libraries and Academic Information Resources (SULAIR) includes more than 30 libraries and programs supporting research, teaching, and learning at Stanford University. SULAIR acquires and delivers library collections in all formats, establishes policies and standards to guide the use of academic information resources, develops training and support programs for academic uses of computers, and maintains a broad array of electronic information resources, including the online library catalog and several hundred article and indexing databases and electronic journal subscriptions.

In each library unit, knowledgeable professional staff provide assistance in locating and using print and online information resources. Subject specialists and reference librarians are available for individual consultation, group classes, demonstrations, and special workshops by request.

Libraries throughout campus provide group and individual study spaces, public computers, personal laptop connections, photocopy machines, and digital scanners for use by Stanford faculty, staff, and students.

For information about library hours, see the Library Hours (<http://exploreddegrees.stanford.edu/librariesandcomputingresources/http://libraryhours.stanford.edu>) web site.

In support of the University's academic mission, Academic Computing Services provides technology expertise, resources and services to students and faculty. Academic Computing Services supports the use of technology in teaching, learning, research, and community; operates and manages technology-enabled teaching and learning environments including classrooms and public study spaces, the Multimedia Studio in Meyer Library, the Digital Language Lab, and computer clusters in Green Library, Tresidder Union, and the student residences; provides technology education, consulting support, and multimedia services at Meyer and in the residences; provides faculty-specific computing resources through the Academic Technology Specialist Program and Academic Technology Lab; and provides technology support to Stanford University Libraries' services.

Information about the library collections, facilities, services, and policies is available at the Libraries & Academic Information Resources (<http://exploreddegrees.stanford.edu/librariesandcomputingresources/http://library.stanford.edu>) web site.

Further information about library services and resources is available from the Information Center staff in Cecil H. Green Library (<http://exploreddegrees.stanford.edu/librariesandcomputingresources/http://infocenter.stanford.edu>) and from reference staff in all University libraries.

## Central Campus Libraries

The Cecil H. Green Library (East and Bing Wings) maintains research collections in the humanities, social sciences, area studies, and interdisciplinary areas. These collections number approximately 2.8 million volumes. Major services in Green Library include: the Information Center, the Media Microtext Center, the Jonsson Reading Room, the Lane Reading Room, the Bender Room, Loan Desk and Privileges, Interlibrary Services, course reserves, the Department of Special Collections, and the University Archives.

The J. Henry Meyer Memorial Library houses the East Asia Library as well as the Academic Computing Services group of SULAIR and provides study, multimedia, consulting, and instructional support services. In addition, Meyer Library houses the University's Digital Language Lab, technology enabled study spaces and classrooms, the Academic Technology Lab, and the central offices of Student Computing and Academic Computing Services.

## Branch Libraries

Humanities and Social Sciences Branch Libraries include the Art and Architecture Library, Cubberley Education Library, East Asia Library, Music Library, and Archive of Recorded Sound.

Science Branch Libraries include the Branner Earth Sciences Library, Engineering Library, Falconer Biology Library, Mathematical and Computer Sciences Library, Harold A. Miller Library at the Hopkins Marine Station, Physics Library, and Swain Library of Chemistry and Chemical Engineering.

For a complete list of campus libraries, see the Libraries and Collections (<http://exploreddegrees.stanford.edu/librariesandcomputingresources/http://libraries.stanford.edu>) web site.

## Coordinate Libraries

### J. Hugh Jackson Library (<http://www.gsb.stanford.edu/jacksonlibrary>), Graduate School of Business

Director: Kathy Long

### Lane Medical Library (<http://lane.stanford.edu>)

Director: Debra Ketchell

### Crown Law Library (<http://www.law.stanford.edu/library>)

Director: Paul Lomio

### SLAC Research Library (<http://www-group.slac.stanford.edu/library>)

Director of Technical Information Services: Patricia Kreitz



# Hoover Institution Library and Archives

Director: John Raisian

Web Site: <http://www.hoover.org/library-and-archives>

Since its founding by Herbert Hoover in 1919 as a special collection dealing with the causes and consequences of World War I, the Hoover Institution has become an international center for documentation, research, and publication on political, economic, social, and educational change in the 20th and 21st centuries.

The Hoover Library and Archives include one of the largest private archives in the world and contain outstanding area collections on Africa, East Asia, Eastern Europe, Russia and the former Soviet Union, Latin America, the Middle East, North America, and Western Europe.

Holdings include government documents, files of newspapers and serials, manuscripts, memoirs, diaries, and personal papers of men and women who have played significant roles in the events of these centuries, the publications of societies and of resistance and underground movements, the publications and records of national and international bodies, both official and unofficial, and books and pamphlets, many of them rare and irreplaceable. The materials are open to all Stanford students, faculty, and staff, to scholars from outside the University, and to the public at large.

## Information Technology Services (IT Services)

Web Site: <http://itservices.stanford.edu>

IT Services manages the University's central information technology infrastructure and provides hundreds of services and applications for use in academic and business activities. Support is provided in four layers:

- Participation and client-focused leadership in institutional IT planning, including strategies for data center expansion, centrally managed storage and backup, and business continuity and disaster recovery.
- Applications and services for departments and end-users including email, calendaring, wireless connectivity, web authentication, and Windows and Linux server hosting. These services are supported by a help desk, contract-support consultants, online self-help, and training.
- Applications and services that support other campus service providers, including the help desk, change management, and network registration systems.
- A communications and collaboration infrastructure robust enough to support advanced network, voice, and web-based services.

To learn about the variety of information technology resources available at Stanford, see the Information Technology Services (<http://exploreddegrees.stanford.edu/librariesandcomputingresources/http://computing.stanford.edu>) web site. For assistance with technology services at Stanford, contact the Stanford IT Help Desk at (650) 725-HELP (5-4357) or submit a request through the HelpSU (<http://exploreddegrees.stanford.edu/librariesandcomputingresources/http://helpsu.stanford.edu>) web site.

## The Continuing Studies Program

The Continuing Studies Program provides adults from the surrounding communities the opportunity to take courses for the purpose of intellectual enrichment. Courses and events are offered in all four academic quarters,

with over 400 courses planned throughout the year. The Continuing Studies Program is a non-degree bearing program.

The instructors are largely drawn from the ranks of the University's professoriate and academic staff. The program presents a wide variety of courses, with a central concentration in the liberal arts, including literature, history, art and architecture, and music.

Tuition discounts are available to University employees, Stanford students and faculty, Stanford Alumni Association members, educators, and those over age 65.

For a list of offered courses, see the Courses tab the Continuing Studies web site (<http://exploreddegrees.stanford.edu/continuingstudies/http://continuingstudies.stanford.edu>).

## Master of Liberal Arts Program

Associate Dean and Director: Linda Paulson

Participating Faculty: Russell Berman (Comparative Literature, German Studies), Marc Bertrand (French and Italian, emeritus), Jay Bhattacharya (Medicine), Eamonn Callan (Education), William Chace (English, emeritus), Gerry Dorfman (Hoover Institution, Political Science), Michele Elam (English), Martin Evans (English), Paula Findlen (History), Larry Friedlander (English), Kenneth Fields (English), Hester Gelber (Religious Studies), Albert Gelpi (English, emeritus), Barbara Gelpi (English, emerita), Robert Gregg (Religious Studies, emeritus), Tom Grey (Music), Hans Ulrich Gumbrecht (French and Italian), Van Harvey (Religious Studies, emeritus), Gavin Jones (English), Charles Junkerman (Continuing Studies Program), Nancy Kollmann (History), Herbert Lindenberger (English, emeritus), Marsh McCall (Classics, emeritus), Mark Mancall (History, emeritus), Scotty McLennan (Religious Life), David Palumbo-Liu (Comparative Literature), Linda Paulson (English), Denis Phillips (Education, emeritus), Ronald Rebholz (English, emeritus), Rush Rehm (Drama, Classics), John Rick (Anthropology), John Rickford (Linguistics), Paul Robinson (History, emeritus), Ramón Saldivar (English), Paul Seaver (History, emeritus), Thomas Sheehan (Religious Studies), Robert Siegel (Microbiology and Immunology), Peter Stansky (History, emeritus), Stephen Stedman (Freeman Spogli Institute for International Studies), Thomas Wasow (Linguistics), Ernlé Young (Medicine, emeritus), Steven Zipperstein (Jewish Culture and History)

Program Offices: 365 Lasuen Street, Littlefield Center

Mail Code: 94305-6079

Phone: (650) 725-0061 Fax: (650) 725-4248

Email: [mlaprogram@stanford.edu](mailto:mlaprogram@stanford.edu)

Web Site: <http://mla.stanford.edu>

Courses offered by the Master of Liberal Arts Program are listed under the subject code MLA on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MLA&filter-catalognumber-MLA=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MLA&filter-catalognumber-MLA=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=MLA&filter-catalognumber-MLA=on>).

## Program Description

The Master of Liberal Arts (MLA) program aims to provide a flexible, interdisciplinary program for returning adult students who seek a broad education in the liberal arts. The underlying premise of the MLA program is that knowledge gained through an interdisciplinary course of study leads to intellectual independence and satisfaction not always found in discipline-based programs of study. The goals of the MLA program are to develop advanced critical thinking, to foster intellectual range and flexibility, and

to cultivate an individual's ability to find the connections among different areas of human thought: art, history, literature, music, philosophy, political science, science, and theology.

The program is designed with part-time students in mind: seminars meet in the evening, and students complete the degree in 4-5 years. All master's seminars are taught by members of the Stanford faculty. Seminar size is limited to 20 students.

## Learning Outcomes (Graduate)

The purpose of the Master of Liberal Arts Program is to address subjects that cross disciplinary boundaries; to develop an understanding of the strength and the shortcomings of disciplinary evaluation; to help students to refine their skills in writing, research, critical thinking, collaborative work, and collegial discussion. While students are not being groomed for academic careers, graduates of the program have used their experience to gain acceptance into Ph.D. programs at Stanford and elsewhere. Students who complete the MLA program are well positioned to advance in careers that require the careful analytical and rhetorical training they receive. This training is achieved through the completion of four foundations courses, which together emphasize the program's goals as stated above; seven seminars that offer a more specific engagement with interdisciplinary subject matter; and a master's thesis, accomplished under the direction of a Stanford faculty member who is expert in the subject of the thesis.

## Degree Requirements

Candidates for the MLA degree must complete a minimum of 50 units of course work with at least a grade point average of 3.3 (B+). These units must include a three-quarter foundation course (equal to 12 units total), one 4-unit core introductory seminar for second-year students, at least seven 4-unit MLA seminars, and a 6-unit master's thesis. Students must also fulfill distribution requirements in each of the following areas: humanities; social science or social policy; and science, engineering, or medicine.

## Foundation Course

During the Autumn, Winter, and Spring quarters following admission to the program, a three quarter foundation course is required of all students. The purpose of this course is to lay the groundwork for the interdisciplinary, intercultural studies the student will shortly undertake. The foundation course introduces students to the broad framework of history, literature, philosophy, political science, and art.

## Core Seminar

During the first quarter of the second year, students take the core introductory seminar, MLA 102 An Introduction to Interdisciplinary Graduate Study. This seminar prepares students for interdisciplinary graduate work at Stanford. Students concentrate on writing a critical graduate paper, conducting library research, presenting the results of their research, and productively participating in a collaborative seminar.

## MLA Seminars

Students are required to take at least seven MLA seminars of 4 units each. Each year, at least nine seminars are offered in the MLA program. Each MLA course requires a substantial seminar paper. Students are encouraged to use these papers as a way to investigate new fields of interest, as well as a way to develop different perspectives on issues in which they have an ongoing interest.

## Master's Thesis

The MLA program culminates in the master's thesis. Students approaching the end of the program write a thesis, approximately 75-100 pages in length, that evolves out of work they have pursued during their MLA studies. The

thesis is undertaken with the prior approval of the MLA program, and under the supervision of a Stanford faculty member. During the process of writing the thesis, students are members of a work-in-progress group, which meets regularly to provide peer critiques, motivation, and advice. Each student presents the penultimate draft of the thesis to a colloquium of MLA faculty and students, in preparation for revising and submitting the final draft to the adviser and to the MLA program.

## Enrollment Requirements

MLA students must enroll for each academic year from the time of original matriculation until conferral of the degree. To remain active, students must either:

1. complete a minimum of two courses (eight units) in one academic year, defined as from the beginning of Autumn Quarter through the end of the following Summer Quarter; or,
2. be actively working on their thesis and regularly attend a minimum of three quarters of the work-in-progress meetings from the time the student enrolls in work-in-progress through graduation.

## Timeline for Completion

All requirements for the Master of Liberal Arts degree must be completed within five years after the student's first term of enrollment in the program. If extraordinary circumstances prevent completion within five years, a student may submit a written petition for a maximum one-year extension to the Associate Dean and Director. This petition is reviewed by a committee which makes a recommendation to the Director; the final decision is at the discretion of the Director. To be considered, the petition must be submitted on or before May 1 of the student's fifth year in the program.

## Registration

Master of Liberal Arts students enroll in courses through Stanford's Axess (<http://axess.stanford.edu>) system.

## Summer Session

*Associate Dean of Summer Session:* Jess Matthews

*Assistant Dean of Summer College:* John Robichaux

## Contact

Program Offices: 365 Lasuen Street

Mail Code: 94305-6079

Phone: (650) 723-3109; Fax: (650) 725-6080

Email: [summersession@stanford.edu](mailto:summersession@stanford.edu)

Web Site: <http://summer.stanford.edu>

Students attending Stanford Summer Session are either Matriculated Stanford students, visiting undergraduate or graduate students, or enrolled in the High School Summer College.

Degree-seeking Stanford students should indicate on Axess during Spring Quarter that they intend to register for Summer Quarter. Separate application is not required.

Visiting undergraduate or graduate students are not presently candidates for a Stanford degree. These are students and adults who have taken at least one course at another college or university. These students must complete a short application, available at <http://summer.stanford.edu>. Qualified high school students who are at least sixteen years old may apply to the High School Summer College (<http://summer.stanford.edu/programs>) program.

Students in Stanford Summer Session, in general, enjoy the privileges of students in the regular degree programs except that work completed cannot be applied toward a Stanford degree or credential until the student has been admitted to regular standing. Admission as a visiting student does not imply later admission to matriculated status. However, should the visiting

student matriculate at a later date through normal admission procedures, the summer work may be applied toward the requirements for a Stanford degree or credential at the discretion of the University or academic department.

Visiting undergraduate and graduate students and students in the High School Summer College are not matriculated Stanford University students, and not all University student policies apply to such students. The University reserves the right, at its discretion, to withhold registration from or require withdrawal from Stanford Summer Session for these students or applicants.

Stanford University admits qualified students of any race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, and gender identity to all the rights, privileges, programs, and activities generally accorded or made available to students at the University. Consistent with its obligations under the law, Stanford prohibits unlawful discrimination, including harassment, on the basis of race, color, national or ethnic origin, sex, age, disability, religion, sexual orientation, gender identity, or any other characteristic protected by applicable law in the administration of the University's programs and activities.

For more information, contact Summer Session by email, mail, phone, or fax using the listings above. Information is updated annually in January and may also be found online at <http://summer.stanford.edu>.

*Dean and Associate Provost:* Charles Junkerman

*Associate Dean and Director:* Dan Colman

## Other Services and Programs

### Bookstore

Web Site: <http://stanfordbookstore.com>

Organized in 1897, Stanford Bookstore, (650) 329-1217, located at 519 Lasuen Mall (White Plaza), provides a diverse selection of books, course materials, and supplies to the students, faculty, staff, and community in and surrounding Stanford. The bookstore carries over 130,000 titles, including a wide selection of medical books and books written by Stanford authors, making it one of the largest bookstores in the nation. The bookstore also carries medical instruments, Stanford logo apparel, gifts and souvenirs, periodicals, and features a café that provides an enhanced shopping experience. The Computer Store, in the main branch, sells academically priced computer hardware and software. Other services include shipping of purchases, gift cards, book buyback, fax service, postage stamp sales, an ATM, and Enterprise Rent-A-Car hotline. There are four branches in addition to the Stanford Bookstore that also serve the community: the Stanford Athletics Shop (formerly the Track House Sports Shop), (650) 327-8870, underneath the Cobb Track and Angell Field bleachers, is the headquarters for Stanford Athletic Gear; Tresidder Express convenience store, (650) 723-9224 in Tresidder Union; the Stanford Shop, (650) 614-0295, at the Stanford Shopping Center, provides Stanford apparel; and the Bookshop, (650) 725-2775, at the Cantor Center for the Arts, carries books on the arts, fine gifts, apparel, and jewelry.

### Stanford Conference Services

Phone: (650) 723-3126

Email: [conferenceinquiries@stanford.edu](mailto:conferenceinquiries@stanford.edu)

Web Site: <http://conference.stanford.edu>

A conference is defined as any student, youth, or adult group that convenes for part of a day (including a luncheon), overnight, or for several days, outside the regular or summer academic sessions for registered students. Policies concerning conferences are the responsibility of the offices of the President and the Provost.

To make arrangements for hosting a new, academically sponsored residential summer conference during the mid-June through late-August time frame, contact Stanford Conference Services by phone or email as listed above. Stanford Conference Services also offers meeting planning services on a year-round basis for academically sponsored conference groups seeking assistance with planning and managing residential and non-residential conferences. In addition, conference organizers seeking to conduct conferences outside of the late August to early June time frame can also contact the non-academic facilities scheduling in the Office of the University Registrar, (650) 723-6755 or [reg-events@stanford.edu](mailto:reg-events@stanford.edu), or contact Stanford Events, (650) 723-2551 or [stanfordevents@stanford.edu](mailto:stanfordevents@stanford.edu).

Academic sponsorship by a Stanford dean or department head is required for first time conferences hosted by University departments or by conferences hosted by external organizations interested in meeting at Stanford. Conferences initiated by University departments or external organizations must demonstrate consistency with the University's academic mission. For summer conferences, the sponsoring department submits its proposal to the Director of Stanford Conference Services for review in terms of available facilities and for the approval of the President's Office. At least half of the participants in any summer conference at Stanford hosted by an external organization must be housed in Stanford's campus residences and participate in daily meal plans provided by Stanford Dining. On-campus residential housing and dining services are normally available from the Sunday following Commencement through late August.

Summer conference groups should contact Stanford Conference Services concerning arrangements for tables, chairs, audio-visual aids, signage, janitorial services, trash pick-up and removal, sprinkler shutoffs, and other conference-related products/services. During the academic year, housing arrangements for University-sponsored visitors can be made through the Stanford Guest House (<http://exploreddegrees.stanford.edu/otherservicesandprograms/http://guesthouse.stanford.edu>) web site or call (650) 926-2800.

### Ombuds

Stanford University Ombuds: David Rasch

Ombuds Office: Mariposa House, 585 Capistrano Way, Room 210

Phone: (650) 723-3682

Fax: (650) 725-7288

Mail Code: 94305-8200

Email: [rasch@stanford.edu](mailto:rasch@stanford.edu)

Web Site: <http://stanford.edu/dept/ombuds>

School of Medicine Ombuds: Martha McKee

Office: MSOB X301

Phone: (650) 498-5744

Fax: (650) 498-5865

Mail Code: 94305-5404

Email: [mmckee@stanford.edu](mailto:mmckee@stanford.edu)

Web Site: <http://med.stanford.edu/ombuds>

The charge to the Ombuds office at Stanford is: "The Ombudsperson's task is to protect the interests and rights of members of the Stanford community from injustices or abuses of discretion, from gross inefficiency, from unnecessary delay and complication in the administration of University rules and regulations, and from inconsistency, unfairness, unresponsiveness, and prejudice in the individual's experience with University activities. The Ombudsperson's office exists to receive, examine, and channel the complaints and grievances of members of the Stanford community, and to secure expeditious and impartial redress."

Any troublesome matter in the University community may be discussed in confidence with the University Ombuds. Services of the office are available

to students, staff, and faculty. Although possessing no decision making authority, the Ombuds has wide powers of inquiry. The Ombuds refers matters to the proper person or office expeditiously and also provides conflict resolution services. For the role of the office of the Ombuds in cases of sexual harassment, see the "Non-Academic Regulations (<http://exploreddegrees.stanford.edu/nonacademicregulations>)" section of this bulletin.

## Police Services

Department Office: Corner of Campus Drive and Serra Street  
Phone: (650) 723-9633  
Web Site: <http://police.stanford.edu>

The Stanford Department of Public Safety is a full service police department that operates 24 hours a day, 7 days a week. For police, fire, or ambulance response, dial 9-1-1, or 9-9-1-1 from a University phone. Emergency assistance can also be obtained by using one of the nearly 100 Blue Emergency Phone Towers strategically placed around campus.

The department is composed of the following divisions:

The Field Services Division consists of sworn and non-sworn officers who patrol the campus and respond to calls for service. Sworn officers receive their police powers through the Santa Clara County Sheriff's Office. Sworn officers have the legal authority to stop vehicles, make arrests, and enforce all laws. Non-sworn officers assist the sworn officers with security patrols, evidence collection, crime prevention presentations, and other assigned tasks.

Community Service Division: Community Service Officers (CSOs) enforce the parking rules and regulations on campus, and provide traffic control at special events, construction zones, and accident scenes. CSOs also provide building security during emergency or critical incidents.

The Support Services Division provides logistical, technical, and accounting support to the department. Special events are handled through this division as well. Special Events Personnel (SEPs) provide security at campus events including athletic events, concerts, student-sponsored events, and dignitary visits. SEPs are available for hire by groups needing security at their University events. Contact the special events office at (650) 723-4924, or email [event\\_security@stanford.edu](mailto:event_security@stanford.edu), for more information.

The Administrative Support Division supports the department through training, recruiting, payroll, human resources, and other business functions. For additional safety information or to view the yearly crime statistics, see the Stanford Safety and Security Almanac, available free from the Public Safety (<http://exploreddegrees.stanford.edu/otherservicesandprograms/http://police.stanford.edu>) web site.

## Office for Religious Life

Office: Memorial Church  
Phone: (650) 723-1762  
Web Site: <http://religiouslife.stanford.edu>

The mission of the Office for Religious Life (ORL) is to guide and enhance spiritual, religious, and ethical life within the Stanford University community. Multifaith exploration and dialogue, central in Stanford's history from its founding, is a vital part of both its ethos and education.

The ORL is committed to welcoming students of all genders and sexual identities, all religious and non-religious traditions, and all cultural backgrounds, striving to ensure that students, faculty, and staff have access to supportive contexts in which to pursue their spiritual journeys on the Stanford campus.

The ORL oversees and provides support for Stanford Associated Religions (SAR), more than thirty religious organizations that offer their spiritual services to the campus, as well as the Center for Inter-Religious Community, Learning, and Experiences (the CIRCLE). Located on the third floor of the remodeled Old Union, the CIRCLE offers an interfaith

sanctuary, a seminar room, a common room, a student lounge, a non-lending library, and offices housing many SAR member groups.

## Stanford Alumni Association

Web Site: <http://stanfordalumni.org>  
Phone: (800) 786-2586 or (650) 723-2021

The Stanford Alumni Association (SAA) seeks to serve all Stanford alumni and students by offering programs and services such as reunions, regional events, Stanford Magazine, online services, volunteer and learning opportunities, and the alumni directory.

The Stanford Alumni Association's alumni and student class outreach department (ASCO) provides undergraduates and graduate students with networking opportunities, celebratory and social events, and programs that enhance their Stanford experience and help connect them to the 200,000 alumni worldwide who make up the Stanford alumni community. ASCO programs bring students and alumni together through Reunion Homecoming Weekend each autumn and Commencement weekend in the spring, along with alumni networking events throughout the year.

For students, SAA sponsors events such as student tailgates, alumni panels, Senior Send-off, Senior Dinner on the Quad, and Class Day. The Alumni Association gives out the J.E. Wallace Sterling Award and the Stanford Award of Excellence annually to honor graduating seniors for exemplary service to the University. For more information on student programs at the Stanford Alumni Association (<http://exploreddegrees.stanford.edu/otherservicesandprograms/http://police.stanford.edu>) web site.

## Office of Special Events & Protocol and the Stanford Ticket Office

The Office of Special Events & Protocol (OSEP) (<https://osep.stanford.edu>) and Stanford Ticket Office (STO) (<http://tickets.stanford.edu>) are divisions of the Office of Public Affairs (<http://publicaffairs.stanford.edu>). OSEP manages the University's public ceremonies such as Commencement, Baccalaureate, New Student Orientation Convocation, and the Founders' Celebration. The organization also designs and produces other high-profile university events hosted by the President and Provost, such as the Roundtable at Stanford, international symposia and visits to campus by foreign delegations and heads of state.

OSEP also serves in an advisory capacity and/or can provide direct planning expertise to campus schools, departments, and student groups. The department has final approval authority of Stanford facility and open space use for non-academic events on campus. For information or event planning assistance, information about policies, procedures, and University facilities, see the OSEP (<https://osep.stanford.edu>) web site, or call (650) 724-1387.

The STO is the University's official full-service box office that provides online, in-person and by phone ticketing services, as well as day-of-event staffing support to hundreds of events throughout the year. Important arts organizations and venues it serves include Stanford Live, Stanford Jazz and Music Departments, the Bing Concert Hall, Frost Amphitheater, and Memorial Auditorium. The Stanford Ticket Office also provides professional ticketing and registration services to all academic departments, institutes, and student groups for lectures, festivals, concerts, and various high profile public events. For more information, see the Stanford Ticket Office (<http://tickets.stanford.edu>) web site, or call (650) 725-ARTS (2787).

# Diversity and Access Office

Director of the Diversity and Access Office and Title IX Coordinator: Rosa Gonzalez

Office: Mariposa House, 585 Capistrano Way

Mail Code: 94305-8230

Phone: (650) 723-0755; TTY: (650) 723-1216

Email: [equal.opportunity@stanford.edu](mailto:equal.opportunity@stanford.edu), [disability.access@stanford.edu](mailto:disability.access@stanford.edu)

Web Site: <http://stanford.edu/dept/diversityaccess>

The Diversity and Access Office has two primary missions:

1. To oversee University compliance with nondiscrimination and equal opportunity laws (including but not limited to Title VI, Title VII, and Title IX), as well as the regulations relating to affirmative action. This includes collecting, monitoring, reporting, and analyzing personnel data regarding the hiring, promotion, and retention of women and minorities. Rosa Gonzalez, Title IX Coordinator, serves as the University's coordinator of Title IX matters relating to concerns of denial of educational opportunities on the basis of gender, including sexual harassment or sexual violence.
2. To oversee University compliance with federal and state disability-related laws, including (but not limited to) the Americans with Disabilities Act, and Sections 503 and 504 of the Rehabilitation Act. This includes providing certain non-academic services (and accommodations) to students with disabilities, and providing assistance and information to staff and faculty with disabilities needing workplace accommodations. The office also provides auxiliary aids and services to the public visiting Stanford and attending public events. In addition, the office monitors disability access on campus and provides information regarding web accessibility.

## Awards and Honors

### Faculty and Staff Awards

#### Kenneth M. Cuthbertson Award

The Kenneth M. Cuthbertson Award was established in 1981 to recognize exceptional service to Stanford University. It was established by members of the faculty who wish to remain anonymous. All members of the Stanford community are eligible for the award; the sole criterion is the quality of the contribution that the recipients have made to the University. The award provides a way of honoring members of the staff and faculty for their efforts on behalf of the University.

Ordinarily, one award is made each year. The award was first presented in 1981 to the person for whom it is named. Kenneth M. Cuthbertson was one of the early architects of Stanford's long-term financial planning and fundraising program. His service to Stanford set an enduring standard for those who will come after him. The award is made annually at the University Commencement Ceremony.

#### Lloyd W. Dinkelspiel Awards

The Lloyd W. Dinkelspiel Awards recognize distinctive and exceptional contributions to undergraduate education at Stanford University. The two principal awards are made to the faculty or staff members adjudged to have made the most distinctive contribution to the development and enrichment of undergraduate education in its broadest sense. Two awards are also made to graduating seniors who combine academic achievement with effective contributions to undergraduate student life. Preference is given to service in the School of Humanities and Sciences in the area of liberal education. The awards are made from an endowment fund established in memory

of Lloyd W. Dinkelspiel, a Stanford alumnus and trustee. The awards are made annually at the University Commencement Ceremony.

#### Walter J. Gores Awards

The Walter J. Gores Faculty Achievement Awards for excellence in teaching were established by bequest of Walter J. Gores, Stanford Alumnus of the Class of 1917 and a professor at the University of Michigan for 30 years. Teaching is understood in its broadest sense and includes, in particular, lecturing, leading discussions, tutoring, and advising at the undergraduate or graduate levels. Any member of the teaching staff of the University is eligible for an award, including all faculty of professorial rank, instructors, lecturers, teaching fellows, and teaching and course assistants. Ordinarily, awards are made to a senior faculty member (associate or full professor) or senior lecturer; a junior faculty member or member of the teaching staff; and a teaching assistant (graduate or undergraduate student). The awards are made annually at the University Commencement Ceremony.

#### Allan Cox Medal For Faculty Excellence Fostering Undergraduate Research

The Allan Cox Medal for Faculty Excellence Fostering Undergraduate Research is awarded annually to a faculty member who has established a record of excellence directing undergraduate research over a number of years. It may also go to a faculty member who has done an especially outstanding job with just one or two undergraduates who have demonstrated superior work. The medal was established in memory of the former professor of Geophysics and Dean of the School of Earth Sciences, a strong supporter of faculty-student research collaboration.

#### Herbert Hoover Medal For Distinguished Service

David Starr Jordan's belief that every academic degree should represent work actually done in or under the direction of the institution granting it has meant that, since its founding, Stanford has awarded no honorary degrees. As a means of recognizing extraordinary individuals who deserve special acknowledgment, the Stanford Alumni Association in 1962 voted to establish the Herbert Hoover Medal for Distinguished Service. The name pays tribute to the former President's example of service to his University, to his country, and to the cause of world humanitarianism. Indeed, Mr. Hoover was the first award recipient. The gold medal is presented following selection by an anonymous committee appointed by the Chair of the Board of Directors of the Alumni Association.

#### Student Awards

##### Boothe Prize for Excellence in Writing

Awarded during the freshman year, the Boothe Prize recognizes excellence in writing. Students are selected for this honor on the basis of essays written for courses fulfilling the Introduction to the Humanities or Writing and Rhetoric requirements. The prize is named for Mr. and Mrs. D. Power Boothe, Jr., whose gifts to the University reflect their interest in the humanities.

##### President's Award for Academic Excellence in the Freshman Year

The President's Award honors students in the top 3% of the class who have exceptionally distinguished academic records that exemplify a strong program of study in the freshman year. Students eligible for the award normally have completed Writing and Rhetoric and Introduction to the Humanities requirements during their first year at Stanford.

## Deans' Award for Academic Achievement

The Deans of Earth Sciences, Engineering, and Humanities and Sciences recognize from five to ten undergraduate students each year for their academic endeavors. Honorees are cited for noteworthy accomplishments which represent more than a high grade point average or success in course work. Faculty nominate students who have exceptional tangible achievements in classes or independent research, national academic competitions, a presentation or publication for a regional or national audience, or exceptional performance in the creative arts.

## Firestone Medal for Excellence in Research

The Firestone Medal is awarded to seniors in recognition of excellence in undergraduate research. Departments in the School of Humanities and Sciences nominate students who have completed outstanding honors projects in the social, physical, and natural sciences.

## Robert M. Golden Medal for Excellence in the Humanities and Creative Arts

The Golden Medal recognizes outstanding achievement in the humanities and the creative arts. Seniors receive these medals upon nomination by their major department.

## Hoefer Prize for Excellence in Undergraduate Writing

The Hoefer Prize recognizes students and faculty for their work in courses that meet the University Writing Requirement for writing in the major. Prizes are awarded in each of the five areas of the undergraduate curriculum: humanities, social sciences, natural sciences, engineering, and earth sciences.

## Frederick Emmons Terman Engineering Scholastic Award

The School of Engineering annually presents the Terman Award to seniors for outstanding academic achievement. The awardees share their award with a high school teacher of their nomination.

## Phi Beta Kappa

Phi Beta Kappa is a nationwide society honoring students for the excellence and breadth of their undergraduate scholarly accomplishments. Membership in the Stanford Chapter (Beta of California) is open to undergraduates of all majors. To be elected to Phi Beta Kappa at Stanford, a student must achieve academic distinction in the major as well as in courses across a broad range of fields.

Approximately a tenth of the members of a graduating class are elected to Phi Beta Kappa. Of this number, about one fifth are chosen in their junior year, the remainder in their senior year.

The chapter's election guidelines define breadth of study as excellence beyond the major field. To be considered for election, a student must have taken at least three courses of 3 units or more at Stanford by the time elections are held early in the Spring Quarter with a letter grade of 'B-' or better in each of the following three major domains of knowledge: humanities; science, engineering, and math; and social sciences. Students who transfer in their junior year must have taken at least two courses at Stanford in two of the major domains and at least one course in the third domain, and must have completed a minimum of 75 units of academic work at Stanford by the end of Winter Quarter. Students who transfer in their

sophomore year must have taken at least two courses at Stanford in each of the major domains.

There is no direct correlation between Stanford University General Education Requirements (GERs) and Phi Beta Kappa breadth requirements. The elections committee analyzes the content of individual courses to determine which major domain requirement they may satisfy. IHUM, PWR, and first-year language courses do not satisfy the PBK breadth criterion.

A grade of '+' or 'CR' is not considered a sign of distinction. Minimally satisfying the breadth criterion is not considered a sign of distinction.

The academic records of eligible students are automatically reviewed, so no special action is required for students wishing to be considered for membership. Anonymity in the election process is ensured by removal of the students' names from their academic records before consideration. Students who desire that their records not be made available for consideration by the Stanford chapter of Phi Beta Kappa should inform the Registrar, 630 Serra Street, Suite 120, Stanford, CA 94305-6032.

## Exchange Programs and Cross-enrollment Agreements

Stanford has exchange programs and cross-enrollment agreements with a number of other colleges and universities. The purpose of these programs and agreements is to offer Stanford students courses and training that are not available in the Stanford curriculum.

### Undergraduate

Stanford has exchange programs with four colleges and universities that allow students to exchange schools for a quarter/semester or for a year, depending on the school. These programs are best suited to students in their junior year, when the major area of study has been determined. Stanford students register for zero units at Stanford during the quarter(s) in which they are attending another college or university and pay the regular Stanford tuition. Courses taken at the other institution are treated as transfer credit back to Stanford. Students should contact the External Credit Evaluation section of the Office of the University Registrar to determine whether the courses taken through an exchange program may qualify for credit toward a Stanford degree. Only the number of units accepted in transfer, not the course titles or the grades received, are recorded on the Stanford transcript.

Exchange programs are currently available at three historically black institutions: Howard University in Washington D.C.; and Morehouse College and Spelman College in Atlanta, Georgia. The exchange program at Dartmouth College in Hanover, New Hampshire, focuses on Native American Studies. Further information is available at the Undergraduate Advising and Research Center.

### Graduate

The Exchange Scholar Program is open to doctoral students in the fields of humanities, social sciences, and sciences who have completed one full year of study at one of the participating institutions. These students may apply to study at Stanford, and Stanford students may apply to one of these other institutions, for a maximum of one academic year (Autumn, Winter, and Spring quarters) to take advantage of particular educational opportunities not available on the home campus. The participating institutions are Brown University, University of Chicago, Columbia University, Cornell University, Harvard University, Massachusetts Institute of Technology, Princeton University, Stanford University, University of Pennsylvania, and Yale University. Further information on the program may be obtained from the Office of the University Registrar, or the graduate dean's office at participating institutions. Some institutions may place restrictions on specific departments.

Stanford also has separate exchange programs with the University of California, Berkeley, and the University of California, San Francisco. Further information may be obtained at the Office of the University Registrar.

## Cross-Enrollment

See the ROTC section (p. ) of this bulletin for information on ROTC cross-enrollment programs.

# Descriptions

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## Courses

## Courses

### Accounting Courses

#### **ACCT 210. Financial Accounting. 4 Units.**

In general terms, financial accounting is the measurement of economic activity for decision-making. Financial statements are a key product of this measurement process and an important component of firms' financial reporting activities. In the past few years, financial accounting came to the forefront of the national consciousness as the stock market continued to decline amid faltering investor confidence. The crisis of confidence began with the revelation of accounting irregularities at some of the United States largest companies. However, the implications extended well beyond the effects of individual accounting or company failures: investors seemed to lose confidence in the integrity of the financial system as a whole. The capital markets, whose relative efficiency is based largely on the timely dissemination of relevant and reliable financial information, were at risk. Clearly, the importance of understanding accounting has never been so salient. The objective of this course is not to train you to become an accountant but rather to help you develop into an informed user of financial statement information. While financial statement users face a wide variety of decisions, they are often interested in understanding the implications of financial statement information for the future cash flows and earnings potential of a firm. We will focus on understanding the mapping between underlying economic events and financial statements, and on understanding how this mapping affects inferences about future profitability. Because annual reports are somewhat formidable, we will spend time familiarizing ourselves with how firms present the information for various accounts in the financial statements, including the footnotes. We also will discuss the role of the various institutions involved in the reporting process. By understanding the environment in which financial reporting takes place you will be in a better position to evaluate critically the disclosures made by firms in published financial statements. The following learning objectives will be emphasized: (1) familiarity with the transactions businesses engage in, (2) fluency in accounting terminology, (3) understanding the structure that maps transactions into accounting numbers, (4) understanding the rationale for various accounting methods, and (5) awareness of the judgment involved and the discretion allowed in choosing accounting methods, making estimates, and disclosing information in financial statements.

#### **ACCT 212. Managerial Accounting: Base. 3 Units.**

Managerial accounting refers to the preparation and use of information for internal planning, control, coordination, and performance evaluation purposes. This orientation contrasts with financial accounting where the focus is on accounting disclosures for parties external to the firm. The majority of the course covers the vocabulary and mechanics of cost accounting, issues involved in the design of an internal accounting system, and the role of accounting in decisions concerning resource allocation and performance measurement. Included in this are discussions of capacity costs, inter-departmental allocations, and activity-based management in manufacturing and service environments. We will pay particular attention to the trade-offs embedded in the choice of internal accounting systems, as well as ways in which to attenuate the problems created by these trade-offs. The second part of the course examines the process of evaluating the performance of individuals, business units and firms. We will study the optimal choice of performance metrics for incentive purposes and the rationale behind the balanced scorecard, as well as the importance of designing appropriate transfer prices for intrafirm transactions.

#### **ACCT 213. Financial Accounting - Accelerated. 4 Units.**

This course develops students' ability to read, understand, and use corporate financial statements. The course is oriented toward the user of financial accounting data (rather than the preparer) and emphasizes the reconstruction and interpretation of economic events from published accounting reports. The course is geared toward students with some familiarity in dealing with financial statement information and allows for deeper coverage and discussion in class.

#### **ACCT 215. Managerial Accounting: Accelerated. 3 Units.**

This course provides a comprehensive introduction to the concepts and tools of managerial accounting. The first part of the course demonstrates how management can rely on internal accounting information to measure and manage the profitability of individual products and customers. As part of that analysis, we examine alternative costing methods and illustrate how the resulting cost information can be used for decision making. The second part of the course focuses on the role of the internal accounting system in evaluating managerial performance and in coordinating the activities among business units within the firm. Our focus here will be on performance metrics that enable effective decentralization by aligning the objectives of individual business units with the overall corporate goals.

#### **ACCT 219. Sloan: Accounting. 4 Units.**

A characteristic of business is the extensive use of accounting data. The financial accounting course has the general objective of developing students' understanding of the nature, scope, and limitations of accounting information. To achieve this objective the course attempts to: (1) develop students' understanding of the conceptual accounting framework, including the objectives of financial reporting, and (2) develop students' ability to understand and critically evaluate the financial disclosures made by corporations. An issue of particular interest will be the managerial incentive aspects of accounting information and disclosures.

#### **ACCT 311. Global Financial Reporting. 4 Units.**

This course is designed to enhance students' understanding of current financial reporting issues through a detailed analysis and comparison of U.S. and International Financial Reporting Standards. The course will cover the development of accounting standards, implementation of these standards, and how to interpret output from these standards. The course highlights intermediate and advanced financial reporting topics including fair value accounting, asset securitization, consolidation including special purpose entities, foreign currency translation, derivatives and hedging, leases, revenue recognition, pensions, and equity compensation. The course also focuses on evaluating emerging financial reporting issues such as proposed financial reporting standards put forth by U.S. or international standard setting bodies. This course should help students better understand the environment governing global financial reporting and how firms develop financial statement information within this environment.



**ACCT 313. Accounting-Based Valuation. 4 Units.**

This course is structured to develop students' ability to interpret and use financial accounting information in equity valuation contexts. The perspective taken is that of an outsider relying on publicly available financial information for investment purposes, and builds heavily on the residual income framework for equity valuation. The first half of the course covers financial statement analysis-based tools for assessing a firm's current financial performance and economic condition, including traditional ratio analysis. The second half of the course introduces the accounting-based valuation framework, and develops the link between financial statement analysis, forecasting and valuation. This portion of the course focuses on techniques for forecasting specific income statement and balance sheet items, the creation of pro-forma financial statements, and the implementation of several accounting-based valuation models. The capstone to the course is the completion of a comprehensive equity valuation project. In addition to learning basic financial statement analysis tools and accounting-based valuation theory, students benefit from applying these tools and theories in the context of weekly cases and the final project. The course is structured for students to gain a deeper understanding of the economic pressures behind the analysis and valuation process by drawing upon and synthesizing concepts from microeconomics, corporate finance, corporate strategy, statistics and accounting. The course will be of value to those students who, as either senior managers or outsiders, anticipate making investment or credit decisions at least partially based on financial statement information.

**ACCT 317. Managerial Accounting: Performance Measurement, Compensation, and Governance. 3 Units.**

The course will examine the academic and professional controversies surrounding corporate governance and executive compensation. A basic framework will be developed to integrate the many important dimensions of corporate governance in the U.S. and international settings. The institutional features of corporate governance and executive compensation will be documented using the professional business and legal literatures. In addition, the scientific research in accounting, economics, finance, and organizational behavior will be used to provide insights into the measurement and consequences of observed corporate governance and executive compensation choices. After successfully finishing the course, a student should be able to (i) understand the debates about appropriate choices for corporate governance and executive compensation and (ii) critically evaluate the implications of academic and professional research studies on these controversial issues.

**ACCT 332. Mergers and Acquisitions: Accounting, Regulatory, and Governance Issues. 4 Units.**

This course covers various financial and economic issues related to mergers and acquisitions. For example, we review the financial reporting implications of business combinations (e.g., consolidation, the "acquisition" method), and income tax treatments of M&A transactions (e.g., taxable vs. non-taxable deals). We also examine corporate governance issues related to firms' decision to acquire or be acquired, the M&A regulatory environment (e.g., anti-trust), and other factors that can potentially shape the structure of M&A transactions. In covering these and other related issues, we will discuss both the theory and practice of mergers and acquisitions. To provide some specific context we will analyze specific M&A deals (e.g., the mergers of HP/Compaq, UpJohn/Pharmacia, and AOL/Time Warner; Oracle's hostile takeover of PeopleSoft; and many more). In discussing these cases, we will examine the situation faced by the company, the issues surrounding the transaction, including the financial reporting implications, and focus on the managerial incentives and the judgment applied. We will also discuss some of the important strategies that underlay a successful negotiation. We will also review some of the related literatures in accounting, economic, and finance, to gain broader perspectives and insights into the financial issues associated with M&A transactions. Class time comprises mini lectures that introduce some of the more technical concepts, case discussions, and guest speakers who will offer additional perspectives on the subject matters. The course is co-taught by Ron Kasznik (GSB) and Safra Catz (Oracle Corporation). Ms. Catz is President of Oracle and a member of its Board of Directors. She has led Oracle through more than 50 acquisitions in recent years (including PeopleSoft, Siebel, BEA, and Sun Microsystems). Prior to joining Oracle in 1999, Ms. Catz was Managing Director at Donaldson, Lufkin & Jenrette, a global investment bank (now part of CSFB). Ms. Catz also serves on the board of directors for HSBC Holdings plc since 2008.

**ACCT 340. Alphanomics: Informational Arbitrage in Equity Markets. 4 Units.**

This is an advanced elective course on the economics of active investing in equity markets. The 2012-13 version of this class will be offered in two parts: A 4-credit class for the Fall quarter (ACCT340), and a 2-credit class for the Spring quarter (ACCT541). If you sign up for the Fall class, your spot on the Spring roster will be automatically reserved. However, you will still have the option at the end of the Fall quarter to opt out of the 2-credit Spring class. The Fall course (ACCT340) is designed as a "start-up kit for an equity hedge fund." In the Fall quarter, we will cover some of the foundational skills needed to build and manage a portfolio of public stocks. There is no final exam. However, there will be a number of individual cases and a final group project. 25% of the grade will be based on class participation, and 75% will be based on cases and projects. Towards the end of Fall, student who choose to continue onto the Spring course (ACCT541) will form teams (of 4 to 6 each) and submit a proposal for a hedge fund product. Once their proposal is approved, each team will be given a \$1 million paper portfolio. Students then manage this portfolio for the rest of the school year (their trades and portfolio statistics are automatically tracked). Students enrolled in the Spring (ACCT541) will reconvene in the second half of the quarter for a series of class lectures/talks as well as team presentations, summarizing their experience. The ACCT541 portion of the course will require each student group to make a class presentation, as well as turn in a written report. A separate grade will be assigned for ACCT541. 25% of this grade will be based on class participation, and 75% will be based on the presentations and reports. The overall goal of this course is to improve student skills in assessing the relative attractiveness of individual companies, as well as in managing portfolio risk according to pre-specified targets. This is a hands-on course with an emphasis on experiential learning. Students will make extensive use of analytical tools in the new "Real-time Analytics and Investment Lab" (High-speed R.A.I.L.) facility in the Bass Center. As part of this course, students will design stock screens, conduct back-tests, do detailed company analyses, execute (virtual) trades, and manage portfolio risk. Because it is an advanced elective, students taking this class are expected to be well versed in core economic, accounting, and finance skills. Material covered in a second Financial Modeling course, as well as in Accounting 312 (Evaluating Financial Statement Information) and Accounting 313 (Accounting-based Valuation) will come in handy. However, none of these courses are required.

**ACCT 354. Analysis and Valuation for Event-Driven Investing. 3 Units.**

This Bass seminar is designed to develop students' ability to interpret and use financial accounting information in credit and equity valuation contexts. The course will focus on valuing the securities of companies undergoing significant changes as a result of litigation, restructuring, regulatory changes, mergers, spin-offs or significant industry shifts. Throughout the course, students will (1) enrich their understanding of how alternative economic, legal, political and regulatory outcomes affect the value of various components of a company's capital structure and (2) develop their ability to apply financial statement analysis to assess the likelihood and valuation implications of the events of interest. Event-driven investing follows the life cycle of companies as they revamp their corporate structures in response to economic and regulatory environments. For example, in rising economic periods companies may undertake acquisitions or spin off divisions to enhance shareholder value. During adverse environments, bankruptcy and reorganizations often reshape the capital structure by offering opportunities to create value through the restructuring process. During economic transitions, debt and equity investors may make significantly different assessments of the quality of a company's earnings, its assets, and its likelihood to meet its debt obligations. To assess the probability of corporate events, investors must make judgments about the quality of a company's earnings and assets and understand how accounting policies may influence management's representations. Investors must also interpret how accounting policies function at various points in a firm's life cycle, influencing the quality of earnings for firms differently in different economic environments. In the first half of the course, we will develop the course framework, and apply it to illustrative cases. Companies featured in the cases include Tyco, AIG, CIT, Fannie Mae and Pharmasset and Gilead. Students will interpret information from companies' public financial disclosures to assess the likelihood of different events or outcomes. The course will also feature readings on current accounting standards, articles from the popular press, publicly available financial statement information, and guest speakers with in-depth knowledge of investing strategies vis a vis the case companies. The latter half of the course will be devoted to project work, with students working in teams to develop an event-driven investing strategy. The aim is to allow students to conduct independent research on a company, industry, economic context, or financial reporting environment of particular interest. Students will develop their investment idea, articulate their sense of the possible outcomes for the components of the firm's capital structure, and explain how they have assessed the likelihood and valuation consequences of those outcomes. At the conclusion of the course, students will present their strategies to the class and a panel of expert judges.

**ACCT 518. Analysis and Valuation of Emerging Market Firms. 1 Unitss.**

The course is designed to introduce students to the unique institutional, corporate governance and transparency issues facing managers and investors in emerging economies, and the impact these issues have on assessment of firm performance and value. The goal of the class is to gain an understanding of how country-level institutional forces interact with firm-level factors to shape firm value in these countries, how to interpret published financial reports in this environment to identify the source of firm-level value creation, and to use your assessment of the firm to identify the primitive sources of the firm's risks and opportunities. Topics covered will include an assessment of related party transactions, importance of political factors and social networks, governance conflicts, and the risk of expropriation. Students will be expected to: (1) make one presentation (most likely as a part of a two-to-three person group) that explores the valuation and value drivers of a specific emerging market firm and (2) attend all four classes. Grades will be on a pass/fail basis. Professor Piotroski teaches the "Accounting-based Valuation" and "Valuation in Emerging Economies" courses at the GSB.

**ACCT 523. Board Governance. 2 Units.**

This course is focused on helping students understand the role boards and board members play in corporate governance and the lives of businesses large and small. This case-driven course is designed to help students who plan to serve on boards as private-equity or venture investors, entrepreneurs who will need to assemble and manage boards, and executives who realize they will need to interact with and answer to boards. The course is designed to help students understand the issues boards face ? both routine and non-routine ? through the eyes of the board member. By understanding the roles and responsibilities of board members and the mechanisms through which they exercise these duties, students will come away with an understanding of how boards function effectively (and in too many cases fail to function effectively). The course will include examining boards in a variety of corporate contexts including: public and private, large and small, for-profit and not-for profit.

**ACCT 541. Alphanomics II. 2 Units.**

This is a 2-credit advanced elective in equity investing that will be offered in the Spring 2013 quarter. This course is open only to students that were enrolled in Alphanomics (ACCT340) in the Fall of 2012. If you complete ACCT340 in the Fall of 2012, your spot in this course will be automatically reserved. However, you still have a chance to opt out of this course at the end of the Fall 2012 quarter. The Fall (ACCT340) course is designed as a "start-up kit for an equity hedge fund". In the Fall quarter, we will cover some of the foundational skills needed to build and manage a portfolio of public stocks. Towards the end of Fall, student who choose to continue onto the Spring course (ACCT541) will form teams (of 4 to 6 each) and submit a proposal for a hedge fund product. Once their proposal is approved, each team will be given a \$1 million paper portfolio. Students then manage this portfolio for the rest of the school year (their trades and portfolio statistics are automatically tracked). Students enrolled in the Spring (ACCT541) will reconvene in the second half of the quarter for a series of class lectures/ talks as well as team presentations, summarizing their experience. The ACCT541 portion of the course will require each student group to make a class presentation, as well as turn in a written report. 25% of the grades will be based on class participation, and 75% will be based on the presentations and reports. The overall goal of this course is to improve student skills in assessing the relative attractiveness of individual companies, as well as in managing portfolio risk according to pre-specified targets. This is a hands-on course with an emphasis on experiential learning. Students will make extensive use of analytical tools in the new "Real-time Analytics and Investment Lab" (High-speed R.A.I.L.) facility in the Bass Center. As part of this course, students will be required to design stock screens, conduct back-tests, do detailed company analyses, execute (virtual) trades, and manage portfolio risk.

**ACCT 609. Financial Reporting and Management Control. 4 Units.**

This course is aimed at doctoral students in accounting and neighboring fields including economics, finance, political economics and operations management. The course seeks to provide an introduction to the role of accounting information in (i) measuring firm performance, (ii) projecting profitability and firm value for external constituents, (iii) and motivating and controlling the firm's management. The main topics covered in this course include: 1. Accrual Accounting and Profitability Measurement 2. Accounting-based Equity Valuation 3. Accounting Conservatism 4. Performance Evaluation and Managerial Incentives The primary objective of the course is to introduce students to current research paradigms on these topics and to identify promising avenues for future research. The course readings include recent theoretical and empirical papers.

**ACCT 610. Seminar in Empirical Accounting Research. 3 Units.**

Empirical Research on Financial Reporting: This doctoral-level course covers research on the role of accounting information in capital markets. The focus is on introducing students to key themes in empirical accounting and capital markets research, and to key research designs applied to examine information-related questions. Course topics include market efficiency, limits to arbitrage, the role of accounting in providing information to investors, anomalies, alternative sources of information, bankruptcy prediction, accounting measurement attributes, earnings management, earnings quality, and the role of accounting information in managers' investment decisions. The course is interdisciplinary in nature. The readings focus on research design, and key theories, themes and approaches from the accounting, finance, economics and psychology literature. Our overall goal is not only to review existing research, but also to identify new research opportunities.

**ACCT 611. Applications of Information Economics in Management and Accounting. 4 Units.**

This course develops tools from information economics to study the strategic interactions between agents inside a firm and between firm insiders and market participants. Common to these studies is that agents acquire private information that is valuable to other parties. The range of applications includes: the structure of managerial performance measures, buyer-supplier contracting arrangements, earnings management, voluntary and mandatory disclosure and financial analysts.

**ACCT 612. Financial Reporting Seminar. 4 Units.**

The purpose of this PhD seminar is to facilitate your conception and execution of substantive individual research in financial reporting. It provides a vehicle for supplementing and integrating your knowledge of basic research tools and methods, as well as an exposure to the dimensions of contemporary research in the field of financial reporting. The focus of the research we will discuss in this seminar is on global financial reporting. Such research encompasses studies dealing with contemporary financial reporting issues as well as research addressing issues relating to the globalization of financial reporting. Because these issues are also of concern to financial reporting standard setters, we will discuss whether and how the research we study informs standard setting debates. Prerequisite: Consent of the instructor.

**ACCT 615. Selected Topics in Accounting Research. 3 Units.**

This course examines selected topics in accounting research. The course features four faculty who will each give a focused look at a given area, introduce students to important questions in that area, key papers in the related literature, and critical aspects of the research designs applied in the area. The aim is to increase student's familiarity with current accounting research, to improve their ability to critically evaluate research and research designs, and to prepare students to conduct independent research.

**ACCT 617. Managerial Incentives and Corporate Governance: Concepts and Empirical Methodology. 4 Units.**

The course will consist of three set of topics. The first part of the class will examine a set of applied econometric topics that are useful in empirical accounting research. Each of these topics will be illustrated using contemporary examples from accounting, economics, and finance. The second part of the class will cover some of the basic theoretical work in moral hazard agency models and various extensions to this type of research. The final part of the course will discuss the empirical literature on corporate governance and executive compensation. The course will be taught in a seminar style and students will be required to develop a series of research projects on the topics covered in the class.

**ACCT 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: FINANCE 691, GSBGEN 691, HRMGT 691, MGTECON 691, MKTG 691, OB 691, OIT 691, POLECON 691, STRAMGT 691.

**ACCT 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: FINANCE 692, GSBGEN 692, HRMGT 692, MGTECON 692, MKTG 692, OB 692, OIT 692, POLECON 692, STRAMGT 692.

**ACCT 802. TGR Dissertation. 0 Unit.**

Same as: FINANCE 802, GSBGEN 802, HRMGT 802, MGTECON 802, MKTG 802, OB 802, OIT 802, POLECON 802, STRAMGT 802.

## Aeronautics Astronautics Courses

**AA 100. Introduction to Aeronautics and Astronautics. 3 Units.**

The principles of fluid flow, flight, and propulsion; the creation of lift and drag, aerodynamic performance including takeoff, climb, range, and landing performance, structural concepts, propulsion systems, trajectories, and orbits. The history of aeronautics and astronautics. Prerequisites: MATH 41, 42; elementary physics.

**AA 115N. The Global Positioning System: Where on Earth are We, and What Time is It?. 3 Units.**

Preference to freshmen. Why people want to know where they are: answers include cross-Pacific trips of Polynesians, missile guidance, and distraught callers. How people determine where they are: navigation technology from dead-reckoning, sextants, and satellite navigation (GPS). Hands-on experience. How GPS works; when it does not work; possibilities for improving performance.

**AA 116N. Electric Automobiles and Aircraft. 3 Units.**

Transportation accounts for nearly one-third of American energy use and greenhouse gas emissions and three-quarters of American oil consumption. It has crucial impacts on climate change, air pollution, resource depletion, and national security. Students wishing to address these issues will need to reconsider how we move, finding sustainable transportation solutions. This course will provide an introduction to the issue, covering the past and present of transportation and its impacts; examining alternative fuel proposals; and digging deeper into the most promising option: battery electric vehicles. Energy requirements of air, ground, and maritime transportation; design of electric motors, power control systems, drive trains, and batteries; and technologies for generating renewable energy. Two fun opportunities for hands-on experiences with electric cars. Prerequisites: Introduction to calculus and Physics AP or elementary mechanics.

**AA 190. Directed Research and Writing in Aero/Astro. 3-5 Units.**

For undergraduates. Experimental or theoretical work under faculty direction, and emphasizing development of research and communication skills. Written report(s) and letter grade required; if this is not appropriate, enroll in 199. Consult faculty in area of interest for appropriate topics, involving one of the graduate research groups or other special projects. May be repeated for credit. Prerequisite: consent of student services manager and instructor.

**AA 199. Independent Study in Aero/Astro. 1-5 Units.**

Directed reading, lab, or theoretical work for undergraduate students. Consult faculty in area of interest for appropriate topics involving one of the graduate research groups or other special projects. May be repeated for credit. Prerequisite: consent of instructor.

**AA 200. Applied Aerodynamics. 3 Units.**

Analytical and numerical techniques for the aerodynamic analysis of aircraft, focusing on airfoil theory, finite wing theory, far-field and Trefftz-plane analysis, two-dimensional laminar and turbulent boundary layers in airfoil analysis, laminar-to-turbulent transition, compressibility effects, and similarity rules. Biweekly assignments require MATLAB or a suitable programming language. Prerequisite: undergraduate courses in basic fluid mechanics and applied aerodynamics, AA 210A.

**AA 201B. Topics in Aeroacoustics. 3 Units.**

Acoustic equations for moving medium, simple sources, Kirchhoff formula, and multipole representation; radiation from moving sources; acoustic analogy approach to sound generation in compact flows; theories of Lighthill, Powell, and Mohring; acoustic radiation from moving surfaces; theories of Curl, Ffowcs Williams, and Hawkings; application of acoustic theories to the noise from propulsive jets, and airframe and rotor noise; computational methods for acoustics. Prerequisite: 201A or consent of instructor.

**AA 202. Hypersonic Flow. 3 Units.**

The fundamental principals and equations governing hypersonic flight and high temperature gas dynamics, including chemical and thermal equilibrium and non-equilibrium; statistical thermodynamics; kinetic theory; transport phenomena; radiation; surface heating; and scramjet engines. Prerequisite: understanding of aerodynamics. Recommended: AA 200A.

**AA 203. Introduction to Optimal Control Theory. 3 Units.**

Basic solution techniques for optimal control problems. Dynamic programming, calculus of variations, and numerical techniques for trajectory optimization. Special cases (chiefly LQR and robotic motion planning); modern solution approaches (such as MPC and MILP); and introduction to stochastic optimal control. Examples in MATLAB. Prerequisites: Linear algebra (EE 263 or equivalent).

**AA 206. Bio-Aerodynamics. 3 Units.**

Topics: flapping flight, low Reynolds number aerodynamics, wing design, flocks, swarms, and dynamic soaring. Readings from current and historical literature dealing with theoretical and observational studies. Applications in aircraft design, and simulation-based problem sets. Prerequisite: course in aerodynamics such as 100, 200A, or 241A.

**AA 208. Aerodynamics of Aircraft Dynamic Response and Stability. 3 Units.**

Companion to 200A for those interested in control and guidance. Typical vehicles and the technical tradeoffs affecting their design. Equations of motion, stressing applications to dynamic performance, stability, and forced response. Forms and sources for the required aerodynamic data. Response to small disturbances and stability derivatives. Static stability and trim. Review of aerodynamic fundamentals, leading to airload predictions for wings, bodies, and complete aircraft. Paneling and other methods for derivative estimation. Natural motions of the aircraft, and the influence on them of various configuration parameters. Vehicle behavior in maneuvers of small and large amplitudes. Prerequisites: 200A, 210A, or equivalents (may be taken concurrently).

**AA 210A. Fundamentals of Compressible Flow. 3 Units.**

Topics: development of the three-dimensional, non-steady, field equations for describing the motion of a viscous, compressible fluid; differential and integral forms of the equations; constitutive equations for a compressible fluid; the entropy equation; compressible boundary layers; area-averaged equations for one-dimensional steady flow; shock waves; channel flow with heat addition and friction; flow in nozzles and inlets; oblique shock waves; Prandtl-Meyer expansion; unsteady one-dimensional flow; the shock tube; small disturbance theory; acoustics in one-dimension; steady flow in two-dimensions; potential flow; linearized potential flow; lift and drag of thin airfoils. Prerequisites: undergraduate background in fluid mechanics and thermodynamics.

**AA 210B. Fundamentals of Compressible Flow. 3 Units.**

Continuation of 210A with emphasis on more general flow geometry. Use of exact solutions to explore the hypersonic limit. Identification of similarity parameters. Solution methods for the linearized potential equation with applications to wings and bodies in steady flow; their relation to physical acoustics and wave motion in nonsteady flow. Nonlinear solutions for nonsteady constant area flow and introduction to Riemann invariants. Elements of the theory of characteristics; nozzle design; extension to nonisentropic flow. Real gas effects in compressible flow. Flows in various gas dynamic testing facilities. Prerequisite: 210A.

**AA 212. Analysis and Design of Multivariable Feedback Systems. 3 Units.**

Analysis and design techniques for multivariable feedback systems. Review of basic properties of multi-input, multi-output linear time-invariant systems. Study of the stability and robustness of feedback loops. Approaches for optimal and robust feedback control design, chiefly  $H_2$  and  $H_\infty$  synthesis. Prerequisites: Linear algebra (EE 263 or CME 200).

**AA 214A. Introduction to Numerical Methods for Engineering. 3 Units.**

Numerical methods from a user's point of view. Lagrange interpolation, splines. Integration: trapezoid, Romberg, Gauss, adaptive quadrature; numerical solution of ordinary differential equations: explicit and implicit methods, multistep methods, Runge-Kutta and predictor-corrector methods, boundary value problems, eigenvalue problems; systems of differential equations, stiffness. Emphasis is on analysis of numerical methods for accuracy, stability, and convergence. Introduction to numerical solutions of partial differential equations; Von Neumann stability analysis; alternating direction implicit methods and nonlinear equations. Prerequisites: CME 200/ME 300A, CME 204/ME 300B. Same as: CME 206, ME 300C.

**AA 214B. Numerical Methods for Compressible Flows. 3 Units.**

For M.S.-level graduate students. Covers the hierarchy of mathematical models for compressible flows. Introduction to finite difference, finite volume, and finite element methods for their computation. Ideal potential flow; transonic potential flow; Euler equations; Navier-Stokes equations; representative model problems; shocks, expansions, and contact discontinuities; treatment of boundary conditions; time and pseudo-time integration schemes. Prerequisites: basic knowledge of linear algebra and ODEs (CME 206 or equivalent).

**AA 214C. Numerical Computation of Viscous Flow. 3 Units.**

Numerical methods for solving parabolic sets of partial differential equations. Numerical approximation of the equations describing compressible viscous flow with adiabatic, isothermal, slip, and no-slip wall boundary conditions. Applications to the Navier-Stokes equations in two and three dimensions at high Reynolds number. Computational problems are assigned. Prerequisite: 214B.

**AA 215A. Advanced Computational Fluid Dynamics. 3 Units.**

High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent. Same as: CME 215A.

**AA 215B. Advanced Computational Fluid Dynamics. 3 Units.**

High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent. Same as: CME 215B.

**AA 218. Introduction to Symmetry Analysis. 3 Units.**

Methods of symmetry analysis and their use in the reduction and simplification of physical problems. Topics: dimensional analysis, phase-space analysis of autonomous systems of ordinary differential equations, use of Lie groups to reduce the order of nonlinear ODEs and to generate integrating factors, use of Lie groups to reduce the dimension of partial differential equations and to generate similarity variables, exact solutions of nonlinear PDEs generated from groups. Mathematica-based software developed by the instructor is used for finding invariant groups of ODEs and PDEs.

**AA 222. Introduction to Multidisciplinary Design Optimization. 3 Units.**

Design of aerospace systems within a formal optimization environment. Mathematical formulation of the multidisciplinary design problem (parameterization of design space, choice of objective functions, constraint definition); survey of algorithms for unconstrained and constrained optimization and optimality conditions; description of sensitivity analysis techniques. Hierarchical techniques for decomposition of the multidisciplinary design problem; use of approximation theory. Applications to design problems in aircraft and launch vehicle design. Prerequisites: multivariable calculus; familiarity with a high-level programming language: FORTRAN, C, C++, or MATLAB.

**AA 236A. Spacecraft Design. 3-5 Units.**

The design of unmanned spacecraft and spacecraft subsystems emphasizing identification of design drivers and current design methods. Topics: spacecraft configuration design, mechanical design, structure and thermal subsystem design, attitude control, electric power, command and telemetry, and design integration and operations.

**AA 236B. Spacecraft Design Laboratory. 3 Units.**

Continuation of 236A. Emphasis is on practical application of systems engineering to the life cycle program of spacecraft design, testing, launching, and operations. Prerequisite: 236A or consent of instructor.

**AA 236C. Spacecraft Design Laboratory. 3 Units.****AA 240A. Analysis of Structures. 3 Units.**

Elements of two-dimensional elasticity theory. Boundary value problems; energy methods; analyses of solid and thin walled section beams, trusses, frames, rings, monocoque and semimonocoque structures. Prerequisite: ENGR 14 or equivalent.

**AA 240B. Analysis of Structures. 3 Units.**

Thin plate analysis. Structural stability. Material behavior: plasticity and fracture. Introduction of finite element analysis; truss, frame, and plate structures. Prerequisite: 240A or consent of instructor.

**AA 241A. Introduction to Aircraft Design, Synthesis, and Analysis. 3 Units.**

New aircraft systems emphasizing commercial aircraft. Economic and technological factors that create new aircraft markets. Determining market demands and system mission performance requirements; optimizing configuration to comply with requirements; the interaction of disciplines including aerodynamics, structures, propulsion, guidance, payload, ground support, and parametric studies. Applied aerodynamic and design concepts for use in configuration analysis. Application to a student-selected aeronautical system; applied structural fundamentals emphasizing fatigue and fail-safe considerations; design load determination; weight estimation; propulsion system performance; engine types; environmental problems; performance estimation. Direct/indirect operating costs prediction and interpretation. Aircraft functional systems; avionics; aircraft reliability and maintainability. Prerequisite: 100 or equivalent.

**AA 241B. Introduction to Aircraft Design, Synthesis, and Analysis. 3 Units.**

New aircraft systems emphasizing commercial aircraft. Economic and technological factors that create new aircraft markets. Determining market demands and system mission performance requirements; optimizing configuration to comply with requirements; the interaction of disciplines including aerodynamics, structures, propulsion, guidance, payload, ground support, and parametric studies. Applied aerodynamic and design concepts for use in configuration analysis. Application to a student-selected aeronautical system; applied structural fundamentals emphasizing fatigue and fail-safe considerations; design load determination; weight estimation; propulsion system performance; engine types; environmental problems; performance estimation. Direct/indirect operating costs prediction and interpretation. Aircraft functional systems; avionics; aircraft reliability and maintainability. Prerequisite: 100 or equivalent.

**AA 241X. Design, Construction, and Testing of Autonomous Aircraft. 3 Units.**

Students grouped according to their expertise to carry out the multidisciplinary design of a solar-powered autonomous aircraft that must meet a clearly stated set of design requirements. Design and construction of the airframe, integration with existing guidance, navigation, and control systems, and development and operation of the resulting design. Design reviews and reports. Prerequisites: expertise in any of the following disciplines by having satisfied the specified courses or equivalent work elsewhere: conceptual design (241A,B); applied aerodynamics (200A,B); structures (240A); composite manufacturing experience; guidance and control (208/271, ENGR 205).

**AA 242A. Classical Dynamics. 3 Units.**

Accelerating and rotating reference frames. Kinematics of rigid body motion; Euler angles, direction cosines. D'Alembert's principle, equations of motion. Inertia properties of rigid bodies. Dynamics of coupled rigid bodies. Lagrange's equations and their use. Dynamic behavior, stability, and small departures from equilibrium. Prerequisite: ENGR 15 or equivalent.

**AA 242B. Mechanical Vibrations. 3 Units.**

For M.S.-level graduate students. Covers the vibrations of discrete systems and continuous structures. Introduction to the computational dynamics of linear engineering systems. Review of analytical dynamics of discrete systems; undamped and damped vibrations of N-degree-of-freedom systems; continuous systems; approximation of continuous systems by displacement methods; solution methods for the Eigenvalue problem; direct time-integration methods. Prerequisites: AA 242A or equivalent (recommended but not required); basic knowledge of linear algebra and ODEs; no prior knowledge of structural dynamics is assumed.

**AA 244A. Introduction to Plasma Physics and Engineering. 3 Units.**

Physics and engineering of plasmas, including space and laboratory plasmas. Debye length and distribution functions. Single-particle motion and drifts. Plasmas as fluids and fluid drifts. Waves in plasmas, including electrostatic and electromagnetic. Diffusion and resistivity. Magnetohydrodynamics.

**AA 244B. Advanced Plasma Physics and Engineering. 3 Units.**

Equilibrium and instability. Turbulent flow in plasmas. Kinetic theory and the Vlasov equation. Nonlinear effects and solutions. Radiation in a plasma. Plasma diagnostics in ground- and space-based experiments.

**AA 252. Techniques of Failure Analysis. 3 Units.**

Introduction to the field of failure analysis, including fire and explosion analysis, large scale catastrophe projects, traffic accident reconstruction, aircraft accident investigation, human factors, biomechanics and accidents, design defect cases, materials failures and metallurgical procedures, and structural failures. Product liability, failure modes and effects analysis, failure prevention, engineering ethics, and the engineer as expert witness.

**AA 254. Information Systems in Aerospace Vehicles. 2 Units.**

Sensors, processors, activators, and operators, and the media and protocols that integrate them for performance and safety.

**AA 256. Mechanics of Composites. 3 Units.**

Fiber reinforced composites. Stress, strain, and strength of composite laminates and honeycomb structures. Failure modes and failure criteria. Environmental effects. Manufacturing processes. Design of composite structures. Individual design project required of each student, resulting in a usable computer software. Prerequisite: ENGR 14 or equivalent.

**AA 257. Design of Composite Structures. 3 Units.**

Hands-on design, analysis, and manufacturing in composites. Composite beams, columns, and plates; application of finite element methods to composite structures; failure analysis and damage tolerance design of composite structures; and impact damage, compression after impact, and bolted and bonded composites joints. Class divided into working teams (design, analysis, manufacturing, and tests) to design and build a composite structure to be tested to failure; the structure may enter the national SAMPE composite bridge design contest. Prerequisite: 256 or consent of instructor.

**AA 260. Sustainable Aviation. 3 Units.**

Quantitative assessment of the impact of aviation on the environment including noise, local, and global emissions, and models used to predict it. Current and future technologies that may allow the air transportation system to meet anticipated growth while reducing or minimizing environmental problems. Atmospheric effects of NO<sub>x</sub>, CO<sub>2</sub>, particulates, unburned hydrocarbons, and water vapor deposition at high altitudes and metrics for assessing global climate effects. Noise sources, measurement, and mitigation strategies. Fundamentals of aircraft and engine performance needed to assess current and future concepts. Major national and international policy implications of existing and future technology choices. Recommended: AA 241B.

**AA 271A. Dynamics and Control of Spacecraft and Aircraft. 3 Units.**

The dynamic behavior of aircraft and spacecraft, and the design of automatic control systems for them. For aircraft: non-linear and linearized longitudinal and lateral dynamics; linearized aerodynamics; natural modes of motion; autopilot design to enhance stability, control the flight path, and perform automatic landings. For spacecraft in orbit: natural longitudinal and lateral dynamic behavior and the design of attitude control systems. Prerequisites: AA242A, ENGR 105.

**AA 272C. Global Positioning Systems. 3 Units.**

The principles of satellite navigation using GPS. Positioning techniques using code tracking, single and dual frequency, carrier aiding, and use of differential GPS for improved accuracy and integrity. Use of differential carrier techniques for attitude determination and precision position determination. Prerequisite: familiarity with matrix algebra and MatLab (or another mathematical programming language).

**AA 279. Space Mechanics. 3 Units.**

Orbits of near-earth satellites and interplanetary probes; transfer and rendezvous; decay of satellite orbits; influence of earth's oblateness; sun and moon effects on earth satellites. Prerequisite: ENGR 15 or equivalent, and familiarity with MatLab (or another mathematical programming language).

**AA 280. Smart Structures. 3 Units.**

Mechanics of smart materials and current approaches for engineering smart structures to monitor health, self heal, and adapt to environment. Definition of smart structures; constitutive models for smart materials; piezoelectric ceramics; electro-active polymers; shape memory alloys; bio-inspired materials and structures; self-healing materials; sensors and sensor networks; structural health monitoring; and energy harvesting. Prerequisite: AA 240A or consent of instructor.

**AA 283. Aircraft and Rocket Propulsion. 3 Units.**

Introduction to the design and performance of airbreathing and rocket engines. Topics: the physical parameters used to characterize propulsion system performance; gas dynamics of nozzles and inlets; cycle analysis of ramjets, turbojets, turbofans, and turboprops; component matching and the compressor map; introduction to liquid and solid propellant rockets; multistage rockets; hybrid rockets; thermodynamics of reacting gases. Prerequisites: undergraduate background in fluid mechanics and thermodynamics.

**AA 284A. Advanced Rocket Propulsion. 3 Units.**

The principles of rocket propulsion system design and analysis. Fundamental aspects of the physics and chemistry of rocket propulsion. Focus is on the design and analysis of chemical propulsion systems including liquids, solids, and hybrids. Nonchemical propulsion concepts such as electric and nuclear rockets. Launch vehicle design and optimization issues including trajectory calculations. Limited enrollment. Prerequisites: 283 or consent of instructor.

**AA 284B. Propulsion System Design Laboratory. 3 Units.**

Propulsion systems engineering through the design and operation of a sounding rocket. Students work in small teams through a full project cycle including requirements definition, performance analysis, system design, fabrication, ground and flight testing, and evaluation. Prerequisite: 284A and consent of instructor.

**AA 284C. Propulsion System Design Laboratory. 3 Units.**

Continuation of 284A,B. Prerequisite: 284B, and consent of instructor.

**AA 290. Problems in Aero/Astro. 1-5 Units.**

(Undergraduates register for 190 or 199.) Experimental or theoretical investigation. Students may work in any field of special interest. Register for section belonging to your research supervisor. May be repeated for credit.

**AA 291. Practical Training. 1-3 Units.**

Educational opportunities in high-technology research and development labs in aerospace and related industries. Internship integrated into a student's academic program. Research report outlining work activity, problems investigated, key results, and any follow-on projects. Meets the requirements for Curricular Practical Training for students on F-1 visas. Student is responsible for arranging own employment and should see department student services manager before enrolling. May be repeated for credit.

**AA 294. Case Studies in Aircraft Design. 1 Unitss.**

Presentations by researchers and industry professionals. Registration for credit optional. May be repeated for credit.

**AA 295. Aerospace Structures and Materials. 1 Unitss.**

Presentations by researchers and industry professionals in aerospace structures and materials. May be repeated for credit.

**AA 297. Seminar in Guidance, Navigation, and Control. 1 Unitss.**

For graduate students with an interest in automatic control applications in flight mechanics, guidance, navigation, and mechanical design of control systems; others invited. Problems in all branches of vehicle control, guidance, and instrumentation presented by researchers on and off campus. Registration for credit optional. May be repeated for credit.

**AA 300. Engineer Thesis. 1-15 Units.**

Thesis for degree of Engineer. Students register for section belonging to their thesis adviser.

**AA 301. Ph.D. Dissertation. 1-15 Units.**

Prerequisite: completion of Ph.D qualifying exams. Students register for section belonging to their thesis adviser. (Staff).

**AA 801. TGR Engineer Thesis. 0 Unit.**

Engineer's thesis or non-doctoral work for a TGR student.

**AA 802. TGR Ph.D. Dissertation. 0 Unit.**

Doctoral dissertation for a TGR student in PhD program.

## African American Studies Courses

**AFRICAAM 16N. African Americans and Social Movements. 3 Units.**

Theory and research on African Americans' roles in post-Civil Rights, US social movements. Topics include women's right, LGBT rights, environmental movement, and contemporary political conservatism. Same as: CSRE 16N, SOC 16N.

**AFRICAAM 30. The Egyptians. 3-5 Units.**

Overview of ancient Egyptian pasts, from predynastic times to Greco-Roman rule, roughly 3000 BCE to 30 BCE. Attention to archaeological sites and artifacts; workings of society; and cultural productions, both artistic and literary. Same as: CLASSHIS 105.

**AFRICAAM 40SI. We Are Never Radical Enough. The Personal Philosophy and Politics of Radical Thought. 1-2 Units.**

This course seeks to present students with a more accessible view of radical thinkers and activists throughout history. This course will examine the politics, philosophy and personal lives of eight scholars, activists and leaders, the course will challenge students to question what radicalism means, where it is rooted and how history and memory create the saints and sinners of the past.

**AFRICAAM 43. Introduction to African American Literature. 3-5 Units.**

(English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. We will engage some of the defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attuned to the invariably hybrid nature of this tradition, we will also devote attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history.

Same as: AMSTUD 143, ENGLISH 43, ENGLISH 143.

**AFRICAAM 45. Dance Improvisation Techniques and Strategies Lab: From Hip Hop to Contact. 1 Unitss.**

By learning various dance improvisation forms across cultures, students will develop techniques to gain a deep understanding of generating movement from the inside-out, harnessing that potential for creating dances. Guest dancer/choreographer workshops and Dance Jams enhance the learning experience.

Same as: DANCE 45.

**AFRICAAM 47. History of South Africa. 3 Units.**

(Same as HISTORY 147. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis.

Same as: HISTORY 47.

**AFRICAAM 48Q. South Africa: Contested Transitions. 3 Units.**

Preference to sophomores. The inauguration of Nelson Mandela as president in May 1994 marked the end of an era and a way of life for S. Africa. The changes have been dramatic, yet the legacies of racism and inequality persist. Focus: overlapping and sharply contested transitions. Who advocates and opposes change? Why? What are their historical and social roots and strategies? How do people reconstruct their society? Historical and current sources, including films, novels, and the Internet.

Same as: HISTORY 48Q.

**AFRICAAM 50B. 19th Century America. 3 Units.**

(Same as HISTORY 150B. History majors and others taking 5 units, register in 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture.

Same as: HISTORY 50B.

**AFRICAAM 54N. African American Women's Lives. 3-4 Units.**

Preference to freshmen. The everyday lives of African American women in 19th- and 20th-century America in comparative context of histories of European, Hispanic, Asian, and Native American women. Primary sources including personal journals, memoirs, music, literature, and film, and historical texts. Topics include slavery and emancipation, labor and leisure, consumer culture, social activism, changing gender roles, and the politics of sexuality.

Same as: HISTORY 54N.

**AFRICAAM 64C. From Freedom to Freedom Now!: African American History, 1865-1965. 3 Units.**

(Same as HISTORY 164C. History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music.

Same as: HISTORY 64C.

**AFRICAAM 75E. Black Cinema. 2 Units.**

How filmmakers represent historical and cultural issues in Black cinema.

**AFRICAAM 103. Dance, Text, Gesture: Performance and Composition. 1 Unitss.**

Students practice, compose and combine the languages of dance, gestural movement, music and text, to render complete expression in performance. Suitable for dancers, actors, spoken word artists and triple threat performers to devise original performance, dance and theater, culminating in an end of quarter showing.

Same as: DANCE 103.

**AFRICAAM 105. Introduction to African and African American Studies. 5 Units.**

Interdisciplinary. Central themes in African American culture and history related to race as a definitive American phenomenon. African survivals and interpretations of slavery in the New World, contrasting interpretations of the Black family, African American literature, and art. Possible readings: Frederick Douglass, Harriet Jacobs, Booker T. Washington, W.E.B. DuBois, Richard Wright, Maya Angelou, James Baldwin, Malcolm X, Alice Walker, and bell hooks. Focus may vary each year. This course is a WIM course.

**AFRICAAM 106. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices. 3-5 Units.**

Focus is on classrooms with students from diverse racial, ethnic and linguistic backgrounds. Studies, writing, and media representation of urban and diverse school settings; implications for transforming teaching and learning. Issues related to developing teachers with attitudes, dispositions, and skills necessary to teach diverse students.

Same as: CSRE 103B, EDUC 103B, EDUC 337.

**AFRICAAM 107C. The Black Mediterranean: Greece, Rome and Antiquity. 4-5 Units.**

Explore problems of race and ethnicity as viable criteria in studying ancient societies and consider the question, What is the Mediterranean?, in relation to premodern evidence. Investigate the role of blackness as a marker of ethnicity; the demography of slavery and its roles in forming social identities; and environmental determinism as a factor in ethnic and racial thinking. Consider Greek and Roman perspectives and behavior, and their impact on later theories of race and ethnicity as well as the Mediterranean as a whole.

Same as: CLASSGEN 107, CSRE 107.

**AFRICAAM 112. Urban Education. 3-4 Units.**

(Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education.

Same as: EDUC 112X, EDUC 212X, SOC 129X, SOC 229X.



**AFRICAAM 121X. Hip Hop, Youth Identities, and the Politics of Language. 3-4 Units.**

Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

Same as: AMSTUD 121X, ANTHRO 121A, CSRE 121X, EDUC 121X, LINGUIST 155.

**AFRICAAM 123. Great Works of the African American Tradition. 5 Units.**

Foundational African and African American scholarly figures and their work from the 19th century to the present. Historical, political, and scholarly context. Dialogues distinctive to African American culture. May be repeated for credit.

**AFRICAAM 127A. Can't Stop Won't Stop: A History Of The Hip-Hop Arts. 4 Units.**

This course explores the history and development of the hip-hop arts movement, from its precursor movements in music, dance, visual arts, literature, and folk and street cultures to its rise as a neighborhood subculture in the Bronx in the early 1970s through its local, regional and global expansion and development. Hip-hop aesthetics, structures, and politics will be explored within the context of the movement's rise as a post-multicultural form in an era of neoliberal globalization.

Same as: CSRE 127A.

**AFRICAAM 130. Discourse of Liberation and Equity in Communities and Classrooms. 3-5 Units.**

Issues and strategies for studying oral and written discourse as a means for understanding classrooms, students, and teachers, and teaching and learning in educational contexts. The forms and functions of oral and written language in the classroom, emphasizing teacher-student and peer interaction, and student-produced texts. Individual projects utilize discourse analytic techniques. Prerequisite: graduate status or consent of instructor. Same as: EDUC 322.

**AFRICAAM 145A. Poetics and Politics of Caribbean Women's Literature. 5 Units.**

Mid 20th-century to the present. How historical, economic, and political conditions in Haiti, Cuba, Jamaica, Antigua, and Guadeloupe affected women. How Francophone, Anglophone, and Hispanophone women novelists, poets, and short story writers respond to similar issues and pose related questions. Caribbean literary identity within a multicultural and diasporic context; the place of the oral in the written feminine text; family and sexuality; translation of European master texts; history, memory, and myth; and responses to slave history, colonialism, neocolonialism, and globalization.

Same as: CSRE 145A.

**AFRICAAM 147. History of South Africa. 5 Units.**

(Same as HISTORY 47. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis.

Same as: HISTORY 147.

**AFRICAAM 150B. 19th-Century America. 5 Units.**

(Same as HISTORY 50B. History majors and others taking 5 units, register for 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture.

Same as: AMSTUD 150B, HISTORY 150B.

**AFRICAAM 152G. Global Harlem Renaissance. 5 Units.**

Examination of the explosion of African American artistic expression during 1920s and 30s New York known as the Harlem Renaissance. Amiri Baraka once referred to the Renaissance as a kind of vicious Modernism, as a Clash that impacted and was impacted by political, cultural and aesthetic changes not only in the U.S. but Europe, the Caribbean and Latin America. Focus on the literature, graphic arts, and the music of the era in this global context.

Same as: AMSTUD 152G, ENGLISH 152G.

**AFRICAAM 166. Introduction to African American History: The Modern African American Freedom Struggle. 3-5 Units.**

This course is an introduction to African-American Political movements of the period after 1930, with special emphasis on mass protest and civil rights activism as well as leaders such as W. E. B. Du Bois, Thurgood Marshall, Martin Luther King, Jr., Malcolm X, Jesse Jackson, and Barack Obama.

The lectures will utilize audio-visual materials extensively, and the exams will cover these materials as well as the traditional lectures. In addition to attending lectures, students are encouraged to undertake research projects. Same as: AMSTUD 166, HISTORY 166.

**AFRICAAM 190. Directed Reading. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**AFRICAAM 195. Independent Study. 5 Units.****AFRICAAM 199. Honors Project. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**AFRICAAM 200X. Honors Thesis and Senior Thesis Seminar. 5 Units.**

Required for seniors. Weekly colloquia with AAAS Director and Associate Director to assist with refinement of research topic, advisor support, literature review, research, and thesis writing. Readings include foundational and cutting-edge scholarship in the interdisciplinary fields of African and African American studies and comparative race studies. Readings assist students situate their individual research interests and project within the larger. Students may also enroll in AFRICAAM 200Y in Winter and AFRICAAM 200Z in Spring for additional research units (up to 10 units total).

**AFRICAAM 200Y. Honors Thesis and Senior Thesis Research. 3-5 Units.**

Winter. Required for students writing an Honors Thesis. Optional for Students writing a Senior Thesis.

**AFRICAAM 200Z. Honors Thesis and Senior Thesis Research. 3-5 Units.**

Spring. Required for students writing an Honors Thesis. Optional for Students writing a Senior Thesis.

**AFRICAAM 204F. The Modern Tradition of Non-Violent Resistance. 5 Units.**

During the twentieth century, peasants and menial laborers who comprised the majority of humanity launched liberation movements to secure citizenship rights. Mohandas K. Gandhi, Martin Luther King, Jr., and Nelson Mandela are among the leaders whose ideas continue to influence contemporary movements for global peace with social justice in a sustainable environment.

Same as: CSRE 104F, HISTORY 204F.

**AFRICAAM 233A. Counseling Theories and Interventions from a Multicultural Perspective. 3-5 Units.**

In an era of globalization characterized by widespread migration and cultural contacts, professionals face a unique challenge: How does one practice successfully when working with clients/students from so many different backgrounds? This course focuses upon the need to examine, conceptualize, and work with individuals according to the multiple ways in which they identify themselves. It will systematically examine multicultural counseling concepts, issues, and research. Literature on counselor and client characteristics such as social status or race/ethnicity and their effects on the counseling process and outcome will be reviewed. Issues in consultation with culturally and linguistically diverse parents and students and work with migrant children and their families are but a few of the topics covered in this course.

Same as: CSRE 233A, EDUC 233A.

**AFRICAAM 245. Understanding Racial and Ethnic Identity Development. 3-5 Units.**

African American, Native American, Mexican American, and Asian American racial and ethnic identity development; the influence of social, political and psychological forces in shaping the experience of people of color in the U.S. The importance of race in relationship to social identity variables including gender, class, and occupational, generational, and regional identifications. Bi- and multiracial identity status, and types of white racial consciousness.

Same as: CSRE 245, EDUC 245.

**AFRICAAM 255. Racial Identity in the American Imagination. 4-5 Units.**

Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music.

Same as: AMSTUD 255D, CSRE 255D, HISTORY 255D, HISTORY 355D.

**AFRICAAM 261E. Mixed Race Literature in the U.S. and South Africa. 5 Units.**

As scholar Werner Sollors recently suggested, novels, poems, stories about interracial contacts and mixed race constitute an orphan literature belonging to no clear ethnic or national tradition. Yet the theme of mixed race is at the center of many national self-definitions, even in our U.S. post-Civil Rights and South Africa's post-Apartheid era. This course examines aesthetic engagements with mixed race politics in these trans- and post-national dialogues, beginning in the 1700s and focusing on the 20th and 21st centuries.

Same as: AMSTUD 261E, ENGLISH 261E.

**AFRICAAM 262D. African American Poetics. 5 Units.**

Examination of African American poetic expressive forms from the 1700s to the 2000s, considering the central role of the genre--from sonnets to spoken word, from blues poetry to new media performance--in defining an evolving literary tradition and cultural identity.

Same as: AMSTUD 262D, ENGLISH 262D.

## African Middle Eastern Languages Courses

**AMELANG 1S. Intensive Beginning Arabic, Part A. 5 Units.**

(Formerly AMELANG 20A.) Stanford graduate students restricted to 9 units register for 1G.

**AMELANG 2S. Intensive Beginning Arabic, Part B. 5 Units.**

(Formerly AMELANG 20A.) Continuation of 1S. Stanford graduate student restricted to 9 units register for 2G.

**AMELANG 3S. Intensive Beginning Arabic, Part C. 5 Units.**

(Formerly AMELANG 20C.) Continuation of 2S. Stanford graduate students restricted to 9 units register for 3G.

**AMELANG 11G. Intensive Intermediate Arabic, Part A. 3-4 Units.**

For Stanford graduate students restricted to 9 units. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.

**AMELANG 11S. Intensive Intermediate Arabic, Part A. 4 Units.**

(Formerly AMELANG 221A.) Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications. Stanford graduate students restricted to 9 units register for 11G.

**AMELANG 12G. Intensive Intermediate Arabic, Part B. 3-4 Units.**

Continuation of 11G. For Stanford graduate students restricted to 9 units. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.

**AMELANG 12S. Intensive Intermediate Arabic, Part B. 4 Units.**

Continuation of 11S. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications. Stanford graduate students restricted to 9 units register for 12G.

**AMELANG 13G. Intensive Intermediate Arabic, Part C. 3-4 Units.**

Continuation of 12G. For Stanford graduate students restricted to 9 units. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications.

**AMELANG 13S. Intensive Intermediate Arabic, Part C. 4 Units.**

(Formerly AMELANG 221C.) Continuation of 12S. Speaking, listening, reading, and writing, emphasizing Arabic grammar and functional applications. Stanford graduate students restricted to 9 units register for 13G.

**AMELANG 27A. Advanced Arabic Conversation, First Quarter. 2 Units.**

(Formerly AMELANG 143A.) Repeatable once for credit. Prerequisite: second-year year Arabic or consent of instructor.

**AMELANG 27B. Advanced Arabic Conversation, Second Quarter. 2 Units.**

Continuation of 27A. Repeatable once for credit. Prerequisite: second-year Arabic or consent of instructor.

**AMELANG 27C. Advanced Arabic Conversation, Third Quarter. 2 Units.**

Continuation of 27B. Repeatable once for credit. Prerequisite: second-year year Arabic or consent of instructor.

**AMELANG 50A. Reading Hebrew, First Quarter. 2-4 Units.**

Introduction to Hebrew literature through short stories and poetry by notable Israeli writers. In Hebrew. Prerequisite: one year of Hebrew or equivalent.

Same as: JEWISHST 50A.

**AMELANG 51A. Reading Biblical Hebrew, First Quarter. 2 Units.****AMELANG 100A. Beginning Amharic, First Quarter. 4 Units.****AMELANG 100B. First-Year Amharic, Second Quarter. 4 Units.**

Continuation of AMELANG 100A. Prerequisite AMELANG 100A or consent of instructor.

**AMELANG 100C. First-Year Amharic, Third Quarter. 4 Units.**  
Continuation of AMELANG 100B. Prerequisite: AMELANG 100B or consent of instructor. Fulfills the University Foreign Language Requirement.

**AMELANG 103A. First-Year Hausa, First Quarter. 4 Units.**

**AMELANG 103B. First-Year Hausa, Second Quarter. 4 Units.**  
Continuation of AMELANG 103A. Prerequisite: AMELANG 103A or consent of instructor.

**AMELANG 103C. First-Year Hausa, Third Quarter. 4 Units.**  
Continuation of AMELANG 103B. Prerequisite: AMELANG 103B or consent of instructor.

**AMELANG 106A. First-Year Swahili, First Quarter. 5 Units.**

**AMELANG 106B. First-Year Swahili, Second Quarter. 5 Units.**  
Continuation of AMELANG 106A. Prerequisite: AMELANG 106A or consent of instructor.

**AMELANG 106C. First-Year Beginning Swahili, Third Quarter. 5 Units.**  
Continuation of AMELANG 106B. Prerequisite: AMELANG 106B or consent of instructor. Fulfills the University foreign language requirement.

**AMELANG 107A. Second-Year Swahili, First Quarter. 5 Units.**  
Continuation of AMELANG 106C. Prerequisite: AMELANG 106C or consent of instructor.

**AMELANG 107B. Second-Year Swahili, Second Quarter. 5 Units.**  
Continuation of AMELANG 107A. Prerequisite: AMELANG 107A or consent of instructor.

**AMELANG 107C. Second-Year Swahili, Third Quarter. 5 Units.**  
Continuation of AMELANG 107B. Prerequisite: AMELANG 107B or consent of instructor.

**AMELANG 108A. Third-Year Swahili, First Quarter. 5 Units.**  
Continuation of AMELANG 107C. Prerequisite: AMELANG 107C or consent of instructor.

**AMELANG 108B. Third-Year Swahili, Second Quarter. 5 Units.**  
Continuation of AMELANG 108A. Prerequisite: AMELANG 108A or consent of instructor.

**AMELANG 108C. Third-Year Swahili, Third Quarter. 5 Units.**  
Continuation of AMELANG 108B. Prerequisite: amelang 108B or consent of instructor.

**AMELANG 126. Reflection on the Other: The Jew in Arabic Literature, the Arab in Hebrew Literature. 4 Units.**  
How literary works outside the realm of western culture struggle with questions such as identity, minority, and the issue of the other. How the Arab is viewed in Hebrew literature and how the Jew is viewed in Arabic literature. Historical, political, and sociological forces that have contributed to the shaping of the writer's views. Arab and Jewish (Israeli) culture. Same as: COMPLIT 145, JEWISHST 106.

**AMELANG 128A. First-Year Hebrew, First Quarter. 5 Units.**  
Same as: JEWISHST 101A.

**AMELANG 128B. First-Year Hebrew, Second Quarter. 5 Units.**  
Continuation of AMELANG 128A. Prerequisite: Placement Test, AMELANG 128A, or consent of instructor  
Same as: JEWISHST 101B.

**AMELANG 128C. First-Year Hebrew, Third Quarter. 5 Units.**  
Continuation of AMELANG 128B. Prerequisite: Placement Test, AMELANG 128B or consent of instructor. Fulfill the University Foreign Language Requirement.  
Same as: JEWISHST 101C.

**AMELANG 129A. Second-Year Hebrew, First Quarter. 4 Units.**  
Continuation of AMELANG 128C. Prerequisite: Placement Test, AMELANG 128C or consent of instructor.  
Same as: JEWISHST 102A.

**AMELANG 129B. Second-Year Hebrew, Second Quarter. 4 Units.**  
Continuation of AMELANG 129A. Prerequisite: Placement Test, AMELANG 129A or consent of instructor.  
Same as: JEWISHST 102B.

**AMELANG 129C. Second-Year Hebrew, Third Quarter. 4 Units.**  
Continuation of AMELANG 129B. Prerequisite: Placement Test, AMELANG 129B or consent of instructor.  
Same as: JEWISHST 102C.

**AMELANG 131. Hebrew Forum. 2-4 Units.**  
Intermediate and advanced level. Biweekly Hebrew discussion on contemporary issues with Israeli guest speakers. Vocabulary enhancement. Focus on exposure to academic Hebrew.  
Same as: JEWISHST 104.

**AMELANG 133B. The African Forum, Second Quarter. 1 Unitss.**

**AMELANG 133C. The African Forum, Third Quarter. 1 Unitss.**

**AMELANG 134A. First-Year Igbo, First Quarter. 4 Units.**

**AMELANG 134B. First-Yer Igbo, Second Quarter. 4 Units.**  
Continuation of AMELANG 134A. Prerequisite: AMELANG 134A or consent of instructor.

**AMELANG 134C. Fist-Year Igbo, Third Quarter. 4 Units.**  
Continuation of AMELANG 134B. Prerequisite: AMELANG 134B or consent of instructor.

**AMELANG 135A. Second-Year Igbo, First Quarter. 3 Units.**  
Continuation of AMELANG 134C. Prerequisite: AMLENAG 134C or consent of instructor. Fulfills the University foreign language requirement.

**AMELANG 140A. First-Year Yiddish, First Quarter. 4 Units.**  
Reading, writing, and speaking.  
Same as: JEWISHST 104A.

**AMELANG 140B. First-Year Yiddish, Second Quarter. 4 Units.**  
Continuation of AMELANG 140A. Prerequisite: AMELANG 140A or consent of instructor.  
Same as: JEWISHST 104B.

**AMELANG 140C. First-Year Yiddish, Third Quarter. 4 Units.**  
Continuation of AMELANG 140B. Prerequisite: AMELANG 140B or consent of instructor. Fulfills the University Foreign Language Requirement.  
Same as: JEWISHST 104C.

**AMELANG 144A. First-Year Modern Persian, First Quarter. 5 Units.**  
One-year sequence. Modern Persian for beginners; concentrates on rapidly developing basic skills in speaking, reading, writing, and understanding modern Persian. Strong emphasis is on the links between language and culture. The course is based on a fully integrated multimedia program. Students will learn the language with an emphasis on communicative and interactive classroom activities.

**AMELANG 144B. First-Year Modern Persian, Second Quarter. 5 Units.**

Continuation of AMELANG 144A. One-year sequence. Modern Persian for beginners; concentrates on rapidly developing basic skills in speaking, reading, writing, and understanding modern Persian. Strong emphasis is on the links between language and culture. The course is based on a fully integrated multimedia program. Students will learn the language with an emphasis on communicative and interactive classroom activities. Prerequisite: Placement Test, AMELANG 144A or consent of instructor.

**AMELANG 144C. First-Year Modern Persian, Third Quarter. 5 Units.**

Continuation of AMELANG 144B. One-year sequence. Modern Persian for beginners; concentrates on rapidly developing basic skills in speaking, reading, writing, and understanding modern Persian. Strong emphasis is on the links between language and culture. The course is based on a fully integrated multimedia program. Students will learn the language with an emphasis on communicative and interactive classroom activities. Fulfills the University Foreign Language Requirement. Prerequisite: Placement Test, AMELANG 144B, or consent of instructor. Fulfills the University Foreign Language Requirement.

**AMELANG 145A. Second-Year Modern Persian, First Quarter. 5 Units.**

Continuation of AMELANG 144C. Expands students' proficiency in Persian language and culture at intermediate level through various texts and multimedia. It stresses oral fluency, written expression, and reading comprehension. Students will continue to learn the language with an emphasis on communicative and interactive classroom activities. Students will be introduced to contemporary as well as classical short poems by famous Persian poets like Rumi. Prerequisite: Placement Test, AMELANG 144C or consent of instructor.

**AMELANG 145B. Second-Year Modern Persian, Second Quarter. 5 Units.**

Continuation of AMELANG 145A. Expands students' proficiency in Persian language and culture at intermediate level through various texts and multimedia. It stresses oral fluency, written expression, and reading comprehension. Students will continue to learn the language with an emphasis on communicative and interactive classroom activities. Students will be introduced to contemporary as well as classical short poems by famous Persian poets like Rumi. Prerequisite: Placement Test, AMELANG 144A or consent of instructor.

**AMELANG 145C. Second-Year Modern Persian, Third Quarter. 5 Units.**

Continuation of AMELANG 145B. Expands students' proficiency in Persian language and culture at intermediate level through various texts and multimedia. It stresses oral fluency, written expression, and reading comprehension. Students will continue to learn the language with an emphasis on communicative and interactive classroom activities. Students will be introduced to contemporary as well as classical short poems by famous Persian poets like Rumi. Prerequisite: Placement Test, AMELANG 144B or consent of instructor.

**AMELANG 146A. Third-Year Persian, First Quarter. 4 Units.**

Continuation of AMELANG 145C. Prerequisite: Placement Test, AMELANG 145C or consent of instructor.

**AMELANG 146B. Third-Year Persian, Second Quarter. 4 Units.**

Continuation of AMELANG 146A. Prerequisite: Placement Test, AMELANG 146A or consent of instructor.

**AMELANG 146C. Third-Year Persian, Third Quarter. 4 Units.**

Continuation of AMELANG 146B. Prerequisite: Placement Test, AMELANG 146B or consent of instructor.

**AMELANG 153A. First-Year Twi, First Quarter. 4 Units.****AMELANG 153B. First-Year Twi, Second Quarter. 4 Units.**

Continuation of AMELANG 153A. Prerequisite: AMELANG 153A or consent of instructor.

**AMELANG 153C. First-Year Beginning Twi, Third Quarter. 4 Units.**

Continuation of AMELANG 153B. Prerequisite: AMELANG 153B or consent of instructor. Fulfills the University Foreign Language Requirement.

**AMELANG 154A. Second-Year Twi, First Quarter. 4 Units.**

Continuation of AMELANG 153C. Prerequisite: AMELANG 153C or consent of instructor.

**AMELANG 154B. Second-Year Twi, Second Quarter. 4 Units.**

Continuation of AMELANG 154A. Prerequisite: AMELANG 154A or consent of instructor.

**AMELANG 154C. Second-Year Twi, Third Quarter. 4 Units.**

Continuation of AMELANG 154B. Prerequisite: AMELANG 154B or consent of instructor.

**AMELANG 156A. First-Year Zulu, First Quarter. 4 Units.****AMELANG 156B. First-Year Zulu, Second Quarter. 4 Units.**

Continuation of AMELANG 156A. Prerequisite AMELANG 156A or consent of instructor.

**AMELANG 156C. First-Year Zulu, Third Quarter. 4 Units.**

Continuation of AMELANG 156B. Prerequisite: AMELANG 156B or consent of instructor. Fulfills the University Foreign Language Requirement.

**AMELANG 157B. Second-Year Zulu, Second Quarter. 4 Units.**

Continuation of AMELANG 157A. Prerequisite: AMELANG 157A or consent of instructor.

**AMELANG 157C. Second-Year Zulu, Third Quarter. 4 Units.**

Continuation of AMELANG 157B. Prerequisite: AMELANG 157B or consent of instructor.

**AMELANG 170A. Biblical Hebrew, First Quarter. 1 Unitss.**

Establish a basic familiarity with the grammar and vocabulary of Biblical Hebrew and will begin developing a facility with the language. Students that are enrolled in this course must also enroll in Beginning Hebrew. This course requires no prior knowledge of Hebrew and will begin with learning the alphabet. By the end of the year, students will be able to translate basic biblical texts, will be familiar with common lexica and reference grammars, and will have sufficient foundational knowledge to enable them to continue expanding their knowledge either in a subsequent course or own their own. Same as: JEWISHST 107A, RELIGST 170A.

**AMELANG 170B. Biblical Hebrew, Second Quarter. 1 Unitss.**

Continuation of 170A  
Same as: JEWISHST 107B.

**AMELANG 170C. Biblical Hebrew, Third Quarter. 1 Unitss.**

Continuation of 170B.  
Same as: JEWISHST 107C.

**AMELANG 171. The Bible in Modern Hebrew Literature. 3-4 Units.**

The role of biblical myths in shaping Israeli identity and the development of a secular Hebrew literature. Readings include modern Hebrew poems and novels which offer new meanings to the stories of Genesis, Exodus, David, and the Song of Songs and make them relevant to the context of modern and postmodern Israeli culture. Readings in Hebrew and English. Prerequisite: intermediate Hebrew.

**AMELANG 176. Introduction to Ladino: Language, Literature, and Culture. 1-4 Units.**

Prerequisite: two quarters of Spanish.

**AMELANG 177. Middle Eastern Cities in Literature and Film. 4-5 Units.**

Sources include short stories, novels, and movies about Beirut, Tel Aviv, Jerusalem, Cairo, and Amman. Focus is on a cultural and intellectual history of each city. Issues such as the role that Middle Eastern cities play in the development of the modern Hebrew and Arabic novels, the city as a center of social and political life, and the city as a space of collective memory.

**AMELANG 182A. Intermediate Fulani, First Quarter. 3 Units.**

Fulfill the University foreign language requirement.

**AMELANG 182B. Intermediate Fulani, Second Quarter. 3 Units.**

Continuation of 182A.

**AMELANG 182C. Intermediate Fulani, Third Quarter. 3 Units.**

Continuation of 182B.

**AMELANG 184A. First-Year Turkish, First Quarter. 5 Units.**

Designed for students who have interest in learning Turkish language, culture, history, cuisine and social life. Proficiency-based orientation with emphasis on oral comprehension and speaking. The grammar is presented through communicative activities where students are exposed to authentic input.

**AMELANG 184B. First-Year Turkish, Second Quarter. 5 Units.**

Continuation of AMELANG184A. Emphasis on speaking, oral comprehension and beginning reading and writing skills. Turkish culture and social life is integrated in daily language learning process through authentic materials. Prerequisite: AMELANG 184A or consent of instructor.

**AMELANG 184C. First-Year Turkish, Third Quarter. 5 Units.**

Continuation of AMELANG 184B. Emphasis is on speaking, oral comprehension, reading and writing skills. Reading simple texts, studying Turkish pop music, viewing short documentaries and communicative writing exercises are part of daily class activities. Prerequisite: AMELANG 184B or consent of instructor. Fulfills the University Foreign Language Requirement.

**AMELANG 185A. Second-Year Turkish, First Quarter. 5 Units.**

Continuation of AMELANG 184C. Designed for students with previous knowledge of Turkish who wish to learn in depth about Turkish culture, history, social life, literature, cuisine and artistic trends. Emphasis on developing intermediate proficiency in reading, writing, listening and speaking. Class discussions and activities aim to enable students to perform various tasks in the target language. Prerequisite: AMELANG 184C or consent of instructor.

**AMELANG 185B. Second-Year Turkish, Second Quarter. 5 Units.**

Continuation of AMELANG 185A. Main focus is on class discussions and essay writing practices about daily life in Turkey. Prerequisite: AMELANG 185A or consent of instructor.

**AMELANG 185C. Second-Year Turkish, Third Quarter. 5 Units.**

Continuation of AMELANG 185B. Main focus is on class discussions and essay writing practices about daily life in Turkey. End of quarter presentation in Turkish. Prerequisite: AMELANG 185B or consent of instructor.

**AMELANG 186A. Third-Year Turkish, First Quarter. 3 Units.**

Continuation of AMELANG 185C. Prerequisite: AMELANG 185C or consent of instructor.

**AMELANG 186B. Third-Year Turkish, Second Quarter. 3 Units.**

Continuation of AMELANG 186A. Prerequisite: AMELANG 186A or consent of instructor.

**AMELANG 186C. Third-Year Turkish, Third Quarter. 3 Units.**

Continuation of AMELANG 186B. Prerequisite: AMELANG 186B or consent of instructor.

**AMELANG 187A. First-Year Yoruba, First Quarter. 4 Units.****AMELANG 187B. First-Year Beginning Yoruba, Second Quarter. 4 Units.**

Continuation of 187A.

**AMELANG 187C. First-Year Yoruba, Third Quarter. 4 Units.**

Continuation of 187B.

**AMELANG 203A. Beginning Hausa, First Quarter. 3 Units.**

For grads only.

**AMELANG 203B. Beginning Hausa, Second Quarter. 3 Units.**

For grads only.

**AMELANG 206B. Intensive Beginning Swahili, Part B. 4 Units.****AMELANG 206C. Intensive Beginning Swahili, Part C. 4 Units.****AMELANG 216A. Contemporary Language of Iran, First Quarter. 3 Units.****AMELANG 216B. Contemporary Language of Iran, Second Quarter. 3 Units.****AMELANG 216C. Contemporary Language of Iran, Third Quarter. 3 Units.****AMELANG 297. Directed Reading in African and Middle Eastern Languages. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**AMELANG 395. Graduate Studies in African and Middle Eastern Languages. 1-5 Units.**

Prerequisite: consent of instructor.

## African Studies Courses

**AFRICAST 72SI. Conflict in the Congo. 1-2 Units.****AFRICAST 109. Running While Others Walk: African Perspectives on Development. 5 Units.**

Throughout the history of modern Africa, Africans have specified their desired future development, understood broadly, and identified the major obstacles in achieving it. Debates about development have intensified in the post-colonial period, especially as African countries have replaced the leaders installed at independence. Amidst the general critique of the imposition of external values and rules, Africans have differed, sometimes sharply, on priorities, process, and programs. While for some the challenge is to catch up with development elsewhere, for others it is essential to leap ahead, to set the pace, to initiate a radical social, economic, and political transformation. To ground and extend the common approaches to studying development that emphasize economics and that rely largely on external commentators, we will explore African perspectives. Our major task will be a broad overview, sampling the analyses of Africa's intellectuals in several domains. Course participants will review, compare, and analyze major contributions, developing an understanding of contemporary intellectual currents.

Same as: AFRICAST 209.

**AFRICAST 112. AIDS, Literacy, and Land: Foreign Aid and Development in Africa. 5 Units.**

Public policy issues, their roots, and the conflicts they engender. The policy making process: who participates, how, why, and with what results? Innovative approaches to contested policy issues. Foreign roles and their consequences. Case studies such as: a clinic in Uganda that addresses AIDS as a family and community problem; and strategies in Tanzania to increase girls' schooling.

Same as: AFRICAST 212.

**AFRICAST 124. Memory and Heritage In South Africa Syllabus. 1 Unitss.**

The focus of this course is to provide a forum in which students examine the role of memory and heritage in South Africa. The course will include visiting speakers, discussion and other activities. The complex relationship between memory and heritage in South Africa will provide the basis for a series of broad conversations about citizenship, national reconciliation, memorialization, justice, modernity and heritage ethics.

Same as: AFRICAST 224.

**AFRICAST 151. AIDS in Africa. 3 Units.**

Medical, social, and political aspects of the HIV epidemic in sub-Saharan Africa including: biology, transmission, diagnosis, and treatment of HIV; mother-to-child transmission and breastfeeding; vaccines; community and activist responses to the HIV epidemic; economics of HIV treatment; governance and health; ethics in research and program implementation.

**AFRICAST 195. BACK FROM AFRICA WORKSHOP. 1-2 Units.**

This course is being offered for students who conducted research over the summer in Africa. It will have students reflect on their time in Africa, transform their observations and research into scholarship and connect them as a community. Cape Town fellows and any others who conducted summer research in Africa can use this course to finish their research.

**AFRICAST 199. Independent Study or Directed Reading. 1-5 Units.**

May be repeated for credit.

**AFRICAST 200. The HIV/AIDS Epidemic in Tanzania: A Pre-Field Seminar. 1 Unitss.**

Goal is to prepare students for an HIV/AIDS prevention, service-learning experience in Tanzania. Topics include: history of HIV/AIDS epidemic globally and in Tanzania; social and economic impact of AIDS; national and societal responses; ethical issues in crosscultural service learning; teaching for prevention; biology of HIV transmission, disease progression, and prevention; introduction to Tanzanian history and politics; HIV/AIDS and development; social, cultural, and economic context of HIV risk; and strategies for HIV prevention in Tanzania.

**AFRICAST 209. Running While Others Walk: African Perspectives on Development. 5 Units.**

Throughout the history of modern Africa, Africans have specified their desired future development, understood broadly, and identified the major obstacles in achieving it. Debates about development have intensified in the post-colonial period, especially as African countries have replaced the leaders installed at independence. Amidst the general critique of the imposition of external values and rules, Africans have differed, sometimes sharply, on priorities, process, and programs. While for some the challenge is to catch up with development elsewhere, for others it is essential to leap ahead, to set the pace, to initiate a radical social, economic, and political transformation. To ground and extend the common approaches to studying development that emphasize economics and that rely largely on external commentators, we will explore African perspectives. Our major task will be a broad overview, sampling the analyses of Africa's intellectuals in several domains. Course participants will review, compare, and analyze major contributions, developing an understanding of contemporary intellectual currents.

Same as: AFRICAST 109.

**AFRICAST 212. AIDS, Literacy, and Land: Foreign Aid and Development in Africa. 5 Units.**

Public policy issues, their roots, and the conflicts they engender. The policy making process: who participates, how, why, and with what results? Innovative approaches to contested policy issues. Foreign roles and their consequences. Case studies such as: a clinic in Uganda that addresses AIDS as a family and community problem; and strategies in Tanzania to increase girls' schooling.

Same as: AFRICAST 112.

**AFRICAST 224. Memory and Heritage In South Africa Syllabus. 1 Unitss.**

The focus of this course is to provide a forum in which students examine the role of memory and heritage in South Africa. The course will include visiting speakers, discussion and other activities. The complex relationship between memory and heritage in South Africa will provide the basis for a series of broad conversations about citizenship, national reconciliation, memorialization, justice, modernity and heritage ethics.

Same as: AFRICAST 124.

**AFRICAST 299. Independent Study or Directed Reading. 1-10 Units.****AFRICAST 300. Contemporary Issues in African Studies. 1 Unitss.**

Guest scholars present analyses of major African themes and topics. Brief response papers required. May be repeated for credit.

**AFRICAST 301A. The Dynamics of Change in Africa. 4-5 Units.**

Crossdisciplinary colloquium; required for the M.A. degree in African Studies. Open to advanced undergraduates and PhD students. Addresses critical issues including patterns of economic collapse and recovery; political change and democratization; and political violence, civil war, and genocide. Focus on cross-cutting issues including the impact of colonialism; the role of religion, ethnicity, and inequality; and Africa's engagement with globalization.

Same as: POLISCI 246P, POLISCI 346P.

**AFRICAST 302. Research Workshop. 1 Unitss.**

Required for African Studies master's students. Student presentations.

## American Studies Courses

**AMSTUD 1B. Media, Culture, and Society. 5 Units.**

The institutions and practices of mass media, including television, film, radio, and digital media, and their role in shaping culture and social life. The media's shifting relationships to politics, commerce, and identity.

Same as: COMM 1B.

**AMSTUD 2. Introduction to American National Government and Politics. 5 Units.**

The role and importance of the ideal of democracy in the evolution of the American political system. American political institutions (the Presidency, Congress, and the Court) and political processes (the formation of political attitudes and voting) are examined against the backdrop of American culture and political history. The major areas of public policy in the current practice of the ideal of democracy.

Same as: POLISCI 2.

**AMSTUD 12. Race, Poverty and Disaster Relief. 1 Unitss.**

An Exploration of pre and post-Katrina New Orleans, is Hillel at Stanford's preparation course for all students participating in Hillel's alternative spring break trip to New Orleans from March 25-April 2. Professors and other speakers from a variety of fields will offer perspectives on the historical, racial, and political context for the disastrous effects of Hurricane Katrina in the Gulf Coast. This course will also offer Jewish and secular perspectives on service, emphasizing the importance of questioning our motivations and approaches to helping others.

**AMSTUD 15. Global Flows: The Globalization of Hip Hop Art, Culture, and Politics. 1-2 Units.**

This course consists of film screenings, dialogues, and performances that examine and engage Hip Hop Cultures and artists from around the world. We will explore diverse scenes and artists, from the formation of new musical genres such as hiplife in Ghana, to the impact of the first Hip Hop concert in Morocco, to comparative investigations of race and citizenship in Japan, Cuba, Palestine, France, and the United States (including Black, Mexican and Arab-Americans).  
Same as: CSRE 15.

**AMSTUD 50N. The Literature of Inequality: Have and Have-Nots from the Gilded Age to the Occupy Era. 3 Units.**

Not since the turn of the last century have Americans experienced such a profound gap between those who have and those who do not, between wealthy and working poor, between defacto upper and lower classes, between those of the status quo and those who slip to the social periphery. We will be examining literary and artistic explorations of social and economic inequity, fiction and art that looks at reversals of fortune as well as the possibilities for social change. Readings include Jacob Riis, *How the Other Half Lives*, W.E.B. Du Bois, *The Souls of Black Folk*, Edith Wharton, *House of Mirth*, James Agee & Walker Evans, *Let Us Not Forget Famous Men*, T.C. Boyle, *The Tortilla Curtain*, Julie Otsuka, *When the Emperor Was Divine* and Occupy Movement art.  
Same as: ENGLISH 50N.

**AMSTUD 51N. Comparative Fictions of Ethnicity. 5 Units.**

We may "know" "who" we "are," but we are, after all, social creatures. How does our sense of self interact with those around us? How does literature provide a particular medium for not only self expression, but also for meditations on what goes into the construction of "the Self"? After all, don't we tell stories in response to the question, "who are you"? Besides a list of nouns and names and attributes, we give our lives flesh and blood in telling how we process the world. Our course focuses in particular on this question--Does this universal issue ("who am I") become skewed differently when we add a qualifier before it, like "ethnic"? Satisfies PWR2.  
Same as: COMPLIT 51N, CSRE 51N.

**AMSTUD 68N. Mark Twain and American Culture. 4 Units.**

Preference to freshmen. Mark Twain has been called our Rabelais, our Cervantes, our Homer, our Tolstoy, our Shakespeare. Ernest Hemingway maintained that all modern American literature comes from one book by Mark Twain called *The Adventures of Huckleberry Finn*. President Franklin D. Roosevelt got the phrase New Deal from *A Connecticut Yankee in King Arthur's Court*. Class discussions will focus on how Twain's work illuminates and complicates his society's responses to such issues as race, technology, heredity versus environment, religion, education, and what it means to be American.  
Same as: ENGLISH 68N.

**AMSTUD 101. American Fiction into Film: How Hollywood Scripts and Projects Black and White Relations. 3-5 Units.**

Movies and the fiction that inspires them; power dynamics behind production including historical events, artistic vision, politics, and racial stereotypes. What images of black and white does Hollywood produce to forge a national identity? How do films promote equality between the races? What is lost or gained in film adaptations of books?.

**AMSTUD 103. On the Road: Cars and the Auto-Mobility of Race, Gender, Class, and Age in American Literature. 3-5 Units.**

The car in American literature, history, and culture, provides hope and makes it possible to relocate, transcend social status, and reinvent oneself. In this class we will examine how the car allows Americans to navigate identity in new ways. Readings include: Fitzgerald, Stein, Steinbeck, Escovedo-Colton, Nabokov, Barrett, Walker, Murray, Simpson, Wolfe, Kerouac, Davis, Freeman, Gilroy, Lucasi, Hamper, Moore, and Nass.  
Same as: COMPLIT 120A.

**AMSTUD 105Q. Law and Popular Culture. 3 Units.**

This seminar focuses on the interface between two important subjects: law and popular culture. Before class, students will see a series of films or television shows relating to law, lawyers, and the legal system. There is also a weekly homework assignment based on materials in the assigned text and the assigned film or TV show. We will discuss the pop culture treatment of subjects such as the adversary system, good and bad lawyers, female and gay lawyers, the work life of lawyers, legal education, ethical issues, the jury system, and criminal and civil justice. The seminar discussions will draw on film theory and film-making technique to deepen understanding of the interrelationship between law and popular culture. The discussions will illuminate the ways in which pop culture products both reflect and change social views about law and lawyers. The assigned text is Michael Asimow & Shannon Mader, "Law and Popular Culture: A Course Book" (Peter Lang 2004).

**AMSTUD 107. Introduction to Feminist Studies. 4-5 Units.**

Introduction to interdisciplinary feminist scholarship, which seeks to understand the creation, perpetuation, and critiques of gender inequalities. Topics include the historical emergence of feminist politics and contemporary analyses of work and family, health and sexuality, creativity, and politics. Close attention to the intersections of race, gender, ethnicity, and sexuality and to international, as well as U.S., perspectives. Students learn to think critically about gender in the past, present, and future.  
Same as: CSRE 108, FEMST 101.

**AMSTUD 114N. Visions of the 1960s. 5 Units.**

Preference to sophomores. Introduction to the ideas, sensibility, and, to a lesser degree, the politics of the American 60s. Topics: the early 60s vision of a beloved community; varieties of racial, generational, and feminist dissent; the meaning of the counterculture; and current interpretive perspectives on the 60s. Film, music, and articles and books.

**AMSTUD 116. American Economic History. 5 Units.**

The American economy from colonial times to the present, illustrating the role of history in economic life. Topics: U.S. economic development in global and comparative context; slavery as an economic system; origins and consequences of the American technology and business organization; economics of the Great Depression and New Deal; post-World War II economic performance and social change. Prerequisite: 1A.  
Same as: ECON 116.

**AMSTUD 120. Digital Media in Society. 4-5 Units.**

(Graduate students register for 220.) Contemporary debates concerning the social and cultural impact of digital media. Topics include the historical origins of digital media, cultural contexts of their development and use, and influence of digital media on conceptions of self, community, and state. Priority to Juniors and Seniors.  
Same as: COMM 120W, COMM 220.

**AMSTUD 121. Masterpieces of American Literature. 3-5 Units.**

(English majors and others taking 5 units, register for 121.) A survey of some of the definitive texts of American writing, such as *Leaves of Grass*, *Benito Cereno*, *Adventures of Huckleberry Finn*, *The Waste Land*, *The Sun Also Rises*, *The Golden Apples*, and *The Crying of Lot 49*.  
Same as: ENGLISH 21, ENGLISH 121.

**AMSTUD 121X. Hip Hop, Youth Identities, and the Politics of Language. 3-4 Units.**

Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.  
Same as: AFRICAAM 121X, ANTHRO 121A, CSRE 121X, EDUC 121X, LINGUIST 155.

**AMSTUD 123D. American Literature, 1855 to World War I. 5 Units.**

A survey of American writers from Whitman to T.S. Eliot, including Emily Dickinson, Mark Twain, Stephen Crane, Frank Norris, Kate Chopin, Theodore Dreiser, and Henry James. Topics include the tension between romance and realism, the impact of naturalism and modernism, as well as race, gender, and the literary evolution of the American language. Same as: ENGLISH 123D.

**AMSTUD 123G. Mark Twain: A Fresh Look at an Icon and Iconoclast, 100 Years after His Death. 3-5 Units.**

The vitality and versatility of a writer who has been called America's Rabelais, Cervantes, Homer, Tolstoy, and Shakespeare. Journalism, travel books, fiction, drama, and sketches by Mark Twain; how Twain engaged such issues as personal and national identity, satire and social justice, imperialism, race and racism, gender, performance, travel, and technology. What are Twain's legacies in 2010, the centennial of his death, the 175th anniversary of his birth, and the 125th anniversary of his most celebrated novel? Guests include actor Hal Holbrook. Same as: ENGLISH 123G.

**AMSTUD 135. Deliberative Democracy and its Critics. 3-5 Units.**

This course examines the theory and practice of deliberative democracy and engages both in a dialogue with critics. Can a democracy which emphasizes people thinking and talking together on the basis of good information be made practical in the modern age? What kinds of distortions arise when people try to discuss politics or policy together? The course draws on ideas of deliberation from Madison and Mill to Rawls and Habermas as well as criticisms from the jury literature, from the psychology of group processes and from the most recent normative and empirical literature on deliberative forums. Deliberative Polling, its applications, defenders and critics, both normative and empirical, will provide a key case for discussion. Same as: COMM 135, COMM 235, COMM 335, POLISCI 234P, POLISCI 334P.

**AMSTUD 137. The Dialogue of Democracy. 4-5 Units.**

All forms of democracy require some kind of communication so people can be aware of issues and make decisions. This course looks at competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small scale discussions or sound bites on television? Or social media? What is the role of technology in changing our democratic practices, to mobilize, to persuade, to solve public problems? This course will include readings from political theory about democratic ideals - from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. It will also include contemporary examinations of the media and the internet to see how those practices are changing and how the ideals can or cannot be realized. Same as: COMM 137W, COMM 237, POLISCI 232T, POLISCI 332T.

**AMSTUD 140. Stand Up Comedy and the "Great American Joke" Since 1945. 3-5 Units.**

Development of American Stand Up Comedy in the context of social and cultural eruptions after 1945, including the Borscht Belt, the Chitlin' Circuit, the Cold War, censorship battles, Civil Rights and other social movements of the 60s and beyond. The artistry of stories, monologues, jokes, impersonations, persona, social satire, scatology, obscenity, riffs, rants, shtick, and more by such artists as Lenny Bruce, Dick Gregory, Richard Pryor, George Carlin, Margaret Cho, Sarah Silverman, Jon Stewart, Stephen Colbert, as well as precursors such as Mark Twain, minstrelsy and vaudeville and related films, TV shows, poems and other manifestations of similar sensibilities and techniques.

**AMSTUD 142. The Literature of the Americas. 5 Units.**

A wide-ranging overview of the literatures of the Americas in comparative perspective, emphasizing continuities and crises that are common to North American, Central American, and South American literatures as well as the distinctive national and cultural elements of a diverse array of primary works. Topics include the definitions of such concepts as empire and colonialism, the encounters between worldviews of European and indigenous peoples, the emergence of creole and racially mixed populations, slavery, the New World voice, myths of America as paradise or utopia, the coming of modernism, twentieth-century avant-gardes, and distinctive modern episodes--the Harlem Renaissance, the Beats, magic realism, Noigandres--in unaccustomed conversation with each other. Same as: COMPLIT 142, CSRE 142, ENGLISH 172E.

**AMSTUD 143. Introduction to African American Literature. 3-5 Units.**

(English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. We will engage some of the defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attuned to the invariably hybrid nature of this tradition, we will also devote attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history. Same as: AFRICAAM 43, ENGLISH 43, ENGLISH 143.

**AMSTUD 146. Asian American Culture and Community. 3-5 Units.**

An examination of the history, art and culture of Vietnamese Americans, and their contemporary experiences in the South Bay. The course will combine in-class learning with a major conference featuring prominent artists and scholars on the Vietnamese Diasporic community. A service learning component requires community work at a service organization in San Jose. Service Learning Course (certified by Haas Center). Course can be repeated once. Same as: ASNAMST 146S, COMPLIT 146, CSRE 146S.

**AMSTUD 147. The Soul Tradition in African American Music. 3-4 Units.**

The African American tradition of soul music from its origins in blues, gospel, and jazz to its influence on today's r&b, hip hop, and dance music. Style such as rhythm and blues, Motown, Southern soul, funk, Philadelphia soul, disco, Chicago house, Detroit techno, trip hop, and neo-soul. Soul's cultural influence and global reach; its interaction with politics, gender, place, technology, and the economy. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4 units only.) Same as: MUSIC 147, MUSIC 247.

**AMSTUD 150. American Literature and Culture to 1855. 5 Units.**

A survey of early American writings, including sermons, poetry, captivity and slave narratives, essays, autobiography, and fiction, from the colonial era to the eve of the Civil War. Same as: ENGLISH 123.

**AMSTUD 150A. Colonial and Revolutionary America. 5 Units.**

(Same as HISTORY 50A. History majors and others taking 5 units, register for HISTORY 150A.) Survey of the origins of American society and polity in the 17th and 18th centuries. Topics: the migration of Europeans and Africans and the impact on native populations; the emergence of racial slavery and of regional, provincial, Protestant cultures; and the political origins and constitutional consequences of the American Revolution. Same as: HISTORY 150A.



**AMSTUD 150B. 19th-Century America. 5 Units.**

(Same as HISTORY 50B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture.

Same as: AFRICAAM 150B, HISTORY 150B.

**AMSTUD 150C. The United States in the Twentieth Century. 5 Units.**

(Same as HISTORY 50C.) Major political, economic, social, and diplomatic developments in the U.S. Themes: the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in society (mass immigration at the turn of the century and since 1965, the civil rights era of the 50s and 60s); the changing status of women since WW II; shifting ideological bases, institutional structures, and electoral characteristics of the political system (New Deal and post-Vietnam); determinants of foreign policy in WW I and II, and the Cold War.

Same as: HISTORY 150C.

**AMSTUD 152. U.S. Society and Politics since 1945. 5 Units.**

Surveys United States history following World War II, blending political, cultural, and intellectual history. Topics include: the Cold War as foreign policy and domestic concern, the Civil Rights movement as a political, social, and religious phenomenon, the Sixties including social movements like the New Left, feminism, black power, and the New Right, the Vietnam War, contemporary transformations in the U.S. economy, the culture wars of the 1980s, and the growing geopolitical importance of the Middle East. Same as: HISTORY 152.

**AMSTUD 152A. "Mutually Assured Destruction": American Culture and the Cold War. 5 Units.**

The temperature of the early Cold War years via readings of Soviet and U.S. propaganda; documentary film and film noir; fiction by Bellow, Ellison, O'Connor, and Mailer; social theory by Arendt, the New York Intellectuals, and the Frankfurt School; and political texts such as Kennan's *Sources of Soviet Conduct*, the Truman Doctrine speech, and the National Security Council Report 68. Major themes include the discourse of totalitarianism, MacCarthyism, strategies of containment, the nuclear threat, the figure of the outsider, and the counterculture, and the cultural shift from sociological to psychological idioms.

Same as: ENGLISH 152A.

**AMSTUD 152G. Global Harlem Renaissance. 5 Units.**

Examination of the explosion of African American artistic expression during 1920s and 30s New York known as the Harlem Renaissance. Amiri Baraka once referred to the Renaissance as a kind of vicious Modernism, a BangClash that impacted and was impacted by political, cultural and aesthetic changes not only in the U.S. but Europe, the Caribbean and Latin America. Focus on the literature, graphic arts, and the music of the era in this global context.

Same as: AFRICAAM 152G, ENGLISH 152G.

**AMSTUD 156H. Women and Medicine in US History: Women as Patients, Healers and Doctors. 5 Units.**

Women's bodies in sickness and health, and encounters with lay and professional healers from the 18th century to the present. Historical construction of thought about women's bodies and physical limitations; sexuality; birth control and abortion; childbirth; adulthood; and menopause and aging. Women as healers, including midwives, lay physicians, the medical profession, and nursing.

**AMSTUD 159X. American Photographs, 1839-1971: A Cultural History. 4 Units.**

This course concentrates on many important American photographers, from the era of daguerreotypes to near the end of the pre-digital era. We study photographs of the Civil War, western exploration, artistic subjects, urban and rural poverty, skyscrapers, crime, fashion, national parks, and social protest, among other topics. Among the photographers we study: Carleton Watkins, Eadweard Muybridge, Walker Evans, Dorothea Lange, Garry Winogrand, and Diane Arbus. Emphasis on developing students' abilities to discuss and write about photography; to see it.

Same as: ARTHIST 159, ARTHIST 359.

**AMSTUD 160. Perspectives on American Identity. 5 Units.**

Required for American Studies majors. Changing interpretations of American identity and Americanness.

**AMSTUD 161. Women in Modern America. 4-5 Units.**

The transformation from the New Woman of the 1890s to the New Woman of the 1990s; attention to immigrant, black, and white women, both historical analyses and personal accounts. Topics include: workforce participation; family and reproductive labor; educational and professional opportunities; the impact of wars, economic depression, and popular culture; and recurrent feminist movements.

Same as: CSRE 162, HISTORY 161.

**AMSTUD 164C. From Freedom to Freedom Now: African American History, 1865-1965. 5 Units.**

(Same as HISTORY 64C.) History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music.

Same as: HISTORY 164C.

**AMSTUD 165. History of Higher Education in the U.S.. 3-5 Units.**

Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities.

Same as: EDUC 165, EDUC 265, HISTORY 158C.

**AMSTUD 166. Introduction to African American History: The Modern African American Freedom Struggle. 3-5 Units.**

This course is an introduction to African-American Political movements of the period after 1930, with special emphasis on mass protest and civil rights activism as well as leaders such as W. E. B. Du Bois, Thurgood Marshall, Martin Luther King, Jr., Malcolm X, Jesse Jackson, and Barack Obama.

The lectures will utilize audio-visual materials extensively, and the exams will cover these materials as well as the traditional lectures. In addition to attending lectures, students are encouraged to undertake research projects. Same as: AFRICAAM 166, HISTORY 166.

**AMSTUD 179. Introduction to American Law. 3-5 Units.**

For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general.

Same as: POLISCI 122, PUBLPOL 302A.

**AMSTUD 183. Border Crossings and American Identities. 5 Units.**

How novelists, filmmakers, and poets perceive racial, ethnic, gender, sexual preference, and class borders in the context of a national discussion about the place of Americans in the world. How Anna Deavere Smith, Sherman Alexie, or Michael Moore consider redrawing such lines so that center and margin, or self and other, do not remain fixed and divided. How linguistic borderlines within multilingual literature by Caribbean, Arab, and Asian Americans function. Can Anzaldúa's conception of borderlands be constructed through the matrix of language, dreams, music, and cultural memories in these American narratives? Course includes examining one's own identity.

Same as: CSRE 183.

**AMSTUD 185. American Studies Internship. 1-3 Units.**

Restricted to declared majors. Practical experience working in a field related to American Studies for six to ten weeks. Students make internship arrangements with a company or agency, under the guidance of a sponsoring faculty member, and with the consent of the director or a program coordinator of American Studies. Required paper focused on a topic related to the internship and the student's studies. May be repeated for credit.

**AMSTUD 186. Tales of Three Cities: New York, Chicago, Los Angeles. 5 Units.**

How urban form and experience shape literary texts and how literary texts participate in the creation of place, through the literature of three American cities as they ascended to cultural and iconographical prominence: New York in the early to mid 19th century; Chicago in the late 19th and early 20th centuries; and Los Angeles in the mid to late 20th century.

Same as: ENGLISH 186.

**AMSTUD 186A. American Hauntings. 5 Units.**

Cultural, psychological, social, and political dynamics of haunting in American literature, from the early national period to the late 20th century. Sources include ghost stories and other instances of supernatural, emotional, or mental intervention. Authors include Charles Brockden Brown, Washington Irving, Edgar Allan Poe, Nathaniel Hawthorne, Louisa May Alcott, Charlotte Perkins Gilman, Charles Chesnut, Henry James, Edith Wharton, Toni Morrison, and Stephen King.

Same as: ENGLISH 186A.

**AMSTUD 195. Individual Work. 1-5 Units.****AMSTUD 201. History of Education in the United States. 3-5 Units.**

How education came to its current forms and functions, from the colonial experience to the present. Focus is on the 19th-century invention of the common school system, 20th-century emergence of progressive education reform, and the developments since WW II. The role of gender and race, the development of the high school and university, and school organization, curriculum, and teaching.

Same as: EDUC 201, HISTORY 158B.

**AMSTUD 210. Critical Theory and The Environment. 3-5 Units.**

Critical theoretical approaches (such as cultural studies, Marxism, postcolonial theory, cultural geography, feminism, and science studies) have generally been underutilized as methodologies for grappling with environmental situations, yet they hold much promise for addressing their complexity. This course asks: How does critical theory about the environment construe the current situation? What kinds of political or technological solutions do these theories call for or imply? The first half of the seminar introduces critical approaches and methodologies in relation to the environment. In the second section, we will use a variety of theoretical approaches to address environmental justice, water, agriculture, toxics, and animals.

Same as: ANTHRO 210B, MTL 210.

**AMSTUD 214. The American 1960s: Thought, Protest, and Culture. 5 Units.**

The meaning of the American 60s emphasizing ideas, culture, protest, and the new sensibility that emerged. Topics: black protest, the new left, the counterculture, feminism, the new literature and journalism of the 60s, the role of the media in shaping dissent, and the legacy of 60s protest. Interpretive materials from film, music, articles, and books.

**AMSTUD 226. Race and Racism in American Politics. 5 Units.**

Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.

Same as: CSRE 226, POLISCI 226, POLISCI 326.

**AMSTUD 240A. Pre-Honors Seminar. 2-5 Units.**

Methods, interpretations, and issues pertinent to honors work in American Studies. Open to juniors interested in honors.

**AMSTUD 244. The Visual Culture of the American Home Front, 1941-1945. 5 Units.**

How does home front of WWII look now? What sort of meanings appear with the vantage of more than sixty years' distance? Examining Hollywood films from those years - films made during the war but mostly not directly about the war - the seminar focuses on developing students' abilities to write emotion-based criticism and history. Weekly short papers, each one in response to a film screening, are required. Among the films screened: *Shadow of a Doubt*, *Gaslight*, *I Walked with a Zombie*, *The Best Years of Our Lives*.

Same as: ARTHIST 244.

**AMSTUD 250. Senior Research. 1-15 Units.**

Research and writing of senior honors thesis under the supervision of a faculty member. The final grade for the thesis is assigned by the chair based on the evaluations of the primary thesis adviser and a second reader appointed by the program. Prerequisite: consent of chair.

**AMSTUD 251C. The American Enlightenment. 5 Units.**

Eighteenth century America was like a laboratory for exciting new social, political, religious, scientific, and artistic theories that we collectively call "the Enlightenment." With readings in original texts and studies of material culture, examines ways in which eighteenth century Americans applied Enlightenment thinking to some of the most important problems and questions of their time. What was the best kind of government, and how could this be known? Was the new world of America fundamentally different or the same as Europe, and did animals, plants, and people improve or worsen there? What creatures (children, apes, women, slaves) were considered unreasonable in the Age of Reason, and why? What was the place of religion and passion in the Age of Reason?

Same as: HISTORY 251C.

**AMSTUD 255D. Racial Identity in the American Imagination. 4-5 Units.**

Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music.

Same as: AFRICAAM 255, CSRE 255D, HISTORY 255D, HISTORY 355D.

**AMSTUD 256. U.S.-China Relations: From the Opium War to Tiananmen. 4-5 Units.**

The history of turbulent relations, military conflict, and cultural clashes between the U.S. and China, and the implications for the domestic lives of these increasingly interconnected countries. Diplomatic, political, social, cultural, and military themes from early contact to the recent past. Same as: HISTORY 256, HISTORY 356.

**AMSTUD 257. Journalism and Imaginative Writing in America. 5 Units.**

Walt Whitman spent twenty-five years as a journalist before publishing his first book of poems. Mark Twain was a journalist for twenty years before publishing his first novel. Topics include examination of how writers; backgrounds in journalism shaped the poetry or fiction for which they are best known; study of recent controversies surrounding writers who blurred the line between journalism and fiction. Writers include Whitman, Fanny Fern, Twain, Pauline Hopkins, Theodore Dreiser, Charlotte Perkins Gilman, Ernest Hemingway, Meridel LeSueur. Same as: COMM 278, ENGLISH 257.

**AMSTUD 258. Topics in the History of Sexuality: Sexual Violence. 4-5 Units.**

Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.

Same as: CSRE 192E, FEMST 258, FEMST 358, HISTORY 258, HISTORY 358.

**AMSTUD 261A. Geography, Time, and Trauma in Asian American Literature. 5 Units.**

The notion that homes can be stable locations for cultural, racial, ethnic, and similarly situated identity categories. The possibility that there really is no place like home for Asian American subjects. How geography, landscape, and time situate traumas within fictional Asian American narratives.

Same as: ASNAMST 187, ENGLISH 261A.

**AMSTUD 261B. East Goes West: Transnational Asia/Pacific Spatial Geographies. 5 Units.**

East goes west as a metaphor to invoke the conceptions of fantasy and desire that play out in transnational scope. What attracts diasporic Asian/American subjects to the locations that they travel to, whether it be an identified homeland with which a character attaches a strong affinity, or to a new country where the promise of economic possibilities await?

Same as: ASNAMST 261B, ENGLISH 261B.

**AMSTUD 261E. Mixed Race Literature in the U.S. and South Africa. 5 Units.**

As scholar Werner Sollors recently suggested, novels, poems, stories about interracial contacts and mixed race constitute an orphan literature belonging to no clear ethnic or national tradition. Yet the theme of mixed race is at the center of many national self-definitions, even in our U.S. post-Civil Rights and South Africa's post-Apartheid era. This course examines aesthetic engagements with mixed race politics in these trans- and post-national dialogues, beginning in the 1700s and focusing on the 20th and 21st centuries.

Same as: AFRICAAM 261E, ENGLISH 261E.

**AMSTUD 261F. Gender and Sexuality in Asian American Literature. 5 Units.**

How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings will include literary criticism, feminist and queer theory.

Same as: ASNAMST 188, ENGLISH 261F, FEMST 261F, FEMST 361F.

**AMSTUD 262D. African American Poetics. 5 Units.**

Examination of African American poetic expressive forms from the 1700s to the 2000s, considering the central role of the genre—from sonnets to spoken word, from blues poetry to new media performance—in defining an evolving literary tradition and cultural identity.

Same as: AFRICAAM 262D, ENGLISH 262D.

**AMSTUD 262F. Transnational American Studies. 5 Units.**

Exploration of the transnational turn in American Studies, focusing on how transnational perspectives enrich and complicate our understanding of American literature, history and the arts. Readings include recent work in transnational American Studies. Topics include experiments with ways of using digital technology to allow archival materials in different locations to be in conversation with each other.

Same as: ENGLISH 262F, ENGLISH 362F.

**AMSTUD 265. Writing Asian American History. 5 Units.**

Recent scholarship in Asian American history, with attention to methodologies and sources. Topics: racial ideologies, gender, transnationalism, culture, and Asian American art history. Primary research paper.

Same as: HISTORY 265, HISTORY 365.

**AMSTUD 267. Religion in Twentieth Century American Life. 5 Units.**

Why is the United States such a religious country? Over 90% of Americans profess a belief in God, and more than half identify religion as "very important" to their lives. In this seminar, we will examine the durability and power of religion in modern American history, from the emergence of Christian fundamentalism to the theology of the Cold war to the conflict with radical Islam. Other topics include: the Holocaust, Civil Rights and religion, gender and sexuality.

Same as: HISTORY 267.

## Anesthesia Courses

**ANES 76Q. The Psychology and Psychopharmacology of Abused Drugs. 2 Units.**

Preference to sophomores. Explores the psychology and pharmacology of abused drugs, both legal and illegal. Discusses pharmaceutical compounds such as ecstasy and LSD, as well as medicinal drug classes with abuse potential (examples being opioids, benzodiazepines, and amphetamines). Also covers lesser-known psychotropics (phenethylamines and tryptamines, and naturally-occurring compounds with controversial and shifting legal statuses, like marijuana and salvia divinorum). Examines the physiological mechanisms by which these drugs exert their effects on human experience, as well as the health implications, history, cultural impact, and legal issues that revolve around these psychoactive chemicals.

**ANES 199. Undergraduate Research. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**ANES 202. Anesthesiology and Pathophysiologic Implications for the Perioperative Patient. 1 Unitss.**

Provides participants a patient-care-related review of organ physiology and an in- depth discussion of the pathophysiologic mechanisms at work in the perioperative period that influence outcome in the surgical patient and their management. Organ systems addressed include cardiovascular, respiratory, renal, hematologic, and cerebral. Subject matter including airway management, ventilatory support, transfusion practices and the acute management of shock provides useful information for all students currently or in the future involved in acute care of the critically ill patient. Additional topics specific to anesthesia, including anesthetic pharmacology. Lecturers are Stanford anesthesia faculty and visiting guest faculty. Prerequisite: completion of first year curriculum is strongly encouraged.

**ANES 207. Medical Acupuncture. 2 Units.**

Acupuncture is part of a comprehensive system of traditional Chinese Medicine developed over the past two millennia. This course reviews the history and theoretical basis of acupuncture for the treatment of various diseases as well as for the alleviation of pain. Issues related to the incorporation of acupuncture into the current health care system and the efficacy of acupuncture in treating various diseases are addressed. Includes practical, hands-on sections.

**ANES 215. Journal Club for Neuroscience, Behavior and Cognition Scholarly Concentration. 1 Unitss.**

Review of current literature in both basic and clinical neuroscience in a seminar format consisting of both faculty and student presentations.

**ANES 243. Introduction to Integrative Medicine. 1 Unitss.**

Presentations by local, national, and international experts in various modalities of integrative medicine commonly used by patients in the US, including mind-body medicine (biofeedback, clinical hypnosis, meditation, yoga); traditional whole systems of medicine (traditional Chinese medicine, Ayurveda); biological therapies (botanical medicine, supplements, herbal medicine); manipulative therapies (chiropractic, massage); and acupuncture. Lectures focus on evidence supporting the potential value of various treatment modalities and explanations of both the traditional and proposed scientific mechanisms of actions. Most classes include an experiential portion.

Same as: FAMMED 243.

**ANES 280. Early Clinical Experience in Anesthesia. 1-2 Units.**

Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

**ANES 299. Directed Reading in Anesthesiology. 1-18 Units.**

Prerequisite: consent of instructor.

**ANES 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**ANES 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Problems related to metabolism, toxicity, and mechanisms of anesthesia; pharmacologic studies involving pain management; the genetic and molecular basis of hemodynamic insufficiency. Animal studies may be included. Interested students should contact Drs. Trudell, MacIver, Clark, Giffard, Patterson, Angelotti, Drover, Chu, or Angst.

## Anthropology Courses

**ANTHRO 1. Introduction to Cultural and Social Anthropology. 5 Units.**

Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films.

Same as: ANTHRO 201.

**ANTHRO 1S. Introduction to Cultural and Social Anthropology. 3-5 Units.**

Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films.

Same as: ANTHRO 101S.

**ANTHRO 3. Introduction to Prehistoric Archeology. 3-5 Units.**

Aims, methods, and data in the study of human society's development from early hunters through late prehistoric civilizations. Archaeological sites and remains characteristic of the stages of cultural development for selected geographic areas, emphasizing methods of data collection and analysis appropriate to each.

Same as: ARCHLGY 1.

**ANTHRO 4. Language and Culture. 4-5 Units.**

Comparative approach, using examples from many languages. Emphasis is on generally non-Western speech communities. Topics include: the structure of language; the theory of signs; vocabulary and culture; grammar, cognition, and culture (linguistic relativism and determinism); encodability of cultural information in language; language adaptiveness to social function; the ethnography of speaking; registers; discourse (conversation, narrative, verbal art); language and power; language survival and extinction; and linguistic ideology (beliefs about language).

**ANTHRO 6. Human Origins. 5 Units.**

The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them.

Same as: ANTHRO 206, HUMBIO 6.

**ANTHRO 10SC. Darwin, Evolution, and Galapagos. 2 Units.**

The tiny remote islands of Galápagos have played a large and central role in the study of evolution. Not surprisingly, they have also been central to the study of conservation. The fascinating adaptations of organisms to the unique ecosystems of the archipelago have left them particularly vulnerable to outside introductions. Drawing on lessons learned in Galapagos from Darwin's time to the present, this seminar explores evolution, conservation, and their connection in the Galapagos. Using case-study material on finches, iguanas, tortoises, cacti, Scalesia plants, and more, we will explore current theory and debate about adaptation, sexual selection, speciation, adaptive radiation, and other topics in evolution. Similarly, we will explore the special challenges Galápagos poses today for conservation, owing to both its unusual biota and the increasing human impact on the archipelago. This course includes an intensive eleven-day expedition to Galápagos to observe firsthand the evolutionary phenomena and conservation issues discussed in class. A chartered ship will serve as our floating classroom, dormitory, and dining hall as we work our way around the archipelago to visit as many as ten islands. For this portion of the class, undergraduates will be joined by a group of Stanford alumni and friends in a format called a Stanford "Field Seminar." Because our class time on campus is limited to one week before travel, students will be required to complete all course readings over the summer. Both on campus and in South America, the course emphasizes student contributions and presentations. Students will be asked to lead discussions and carry out literature research on the evolutionary and conservation biology of particular Galápagos species. The final assignment for the seminar is to complete a seven- to ten-page paper on the evolutionary biology and conservation challenges of a particular organism or adaptation and to present the main findings of that paper in a joint seminar of undergrads and alumni as we travel in Galápagos. Note: Students will arrive on campus and will be housed at Stanford until we leave for Galápagos. Travel to Galápagos will be provided and paid by Sophomore College (except incidentals) and is made possible by the support of the Stanford Alumni Association Travel/Study Program and generous donors. Students will return to campus late afternoon or evening on Sunday, September 23, the day before the fall term begins. Same as: HUMBIO 17SC.

**ANTHRO 12. Anthropology and Art. 5 Units.**

Modernity. How the concept of art appears timeless and commonsensical in the West, and with what social consequences. Historicizing the emergence of art. Modernist uses of primitive, child art, asylum, and outsider art.

**ANTHRO 14. Introduction to Anthropological Genetics. 3 Units.**

For upper division undergraduates. The extent and pattern of variation among human genomes, the origin of these patterns in human evolution, and the social and medical impact of recent discoveries. Topics include: the Human Genome Project; human origins; ancient DNA; genetic, behavioral, linguistic, cultural, and racial diversity; the role of disease in shaping genetic diversity; DNA forensics; genes and reproductive technology.

**ANTHRO 15. Sex and Gender. 3 Units.**

Commonality and diversity of gender roles in crosscultural perspective. Cultural, ecological, and evolutionary explanations for such diversity. Theory of the evolution of sex and gender, changing views about men's and women's roles in human evolution, conditions under which gender roles vary in contemporary societies, and issues surrounding gender equality, power, and politics.

**ANTHRO 16. Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America. 5 Units.**

What does it mean to be a Native American in the 21st century? Beyond traditional portrayals of military conquests, cultural collapse, and assimilation, the relationships between Native Americans and American society. Focus is on three themes leading to in-class moot court trials: colonial encounters and colonizing discourses; frontiers and boundaries; and sovereignty of self and nation. Topics include gender in native communities, American Indian law, readings by native authors, and Indians in film and popular culture. Same as: NATIVEAM 16.

**ANTHRO 18. Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years. 3-5 Units.**

Fossil, genetic and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. This class introduces students to the data and issues regarding human dispersal, migration and colonization of continents and islands around the world. We explore problems related to the timing and cause of colonizing events, and investigate questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and our contemporary environmental crisis. Same as: ARCHLGY 12, EARTHSSYS 21, HUMBIO 182.

**ANTHRO 19Q. Hauntings, Visions, and Prophecy. 1-3 Units.**

Preference to sophomores. Why do people see ghosts? Why do people believe that stars foretell the future? When do people see demons and angels? Focus is on the conditions under which people experience themselves as having sensory evidence of supernatural phenomena and the role of training and expectation in the process. Intellectual exploration of what is known from the ethnographic, historical, and psychological record. Practical experimental projects involve attempting to induce positive supernatural experience. Prerequisite: consent of instructor.

**ANTHRO 21N. The Anthropology of Globalization. 4 Units.**

Preference to freshmen. Anthropological approach to how cultural change, economic restructuring, and political mobilization are bound up together in the process of globalization.

**ANTHRO 22. Archaeology of North America. 3-5 Units.**

Why and how people of N. America developed. Issues and processes that dominate or shape developments during particular periods considering the effects of history and interactions with physical and social environment. Topics include the peopling of the New World, explaining subsequent diversity in substance and settlement adaptations, the development of social complexity, and the impact of European contact.

**ANTHRO 22N. Ethnographies of North America: An Introduction to Cultural and Social Anthropology. 3-4 Units.**

Preference to freshmen. Ethnographic look at human behavior, including cultural transmission, social organization, sex and gender, culture change, and related topics in N. America. Films.

**ANTHRO 23N. Glimpses of Divinity. 3 Units.**

Preference to freshmen. How human beings search for and identify the presence of the divine in everyday human life. Sources include spiritual classics in the Christian, Jewish, and Hindu traditions including works by Augustine, Teresa of Avila, Jonathan Edwards, the Bhagavad Gita, the Zohar, and some ethnographies of non-literate traditions.

**ANTHRO 24N. Maya Hieroglyphic Writing. 4 Units.**

Preference to freshmen. Decipherment of classic Maya writing. Principles of archaeological decipherment. Maya calendrical, astronomical, historical, mythological, and political texts on stone, wood, bone, shell, murals, ceramics, and books (screenfold codices). Archaeology and ethnohistory of Maya scribal practice and literacy. Related Mesoamerican writing systems. The evolution of writing and the relevance of writing to theories of culture and civilization.

**ANTHRO 25N. Contemporary Japanese Popular Culture. 3 Units.**

This is a seminar focusing on the intersection between politics and popular culture in contemporary Japan. It will survey a range of social and political implications of practices of popular culture. Topics include representations of gender in J-pop, manga, and anime, the otaku culture and its pathologization. Students will be introduced to theories of popular culture in general, and a variety of contemporary anthropological studies on Japanese popular culture in particular as well.

**ANTHRO 26N. God and the Supernatural. 3-5 Units.**

This course explores the conditions under which people have experiences that they identify as "supernatural": experiences of something that is not physically present. We will explore the cultural and psychological dimensions of this very real phenomenon. We will not, however, make ontological judgments about whether something which is experienced as externally present is in fact externally present: in other words, this is a class about culture and psychology, not about metaphysics. We will do experimental work, using our selves and fellow classmates, as subjects, to understand who, when and how people have experiences that they deem "supernatural."

**ANTHRO 27N. Ethnicity and Violence: Anthropological Perspectives. 3-5 Units.**

Ethnicity is one of the most compelling and most modern ways in which people - in the midst of considerable global and local uncertainty - all across the world imagine and narrate themselves. This seminar will take an anthropological look at both the modernity and the compulsions of ethnic allegiance, and, why struggles over ethnic identity are so frequently violent. Our questions will be both historical ¿ how, why and when did people come to think of themselves as possessing different ethnic identities - and contemporary ¿ how are these identities lived, understood, narrated, and transformed and what is the consequence of such ethnicisation. We follow this through anthropological perspectives which ask persistently how people themselves locally narrate and act upon their experiences and histories. Through this we will approach some of the really big and yet everyday questions that many of us around the world face: how do we relate to ourselves and to those we define as others; and how do we live through and after profound violence? The seminar will take these larger questions through a global perspective focusing on cases from Rwanda and Burundi, India, Sri Lanka, Northern Ireland, Guatemala, and the countries of Former Yugoslavia among others. These cases cover a broad canvas of issues from questions of historicity, racial purity, cultural holism, and relations to the state, to contests over religious community, indigeneity, minority identities, globalization, gender, and generation.

**ANTHRO 28N. Secularism and its Critics. 3-5 Units.**

Secularism is often taken to be a necessary prerequisite for democracy in the modern world. The separation of religion and politics is often written into constitutions as a fundamental priority. Yet around the world, growing numbers of religious movements have sought to dispute the legitimacy of secularism. Social scientists, including anthropologists, are beginning to research the forms of domination and political violence that have been justified in the name of secularism. This course seeks to make sense of this global debate about secularism. It does so by taking up an anthropological perspective: much as anthropologists might study culture, religion, or kinship, we will interrogate secularism as a comparative social artifact, constituted by historically specific repertoires of signs, identities, everyday practices, and institutional powers. The course focuses on case studies in the United States, Western Europe, the Middle East, and South Asia.

**ANTHRO 30Q. The Big Shift: An Anthropological Approach to Wealth, Migration, and the New Margins of America. 4 Units.**

Is the middle class shrinking? How do people who live at the extremes of American society- the super rich, the working poor and those who live on the margins, imagine and experience "the good life"? How do we understand phenomena such as gang cultures, addiction and the realignment of white consciousness? This class uses the methods and modes of ethnographic study in an examination of American culture. Ethnographic materials range from an examination of the new American wealth boom of the last 20 years (Richistan by Robert Frank) to the extreme and deadly world of the invisible underclass of homeless addicts on the streets of San Francisco (Righteous Dopefiend by Phillippe Bourgois and Jeff Schonberg). The experiences of Hispanic immigrants and the struggle to escape gang life in Los Angeles are highlighted in the story of Homeboy Industries a job creation program initiated by a priest working in LA's most deadly neighborhoods (G-Dog and the Homeboys by Celeste Fremon). Finally in Searching for Whitoopia: an improbable journey into the heart of White America, Rich Benjamin explores the creation on ethnic enclaves (whitopias) as fear over immigration and the shrinking white majority redefine race consciousness in the 21st century. Each of these narratives provides a window into the various ways in which Americans approach the subjects of wealth and the good life, poverty and the underclass, and the construction of class, race, and gender in American society. Students will not be required to have any previous knowledge, just curiosity and an open mind.

**ANTHRO 31. Ecology, Evolution, and Human Health. 3-5 Units.**

Ecology, Evolution, and Human Health Human ecology, environments, adaptation and plasticity, and their relationship to health and well-being considered in the broad comparative context. Topics include human population history, subsistence ecology, demography, reproductive decision making, urbanization, migration, infectious disease, the physiology of stress and the inflammatory response, social capital and social networks, nutrition, nutritional deficiencies, growth, and social inequalities. No prior course work in ecological or medical anthropology required. Same as: ANTHRO 331A.

**ANTHRO 32. Theories in Race and Ethnicity: A Comparative Perspective. 5 Units.**

This undergraduate course employs an anthropological and historical perspective to introduce students to ideas and concepts of race and ethnicity that emerged primarily in Europe and the United States in the eighteenth and nineteenth centuries and that continue to shape contemporary racial attitudes, interactions, and inequalities. Ideas about race and ethnicity forged outside the U.S. and case studies from other nations are presented to broaden students' understanding and to overcome the limitations of an exclusive focus on the U.S. This course is geared to sophomores and juniors who have already taken at least one course on race and ethnicity, anthropology, African American Studies, Asian American Studies, Chicana/o Studies, Jewish Studies or Native American Studies. Same as: CSRE 32.

**ANTHRO 33. Introduction to Comparative Studies in Race and Ethnicity. 5 Units.**

How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. Same as: CSRE 196C, ENGLISH 172D, PSYCH 155, SOC 146.

**ANTHRO 55A. Introduction to Archaeobotany. 5 Units.**

The aim of this course is to provide a short introduction to archaeobotany. An overview of types of archaeobotanical remains will include an examination of macrobotanical remains (seeds, charcoal), microfossil remains (starch, pollen, phytoliths) and molecular remains (aDNA, isotopes). The ways in which various types of plant remains have been used will be discussed through case studies. Major debates that archaeobotanical research has shed light on, including the origins of agriculture and issues around domestication will also be examined. Some practical work will allow students to gain familiarity with botanical nomenclature and some archaeobotanical protocols and plant identification techniques. Students will look at microfossil residues from local grinding slabs and write a short paper on the residues recovered. They will also look at seed remains from either Chinese or local flotation samples using microscopes in the lab. Same as: ARCHLGY 55.

**ANTHRO 77. Japanese Society and Culture. 5 Units.**

Focus is on power, identity, and the politics of knowledge production. How transnational interactions influence Japanese identity. How anthropological knowledge has contributed to understanding Japanese culture and society. Gender, race and class; contemporary ethnographies. Modernity and globalization. Cultural politics, domestic work, labor management, city planning, ad images, anime, martial art, fashion, theater, leisure, and tourism. Same as: ANTHRO 277.

**ANTHRO 82. Medical Anthropology. 3-5 Units.**

Emphasis is on how health, illness, and healing are understood, experienced, and constructed in social, cultural, and historical contexts. Topics: biopower and body politics, gender and reproductive technologies, illness experiences, medical diversity and social suffering, and the interface between medicine and science. Same as: ANTHRO 282.

**ANTHRO 90A. History of Archaeological Thought. 5 Units.**

Introduction to the history of archaeology and the forms that the discipline takes today, emphasizing developments and debates over the past five decades. Historical overview of culture, historical, processual and post-processual archaeology, and topics that illustrate the differences and similarities in these theoretical approaches. Same as: ARCHLGY 103.

**ANTHRO 90B. Theory of Cultural and Social Anthropology. 5 Units.**

Preference to Anthropology majors. Anthropological interpretations of other societies contain assumptions about Western societies. How underlying assumptions and implicit categories have influenced the presentation of data in major anthropological monographs. Emphasis is on Karl Marx, Emile Durkheim, Max Weber, and anthropological analyses of non-Western societies.

**ANTHRO 90C. Theory of Ecological and Environmental Anthropology. 5 Units.**

Dynamics of culturally inherited human behavior and its relationship to social and physical environments. Topics include a history of ecological approaches in anthropology, subsistence ecology, sharing, risk management, territoriality, warfare, and resource conservation and management. Case studies from Australia, Melanesia, Africa, and S. America. Same as: HUMBIO 118.

**ANTHRO 90D. Social Theory in the Anthropological Sciences. 5 Units.**

Required of majors. Foundational course in the history of social theory in anthropology from the late 19th century to the present. Major approaches to human culture and society: symbolic, social, material, and psychological. Questions about the role of theory in anthropology and how it can be applied to human issues. (HEF IV).

**ANTHRO 91. Method and Evidence in Anthropology. 5 Units.**

This course provides a broad introduction to various ways of designing anthropological questions and associated methods for collecting evidence and supporting arguments. We review the inherent links between how a question is framed, the types of evidence that can address the question, and way that data are collected. Research activities such as interviewing, participant observation, quantitative observation, archival investigation, ecological survey, linguistic methodology, tracking extended cases, and demographic methods are reviewed. Various faculty and specialists will be brought in to discuss how they use different types of evidence and methods for supporting arguments in anthropology.

**ANTHRO 91A. Archaeological Methods. 5 Units.**

Methodological issues related to the investigation of archaeological sites and objects. Aims and techniques of archaeologists including: location and excavation of sites; dating of places and objects; analysis of artifacts and technology and the study of ancient people, plants, and animals. How these methods are employed to answer the discipline's larger research questions. Same as: ARCHLGY 102.

**ANTHRO 92A. Undergraduate Research Proposal Writing Workshop. 2-3 Units.**

Practicum. Students develop independent research projects and write research proposals. How to formulate a research question; how to integrate theory and field site; and step-by-step proposal writing.

**ANTHRO 92B. Undergraduate Research Proposal Writing Workshop. 2-3 Units.**

Practicum. Students develop independent research projects and write research proposals. How to formulate a research question; how to integrate theory and field site; and step-by-step proposal writing.

**ANTHRO 93. Prefield Research Seminar. 5 Units.**

For Anthropology majors only; non-majors register for 93B. Preparation for anthropological field research in other societies and the U.S. Data collection techniques include participant observation, interviewing, surveys, sampling procedures, life histories, ethnohistory, and the use of documentary materials. Strategies of successful entry into the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Prerequisites: two ANTHRO courses or consent of instructor.

**ANTHRO 93B. Prefield Research Seminar: Non-Majors. 5 Units.**

Preparation for anthropological field research in other societies and the U.S. Data collection techniques include participant observation, interviewing, surveys, sampling procedures, life histories, ethnohistory, and the use of documentary materials. Strategies for successful entry into the community, research ethics, interpersonal dynamics, and the reflexive aspects of fieldwork. Service Learning Course (certified by Haas Center).

**ANTHRO 94. Postfield Research Seminar. 5 Units.**

Goal is to produce an ethnographic report based on original field research gathered during summer fieldwork, emphasizing writing and revising as steps in analysis and composition. Students critique classmates' work and revise their own writing in light of others' comments. Ethical issues in fieldwork and ethnographic writing, setting research write-up concerns within broader contexts.

**ANTHRO 95. Research in Anthropology. 1-10 Units.**

Independent research conducted under faculty supervision, normally taken junior or senior year in pursuit of a senior paper or an honors project. May be repeated for credit.

**ANTHRO 95B. Directed Study in Honors and Senior Papers. 1-10 Units.**

Taken in the final quarter before graduation. Independent study and work on senior paper for students admitted to the program. Prerequisite: consent of program adviser and instructor.

**ANTHRO 96. Directed Individual Study. 1-10 Units.**

Prerequisite: consent of instructor.

**ANTHRO 97. Internship in Anthropology. 1-10 Units.**

Opportunity for students to pursue their specialization in an institutional setting such as a laboratory, clinic, research institute, or government agency. May be repeated for credit. Service Learning Course (certified by Haas Center).

**ANTHRO 98B. Digital Methods in Archaeology. 3-5 Units.**

This is a course on digital technologies in archaeology used for documentation, visualization, and analysis of archaeological spaces and objects. Emphasizes hands-on approaches to image manipulation, virtual reality, GIS, CAD, and photogrammetry modeling methods.

Same as: ANTHRO 298B.

**ANTHRO 98E. Catalhoyuk and Neolithic Archaeology. 1-3 Units.**

Catalhoyuk as a case study to understand prehistoric social life during the Neolithic in Anatolia and the Near East. Developments in agriculture, animal domestication, material technology, trade, art, religion, skull cults, architecture, and burial practices. Literature specific to Catalhoyuk and other excavations throughout the Anatolian and Levantine regions to gain a perspective on diversity and variability throughout the Neolithic. The reflexive methodology used to excavate Catalhoyuk, and responsibilities of excavators to engage with larger global audiences of interested persons and stakeholders.

**ANTHRO 98F. Field School Training Workshop. 1-3 Units.**

Provides students important preparatory orientation to anthropology as well as the methods, ethics, and logistics of the specific field school each student will be attending in the summer.

**ANTHRO 100A. India's Forgotten Empire: The Rise and Fall of Indus Civilization. 3 Units.**

How and why cities with public baths, long-distance trade, sophisticated technologies, and writing emerged, maintained themselves, and collapsed in the deserts of present-day Pakistan and India from 2500 to 1900 B.C.

**ANTHRO 100C. Chavin de Huantar Research Seminar. 2-5 Units.**

For participants in fieldwork at Chavín de Huantar. Archaeological research techniques, especially as applied at this site. Students work on data from the previous field season to produce synthetic written materials. Maybe repeated for credit.

**ANTHRO 101. The Aztecs and Their Ancestors: Introduction to Mesoamerican Archaeology. 3-5 Units.**

The prehispanic cultures of Mesoamerica through archaeology and ethnohistory, from the archaic period to the Spanish conquest in the 16th century.

**ANTHRO 101A. Archaeology as a Profession. 5 Units.**

Academic, contract, government, field, laboratory, museum, and heritage aspects of the profession.

Same as: ARCHLGY 107A.

**ANTHRO 101S. Introduction to Cultural and Social Anthropology. 3-5 Units.**

Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films.

Same as: ANTHRO 1S.

**ANTHRO 102. Urban Ethnography. 5 Units.**

Ethnographic research and writing focuses on the ways our lives are shaped by interacting forces such as history, political economy, and creative cultural practices. In the last fifty years, more and more cultural anthropology has been carried out in urban contexts, due to both urbanization around the world and changes in anthropology as a field. This seminar focuses on careful reading and analysis of book-length ethnographies about urban cultures, people and dynamics to consider what the theory and methodological tools of anthropology have to offer us as we seek to better understand the city. Readings include a variety of approaches to ethnographic research in and/or about cities, with a mix from different eras and about different cities around the world.

Same as: URBANST 140.

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Same as: URBANST 140.

**ANTHRO 102A. Ancient Civilizations: Complexity and Collapse. 3-5 Units.**

How archaeology contributes to understanding prehistoric civilizations. How and why complex social institutions arose, and the conditions and processes behind their collapse. The development of monumental architecture, craft specialization, trade and exchange, and social stratification using examples from the archaeological record. (HEF II, III; DA-B)

Same as: ANTHRO 202A.



**ANTHRO 103. The Archaeology of Modern Urbanism. 5 Units.**

Seminar. Urbanism as a defining feature of modern life. The perspective of archaeology on the history and development of urban cultures. Case studies are from around the globe; emphasis is on the San Francisco Bay Area megalopolis. Cities as cultural sites where economic, ethnic, and sexual differences are produced and transformed; spatial, material, and consumption practices; and the archaeology of communities and neighborhoods.

**ANTHRO 105. Ancient Cities in the New World. 3-5 Units.**

Preindustrial urbanism as exemplified by prehispanic New World societies. Case studies: the central and southern highlands of Mesoamerica, and the Maya region. Comparative material from highland S. America. Same as: ANTHRO 205.

**ANTHRO 108A. Latin Americans in the Diaspora: Citizenship and Belonging Across Transnational Migration Regimes. 3-5 Units.**

In this course we will explore some of the dilemmas of citizenship and belonging in the era of migration, from the point of view of Latin Americans across transnational migration regimes. While "Latin@s" may appear to be a social category specific to the U.S., Latin Americans are also migrating to the European Union, and most especially to Spain, the former colonial metropolis, where new linguistic, cultural and postcolonial issues arise. The course will review some crucial literature on diaspora and transnational studies to scrutinize how Latin Americans are shaping their cosmopolitan experience beyond the US. We will learn about the European Union migratory regime (and compare it to the US) from selected ethnographic material as well as documentary films, movies and biographic fictional narratives. Emphasis will be placed on understanding the challenges of the (de-) coupling of identity and rights in today's globalized societies through analysis of political and cultural practices of Latin Americans in the diaspora.

Same as: ANTHRO 208A.

**ANTHRO 108E. Catalhoyuk and Neolithic Archaeology. 3-5 Units.**

Catalhoyuk as a case study to understand prehistoric social life during the Neolithic in Anatolia and the Near East. Developments in agriculture, animal domestication, material technology, trade, art, religion, skull cults, architecture, and burial practices. Literature specific to Catalhoyuk and other excavations throughout the Anatolian and Levantine regions to gain a perspective on diversity and variability throughout the Neolithic. The reflexive methodology used to excavate Catalhoyuk, and responsibilities of excavators to engage with larger global audiences of interested persons and stakeholders.

**ANTHRO 109. Archaeology: World Cultural Heritage. 5 Units.**

Focus is on issues dealing with rights to land and the past on a global scale including conflicts and ethnic purges in the Middle East, the Balkans, Afghanistan, India, Australia, and the Americas. How should world cultural heritage be managed? Who defines what past and which sites and monuments should be saved and protected? Are existing international agreements adequate? How can tourism be balanced against indigenous rights and the protection of the past?

Same as: ANTHRO 209.

**ANTHRO 110A. Neandertals and Modern Humans: Origin, Evolution, Interactions. 3 Units.**

The expansion out of Africa of our species represents the last spectacular step in the course of Human Evolution. It resulted in the colonization of the whole planet and the replacement of archaic forms of humans in Eurasia. One way to investigate why Homo sapiens has been such a successful species is to compare its evolution with that of its closest relative, the Neandertals. Exploring the bio-cultural processes at work in the two lineages leads to examine some of the main issues in Paleoanthropology and the most recent methodological advances in the field.

Same as: ANTHRO 210A.

**ANTHRO 111. Archaeology of Sex, Sexuality, and Gender. 5 Units.**

How archaeologists study sex, sexuality, and gender through the material remains left behind by past cultures and communities. Theoretical and methodological issues; case studies from prehistoric and historic archaeology.

Same as: ANTHRO 211.

**ANTHRO 111A. Archaeology of the Andes of Argentina. 3-5 Units.**

The aim of this course is to provide a panorama of the archaeology of the andean region of Argentina, along some main topics of past and current researches. North andean Argentina has been considered for a long time as subordinated to the major developments in the central Andes and Puna, as if it were in a marginal position that mirrored their history. More than a hundred years of research in the area have produced different insights, which put that affirmation in relative terms. The course will give an overview of major historical contributions and contemporary trends in the archaeological thinking in relation to themes such as time, the space, people, things and nature. An overview of the conceptions and construction of time. Space seen as cultural area; natural environment and built landscape; archaeological areas as national territory. Historical conceptions of people; bodies; social inequality; the past and present others in the archaeological research. Artefacts, classifications and typologies; material archaeological contexts as cultural units; from artefacts to things; past ontologies. Nature and environment; domestication; ecological approaches; agropastoralism; nature/culture. It is expected that by the end of the course students will gain a panorama of the major problems of the archaeology of andean Argentina with historically and theoretically informed perspectives.

Same as: ANTHRO 211A.

**ANTHRO 112. Public Archaeology: Market Street Chinatown Archaeology Project. 4-5 Units.**

This internship-style course centers on the practice and theory of historical archaeology research and interpretation through a focused study of San Jose's historic Chinese communities. The course includes classroom lectures, seminar discussion, laboratory analysis of historic artifacts, and participation in public archaeology events. Course themes include immigration, urbanization, material culture, landscape, transnational identities, race and ethnicity, gender, cultural resource management, public history, and heritage politics. The course includes required lab sections, field trips, and public service. Transportation will be provided for off-site activities.

Same as: ANTHRO 212, ASNAMST 112.

**ANTHRO 112B. Advanced Study in Public Archaeology. 2-5 Units.**

This service-learning course is offered only to students who have completed Anthro 112a and wish to deepen their scholarship in public archaeology and heritage practice through continued study. Students enrolled in Anthro 112b complete readings, collections management study, public archaeology events, and community-based research oriented towards their specific interests. Prerequisite: Completion of Anthro 112a AND instructor consent.

**ANTHRO 113. Faunal Analysis: Animal Remains for the Archaeologist. 5 Units.**

The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodological issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.

Same as: ANTHRO 213, BIO 166, BIO 266.

**ANTHRO 114. Prehistoric Stone Tools: Technology and Analysis. 5 Units.**

Archaeologists rely on an understanding of stone tools to trace much of what we know about prehistoric societies. How to make, illustrate, and analyze stone tools, revealing the method and theory intrinsic to these artifacts.

Same as: ANTHRO 214.

**ANTHRO 114A. Caste, Religion, and Dalit Liberation in India. 2-4 Units.**

'Caste' points to systems of social hierarchy based on birth, long prevalent in India, associated with Hinduism but also practiced by non-Hindu groups. 'Dalit' is a modern, politically positive name for the most oppressed caste groups, the so-called 'untouchables.' Though specific to India, the study of caste touches themes relevant to social inequality everywhere. A series of lectures and films by distinguished scholars and directors, illuminating the nature and history of caste and modern movements to end untouchability. Same as: RELIGST 114.

**ANTHRO 115A. The Aegean in the Neolithic and Bronze Age. 3-5 Units.**

This course provides a survey of Aegean prehistory (7th-2nd millennium BC), focusing on traditions that were picked up or renegotiated, instead of taking a standpoint that evaluates phenomena as steps leading up to a 'state-like' palatial society. It will draw on the region's wealth of data, and will be set within a theoretically informed, problem-oriented framework, aiming to introduce students to current interpretations and debates, mainly through discussion of specific case-studies.

Same as: ANTHRO 215A, ARCHLGY 139, ARCHLGY 239.

**ANTHRO 116. Data Analysis for Quantitative Research. 5 Units.**

This course allows graduate and advanced undergraduate students in archaeology and anthropology to acquire practical skills in quantitative data analysis. Some familiarity with basic statistical methods is useful but not assumed; the structure of the course will be flexible enough to accommodate a range of student expertise and interests. Topics covered include: statistics and graphics in R; database design, resampling methods, diversity measures, contingency table analysis, and introductory methods in spatial analysis.

Same as: ANTHRO 216.

**ANTHRO 117. Acultural Animals as Proxies for Cultural Humans. 5 Units.**

The human-animal relationship is dynamic, all encompassing and durable. Without exception, all socio-cultural groups have evidenced complex interactions with the animals around them, both domesticated and wild. However, the individual circumstances of these interactions are hugely complicated, and involve much more than direct human-animal contact, going far beyond this to incorporate social, ecological and spiritual contexts. This course delves into this complexity, covering the gamut of social roles played by animals, as well as the methods and approaches to studying these, both traditional and scientific. While the notion of 'animals as social actors' is well acknowledged, their use as proxies for human autecology (the relationship between a species and its environment) is also increasingly recognised as a viable mechanism for understanding our cultural and economic past. The module presents an overview covering a broad timespan from the Pleistocene to the modern day. It will piece together the breadth of human-animal relationships using a wide geographic range of case studies.

Same as: ANTHRO 217.

**ANTHRO 118. Heritage, Environment, and Sovereignty in Hawaii. 4 Units.**

This course explores the cultural, political economic, and environmental status of contemporary Hawaiians. What sorts of sustainable economic and environmental systems did Hawaiians use in prehistory? How was colonization of the Hawaiian Islands informed and shaped by American economic interests and the nascent imperialism of the early 20th century? How was sovereignty and Native Hawaiian identity been shaped by these forces? How has tourism and the leisure industry affected the natural environment? This course uses archaeological methods, ethnohistorical sources, and historical analysis in an exploration of contemporary Hawaiian social economic and political life.

Same as: EARTHSYS 118.

**ANTHRO 119. Zooarchaeology: An Introduction to Faunal Remains. 5 Units.**

As regularly noted, whether historic or pre-historic, animal bones are often the most commonly occurring artefacts on archaeological sites. As bioarchaeological samples, they offer the archaeologist an insight into food culture, provisioning, trade and the social aspects of human-animal interactions. The course will be taught through both practical and lecture sessions: the 'hands-on' component is an essential complement to the lectures. The lectures will offer grounding in the main methodological approaches developed, as well as provide case-studies to illustrate where and how the methods have been applied. The practical session will walk students through the skeletal anatomy of a range of species. It will guide students on the identification of different parts of the animal, how to age / sex individuals, as well as recognise taphonomic indicators and what these mean to reconstructing post-depositional modifications.

**ANTHRO 119A. Spirits, Selves, and the Social: Histories of Thinking about Religion. 5 Units.**

This course explores how anthropological approaches to religion have changed over the discipline's history. What key questions and assumptions motivate various approaches to the study of religion? How do anthropologists attempt to understand and represent religious experiences? How does the practice of various religions ranging from Sufi Islam to Haitian Vodou work together produce the self's relationship to society? Starting with E.B. Tylor's 19th-century designation of 'religion' as a category, the first half of the course will explore how the study of religion reflects broader theoretical trends in the discipline such as symbolism and structural-functionalism. Talal Asad's late-20th-century critique of religion as a universal category serves as a pivotal point in the anthropological study of religion. The second half of the course will explore how anthropologists respond to Asad's critique, turning their attention from immaterial belief to material histories and practices.

**ANTHRO 121. Language and Prehistory. 3-5 Units.**

Language classification and its implications for human prehistory. The role of linguistic data in analyzing prehistoric populations, cultures, contact, and migrations. Comparison of linguistic and biological classifications. Reconstruction, proto-vocabularies, and culture. Archaeological decipherment and the origins and evolution of writing. Archaeological and genetic evidence for human migrations. (DA-A; HEF II,III)

Same as: ANTHRO 221.

**ANTHRO 121A. Hip Hop, Youth Identities, and the Politics of Language. 3-4 Units.**

Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

Same as: AFRICAAM 121X, AMSTUD 121X, CSRE 121X, EDUC 121X, LINGUIST 155.

**ANTHRO 123. Readings in Linguistic Anthropology. 2 Units.**

One or two major related works on language in its cultural context. Works for 2007-08 involve attempts to correlate linguistic and non-linguistic data for analysis of prehistoric human contact and migrations. May be repeated for credit.

Same as: ANTHRO 223.

**ANTHRO 124. Maya Mythology and the Popol Vuh. 3-5 Units.**

The mythology and folklore of the ancient Maya, emphasizing the relationship between the 16th-century Quiché Maya mythological epic *Popol Vuh* (Book of the Council) and classic lowland Maya art, architecture, religion, and politics. General Mesoamerican mythology. Anthropological and other theories of mythology. Class participates in the creation of a web project on the *Popol Vuh*.

**ANTHRO 125. Language and the Environment. 3-4 Units.**

Lecture course on vocabulary and grammar as keys to peoples' understanding and use of the environment. Ethnobotany, ethnobiology, and ethnosemantics in the analysis of the language of place, plants and animals, the earth, the body, and disease. Terminological gaps and gluts and what they imply. Language as a strategic resource in environmental management. Language contact and conflict in the modern global environment, with particular attention to the vocabularies of capitalism and property. Language extinction and its environmental implications. Anthropology concentration: CS, EE. No prerequisites. Same as: ANTHRO 225.

**ANTHRO 126. Urban Culture in Global Perspective. 5 Units.**

Core course for Urban Studies majors. We will study urban space both historically and cross-culturally. Urban Studies, by definition, is an interdisciplinary field, where the methodological approaches draw upon a diverse set of analytic tools. Disciplines that occupy a prominent place in this class are geography, cultural anthropology, sociology, history, media studies, and literature. In this context, we will discuss the importance of cities around the world to the economic, cultural, and political well-being of modern societies and examine how forces such as industrialization, decentralization, and globalization affect the structure and function of cities. Same as: URBANST 114.

**ANTHRO 127. City and Sounds. 5 Units.**

How do people experience modern cities and urban public cultures through auditory channels? How does sound mediate and constitute urban space? How to listen to and write about culture through sound. Students carry out narrative interviews and sound fieldwork in the Bay Area. Readings include urban anthropology, semiotics, art history, social studies of science and technology, media studies, and musicology.

**ANTHRO 127A. Cities and the Future: Utopias, Dystopias, and Other Urbanisms to Come. 3 Units.**

What sort of futures are being imagined for the cities of the twenty-first century? An interdisciplinary seminar, this course will critically analyze how the future of cities, and the cities of the future, are being thought about and acted upon in the present. It is designed for graduate students and advanced undergraduates with experience in the social sciences and humanities and who also have a keen interest in urban studies. Its primary objective is to develop sophisticated ways of thinking about the future of cities, since doing so has real significance for the kind of city we want to, and eventually will, ourselves inhabit.

**ANTHRO 128. Visual Studies. 5 Units.**

Drawing on anthropology, art history, cultural studies, and other fields, this course explores how and why one might want to think critically about the politics of visibility, social imagination, the politics of making and consuming images and things, iconophilia and iconophobia, the classification of people and things into *artists* and *art*, and cultural production more generally.

**ANTHRO 130A. Interpreting Space and Place: An Introduction to Mapmaking. 5 Units.**

How mapmaking, geographical information systems (GIS), and spatial tools can be applied in social research. Qualitative and quantitative approaches in the use of geospatial information. Methodologies and case examples.

**ANTHRO 130B. Introduction to GIS in Anthropology. 5 Units.**

How GIS and spatial tools can be applied in social research. Case studies and student projects address questions of social and cultural relevance using real data sets, including the collection of geospatial data and building of spatial evidence. Analytical approaches and how they can shape a social and cultural interpretation of space and place. Same as: ANTHRO 230B.

**ANTHRO 132. Religion and Politics in the Muslim World. 5 Units.**

This course provides an ethnographic examination of religion and politics in the Muslim world. What is the role of Islam in the political life of modern Muslim societies? Conversely, how do modern political powers shape and constrain the terms of religious life? This course takes an anthropological perspective on the study of Islam: our investigations will not focus on the origins of scriptures and doctrines but rather on the use of religious texts and signs in social context and on the political significance of ritual and bodily practices. A major aim of the course is provide students with analytical resources for thinking critically about the history and politics of modern Muslim societies, with a particular focus on issues of religious authority, gender and sexuality, and the politics of secularism.

**ANTHRO 134. Object Lessons. 5 Units.**

Human-object relations in the processes of world making. Objectification and materiality through ethnography, archaeology, material culture studies, and cultural studies. Interpretive connotations around and beyond the object, the unstable terrain of interrelationships between sociality and materiality, and the cultural constitution of objects. Sources include: works by Marx, Hegel, and Mauss; classic Pacific ethnographies of exchange, circulation, alienability, and fetishism; and material culture studies. Same as: ANTHRO 234.

**ANTHRO 135. Cultural Studies. 5 Units.**

Identity, community, and culture; their interactions and formation. Same as: ANTHRO 235.

**ANTHRO 135A. The Anthropology of Security. 3-5 Units.**

This seminar begins by outlining the main theoretical and empirical challenges in the areas of surveillance studies and security studies. The seminar provides a space wherein students will be able to discuss these inter-disciplinary areas and develop their own Anthropology-informed perspectives. The seminar then discusses the work of Anthropologists who through their ethnographic and theoretical work have helped developed and important and emergent area: *The Anthropology of Security*. Areas covered include, inter alia, national security, security and war, biometrics, gated-ness, and environmental and bio-security threats. Same as: ANTHRO 235A.

**ANTHRO 135H. Conversations in CSRE: Case Studies in the Stanford Community. 1-2 Units.**

Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists. Same as: CSRE 135H.

**ANTHRO 135I. CSRE House Seminar: Race and Ethnicity at Stanford. 1-2 Units.**

Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists. Same as: CSRE 135I.

**ANTHRO 136. The Anthropology of Global Supply Chains. 5 Units.**

This upper-division undergraduate seminar focuses on recent studies by anthropologists and scholars in related disciplines on global supply chains and consumption practices. The goal of the course is to assess concepts and methods for integrating a cultural analysis of transnational production with a cultural analysis of transnational consumption. We will review ethnographic studies of the production and consumption of commodities linked by transnational and global networks. The class will then pursue collaborative research on the global production, distribution, and consumption of a selected commodity. Prerequisite: junior or senior standing and previous coursework in cultural anthropology or permission of instructor. Same as: ANTHRO 236.

**ANTHRO 137. The Politics of Humanitarianism. 5 Units.**

What does it mean to want to help, to organize humanitarian aid, in times of crisis? At first glance, the impulse to help issue generis a good one. Helping is surely preferable to indifference and inaction. This does not mean that humanitarian interventions entail no ethical or political stakes, or that they are beyond engaged critique. We need to critique precisely that which we value, and to ask some hard questions, among them these: What are the differences among humanitarianism, charity, and philanthropy? What of social obligations and solidarities? How does the neoliberal world order currently create structural inequalities that ensure the reproduction of poverty and violence? How does the current order of things resemble or differ from the colonial world order? This course examines the history of humanitarian sensibilities and the emergence of organized action in the cause of humanity. In the early years of humanitarian intervention, political neutrality was a key principle; it has now come under ever greater analytical and political scrutiny. We will examine the reasons for the politicization and militarization of aid -- be it humanitarian aid in natural disasters or political crises; development programs in the impoverished south (the Third World), or peace-keeping. We will end with a critical exploration of the concept of human rights, humanity, and personhood. The overall methodological aim of the course is to demonstrate what insights an ethnographic approach to the politics, ethics, and aesthetics of humanitarianism can offer.

Same as: ANTHRO 237.

**ANTHRO 140A. Ethnographic Archaeologies. 4-5 Units.**

How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

Same as: ANTHRO 240A, ARCHLGY 137.

**ANTHRO 144A. Practice of Everyday Life in Kazakhstan: From Nomadism to Modernity. 3-5 Units.**

An interdisciplinary introduction to the historically nomadic land of Kazakhstan, its peoples and their lifestyles, the practice of everyday life. Ranked as the ninth largest country in the world, Kazakhstan is also the world's largest landlocked country; its territory is greater than Western Europe: it stretches from the fringes of Europe to the borders of Mongolia and China. The seminar surveys language and society, traditional economics and customary law, rituals and folk customs, local dwelling, craft and art, the cultural panorama, the historical relationship between sedentary and nomadic peoples as well as new approaches to the study of nomads in modernity. Speaking of the present time, we will follow the changing nomads in a changing world. The instructor is going to base, to the extent possible, on the extremely rich fieldwork data recently discovered in Kazakhstan -- the data is yet little known in the West. The seminar will make extensive use of audio-visual materials and films.

Same as: REES 244A.

**ANTHRO 146. STS Senior Capstone. 5 Units.**

Car Culture. Since at least the 50s, the U.S. has been notorious as a nation in love with the car. An examination of this premise, analyzing new methods of production brought by automobile manufacture, how automobiles shaped urban growth, debates about pollution and environmental degradation, and debates around auto safety. How the car has influenced American practices including courting, eating out, and suburban living.

Same as: STS 200B.

**ANTHRO 146A. Anthropology of Youth. 5 Units.**

This course will be a survey of classical texts and contemporary research on youth and generations. We will explore the historical and cultural construction of 'youth' and youth practices across regions over time. We will pay special attention to the organization of contemporary capitalism, its effect in producing marginality and exclusion, and issues underlying youth political movements.

**ANTHRO 147. Nature, Culture, Heritage. 5 Units.**

Seminar. Shared histories of natural and cultural heritage and their subsequent trajectories into the present. How thought about archaeological sites and natural landscapes have undergone transformations due to factors including indigenous rights, green politics, and international tourism. The development of key ideas including conservation, wilderness, sustainability, indigenous knowledge, non-renewability and diversity. Case studies draw on cultural and natural sites from Africa, the Americas and Australia.

Same as: ANTHRO 247.

**ANTHRO 147A. Folklore, Mythology, and Islam in Central Asia. 3-5 Units.**

Central Asian cults, myths, and beliefs from ancient time to modernity. Life crisis rites, magic ceremonies, songs, tales, narratives, taboos associated with childbirth, marriage, folk medicine, and calendrical transitions. The nature and the place of the shaman in the region. Sources include music from the fieldwork of the instructor and the Kyrgyz epoch *Manas*. The cultural universe of Central Asian peoples as a symbol of their modern outlook.

Same as: REES 247A.

**ANTHRO 149. South Asia: History, People, Politics. 5 Units.**

The South Asian subcontinent (comprising of India, Pakistan, Bangladesh, Nepal, Bhutan and Sri Lanka) is one of the most diverse and densely populated regions in the world and increasingly prominent in new global political and cultural economies. South Asia has also provided the inspiration for cutting edge theories about the colonial state, postcolonial studies, democracy, popular culture, and religious conflict. The course will provide an overview of major historical events and social trends in contemporary South Asia and focus on themes such as gender, religion, caste, migration and movement, new technologies, the urban and rural, the state, and new forms of consumption among others. Thus, the course will give students historically and theoretically informed perspectives on contemporary South Asia, as well as how to apply insights learned to larger debates within the political and social sciences.

Same as: ANTHRO 249.

**ANTHRO 151. Women, Fertility, and Work. 5 Units.**

How do choices relating to bearing, nursing, and raising children influence women's participation in the labor force? Cultural, demographic, and evolutionary explanations, using crosscultural case studies. Emphasis is on understanding fertility and work in light of the options available to women at particular times and places.

Same as: ANTHRO 251, HUMBIO 148W.

**ANTHRO 152A. Urban Poverty and Inequality in Contemporary China. 5 Units.**

Experiences of poverty and inequality and their relationship to gender, space development, post-socialism, and globalization. How processes of class-making in China's cities are bound up with transformations in the country's sociopolitical landscape.

**ANTHRO 153A. Population and social trends in Japan. 3-5 Units.**

Anthropological theories and concepts as applied to Japan. Postwar demographic trends. Delayed marriage. Declining nuclear family. Restructuring of education and workplace. Problems for the seniors. Foreign laborers shaking fundamentals of Japan.

Same as: ANTHRO 253A.

**ANTHRO 155. Research Methods in Ecological Anthropology. 3-5 Units.**

The course prepares students for the methodological and practical aspects of doing ecologically oriented, quantitative anthropological field research. The primary goal is to explore what it means to ask anthropological questions in a systematic way. We will focus on understanding what can constitute an interesting question, how to frame a question in a way that facilitates investigation, and how to design methods to begin investigating a question. In turn, the course will provide a format to refine research projects in preparation for doing more extensive fieldwork.  
Same as: ANTHRO 255.

**ANTHRO 161. Human Behavioral Ecology. 3-5 Units.**

Theory, method, and application in anthropology. How theory in behavioral ecology developed to understand animal behavior is applied to questions about human economic decision making in ecological and evolutionary contexts. Topics include decisions about foraging and subsistence, competition and cooperation, mating, and reproduction and parenting.  
Same as: ANTHRO 261, HUMBIO 117H.

**ANTHRO 161A. Human Ecology: Adaptations to Climate and Climate Change. 5 Units.**

Humans face essentially the same adaptive challenges as all organisms but are unique for having successfully adapted to virtually every environment on Earth. The resulting diversity of phenotypes and cultures is key to understanding how interactions with environments shape the economic, social, and cultural lives of hunter-gatherers, pastoralists and agriculturalists. This course surveys the range of human adaptations from an ecological and evolutionary perspective to understand human adaptive capacity and vulnerability to climate change.  
Same as: ANTHRO 261A.

**ANTHRO 162. Indigenous Peoples and Environmental Problems. 3-5 Units.**

The social and cultural consequences of contemporary environmental problems. The impact of market economies, development efforts, and conservation projects on indigenous peoples, emphasizing Latin America. The role of indigenous grass roots organizations in combating environmental destruction and degradation of homeland areas.  
Same as: ANTHRO 262.

**ANTHRO 163. Conservation and Evolutionary Ecology. 5 Units.**

Environmental degradation resulting from human behavior, and what can be done about it. Patterns of interaction between people and environments, and why they vary over time and space. Topics include adaptation and behavior, resource acquisition and utilization, conflicts of interest, collective action problems, conspicuous consumption, waste, land management, and public policy.  
Same as: ANTHRO 263.

**ANTHRO 164A. Anthropology of Ecotourism. 5 Units.**

Ecotourism has been touted as a win-win scenario for both biodiversity conservation and the well-being of local residents. In practice, these lofty ideals of ecotourism have proven difficult to implement. The rapid development of ecotourism over the last two decades. Focus is on the scholarly literature relating to ecotourism from both supporting and critical perspectives.

**ANTHRO 164B. Anthropology of Tourism. 5 Units.**

As the largest scale movement of goods, services, and people that humanity has ever seen, tourism is an immense phenomenon and is currently the world's most immense industry, reaching some of the most remote people and places on the planet. Yet scholars have only begun to focus on the topic in recent decades. This seminar-style course will focus on the key anthropological and social science literature relating to tourism from both supporting and critical perspectives; however, tourism is an inherently multi-disciplinary subject and students from all disciplines are encouraged to enroll. After providing an initial overview of this phenomenon and field of study, later sections of the course will focus on emerging sub-types of tourism including sustainable tourism, ecotourism, agritourism, and geotourism to name just a few.

**ANTHRO 165. Parks and Peoples: The Benefits and Costs of Protected Area Conservation. 5 Units.**

Seminar. Emphasis is on the social impact of parks and reserves. Integrated conservation and development projects (ICDPs) based on protected areas; alternative ways to derive local social benefits from them. Cases include Yellowstone, Manu, Galápagos, Ngorongoro, and Guanacaste.

**ANTHRO 165A. People and Parks: Management of Protected Areas. 5 Units.**

As resources become scarcer, parks increasingly serve as ideological battlegrounds for contested core human values and often put livelihoods at stake. Their historical development and the complex array of present-day issues associated with the formal protection of biodiversity. The ideas behind parks and the evolution of these ideas.

**ANTHRO 168. Everest: Extreme Anthropology. 3 Units.**

Using Mt. Everest as a touch point, this class will examine the anthropology of nature, specifically focusing on exploration and adventure travel.

**ANTHRO 168A. Risky Environments: The Nature of Disaster. 5 Units.**

This seminar explores topics including environmental movements and countercultures, human agency and geoengineering ecotourism, and indigenous perspectives of changing climates to query how humans view nature in terms of stability, instability, risk and disaster in the 21st century. Case studies draw upon a broad range of geographical regions including the Arctic, Iceland, Australia, and the Americas. Discussions will draw upon film portrayals and interviews with researchers in addition to readings.  
Same as: ANTHRO 268A.

**ANTHRO 169. The Ecology of Cuisine: Food, Nutrition, and the Evolution of the Human Diet. 3-5 Units.**

This course is an interdisciplinary approach to understanding human food consumption and nutrition, incorporating biological, evolutionary, ecological and social perspectives. Topics include a broad survey of primate diets and their physiological and behavioral correlates; fossil and archaeological evidence for early human diets; adaptations to dietary shifts since the Neolithic; infant and early child feeding practices and their role in shaping human social arrangements, metabolic syndrome, food security, food taboos; the origins of spices; cultural diversity in the social uses and meanings of food and the sharing of food; gathering, hunting and locavorism as high hipster cuisine. Emphasis is on understanding the diversity of human foodways through time and space: how biology, culture, and ecology interact to shape the food we eat, and how the food we eat shapes us.  
Same as: ANTHRO 269.

**ANTHRO 172. Seminar on Cultural Evolution and Coevolution. 3-5 Units.**

Upper division/graduate seminar on recent approaches to the study of cultural evolution and coevolution. Critical evaluation of Darwinian and non-Darwinian theories, with special attention to the interplay of culture, genes, environment and society. Students will undertake projects of their own design to review, test, or improve current theoretical formulations. Prerequisite: a university-level course in evolution, ecology, or human behavioral biology.

Same as: ANTHRO 272.

**ANTHRO 173. Human Dimensions of Global Environmental Change: Resilience, Vulnerability, and Environmental Justice. 3 Units.**

The complexity of social and political issues surrounding global environmental change. Emphasis is on synergies precipitated by human-induced climatic change. Case studies and scenarios to explore the vulnerability and resilience in households, communities, regions, and nation-states most affected by extreme weather conditions. Their concerns, livelihood changes, and diverse responses of rural smallholders, indigenous communities, the state, and local and regional migrants. Central theme is environmental justice.

Same as: HUMBIO 111.

**ANTHRO 174. Beginnings of Social Complexity. 5 Units.**

Models and examples of the social evolution of stratification and political centralization in prehistoric human societies. Inferences from the archaeological record concerning the forces and mechanisms behind the rise and fall of complex societies, particularly in S. America. (HEF II; DA-B)

Same as: ANTHRO 274.

**ANTHRO 175. Human Skeletal Anatomy. 5 Units.**

Study of the human skeleton (a. k. a. human osteology), as it bears on other disciplines, including medicine, forensics, archaeology, and paleoanthropology (human evolution). Basic bone biology, anatomy, and development, emphasizing hands-on examination and identification of human skeletal parts, their implications for determining an individual's age, sex, geographic origin, and health status, and for the evolutionary history of our species. Three hours of lecture and at least three hours of supervised and independent study in the lab each week.

Same as: ANTHRO 275, BIO 174, BIO 274, HUMBIO 180.

**ANTHRO 176. Cultures, Minds, and Medicine. 1 Unitss.**

This workshop aims to bring together scholars from the social sciences, humanities, medicine and bio-science and technology to explore the ways that health and illness are made through complex social forces. We aim for informal, interactive sessions, full of debate and good will. We will meet every other week on Wednesday evening 5:30-7, starting on January 11, for dinner and conversation.

Same as: ANTHRO 276.

**ANTHRO 178A. Culture, Narrative, and Medicine. 5 Units.**

This course examines the ways in which medicine is practiced in diverse cultural contexts with narrative skills of recognizing, interpreting and being moved by the stories of illness. It is an examination of the human experience of illness and healing through narratives as presented in literature, film, and storytelling. We explore how cultural resources enable and empower healing and how narrative medicine can guide the practice of culturally competent medical care.

Same as: HUMBIO 177C.

**ANTHRO 179. Cultures of Disease: Cancer. 5 Units.**

History, politics, science, and anthropology of cancer; political and economic issues of disease and health care in the U.S., including the ethics and economics of health care provision, the pharmaceutical industry, carcinogen production, and research priorities.

**ANTHRO 179A. Health, Illness, and Healing in South Asia. 5 Units.**

This course has three related goals pertinent to medicine and healing in South Asia. The first is to understand the experiences of illness, and therapy in ordinary South Asian communities. How do social and economic inequality, religious commitments, available healing traditions, and community and family contexts shape the experience of illness and healing? The second goal is to think about South Asian medical systems using a broad historical perspective. How had biomedicine been used during the colonial period to manage the health of native populations? What is the legacy of this colonial history on current practices? What happens when South Asian medical traditions (such as Ayurveda) become global? Third, we will explore crucial health problems in South Asia from the perspective of medical anthropology. Possible topics for the third portion of the course include: child birth and maternal health, sex-selection technologies, malnutrition, metabolic diseases, the selling of organs, medical tourism, tuberculosis, HIV, suicide, and schizophrenia.

Same as: ANTHRO 279A.

**ANTHRO 180. Science, Technology, and Gender. 3-5 Units.**

Why is engineering often seen as a masculine profession? What have women's experiences been in entering fields of science and technology? How has gender been defined by scientists? Issues: the struggles of women in science to negotiate misogyny and cultural expectation (marriage, children), reproductive issues (surrogate motherhood, visual representations of the fetus, fetal surgery, breast feeding, childbirth practices), how the household became a site of consumerism and technology, and the cultural issues at stake as women join the ranks of scientists.

**ANTHRO 181A. Gender in the Middle East: Iran, Turkey, and Egypt. 3-5 Units.**

This course explores the construction of gender in the Middle East. Drawing on the historical, sociological and anthropological research in the region, the course aims to question the stereotypes about the subordination of Muslim women and to offer students a systematic reading and analytical discussion of the political, economic and cultural structures that inform gender relations and practices in the region. The course starts with an examination of early Islam and religious sources with regard to women's status, then moves on to nationalist and modernization movements in the 19th and 20th centuries, and finally explores women's and men's lives in contemporary Egypt, Turkey and Iran. In this framework, we will pay special attention to Islamist mobilizations, family and sexual relations, as well as women's changing livelihoods and labor.

**ANTHRO 182. An Anthropology of Annihilation: Tobacco at the Turn of the Millennium. 3-5 Units.**

The cigarette as the world's greatest weapon of mass destruction: 100 million dead worldwide from cigarettes during the 20th century, one billion expected to die in the 21st century. How to understand this toll, its production, management, politicization, and depoliticization? What can anthropological and allied perspectives disclose? How does the catastrophe challenge key precepts within anthropology and other branches of the academy?.

**ANTHRO 182A. Down and Out: Marginal Lives and Institutional Technologies. 5 Units.**

This course examines the neglect and management of socially marginalized persons including the mentally ill, youth runaways, child wards of the state, drug addicts and prisoners. In this course, we will approach the concept of marginality by investigating the spaces and institutions of decay, neglect and rehabilitation to which unwanted and indigent individuals are relegated. Readings are focused on qualitative research conducted within institutions of health, welfare, and reform. There will be two comparative public mental health sections in this course: one focused on South Asia and the second on Africa. This course is relevant for students interested in medical anthropology, applied anthropology, public health policy, or clinical careers in medicine, psychology, or social work.

Same as: ANTHRO 282A.

**ANTHRO 184. Spirituality and Healing. 3-5 Units.**

This course considers the puzzle of symbolic healing. How have societies without the resources of modern medicine approached healing? Why do these rituals have common features around the world? We explore shamanism, spirit possession, prayer, and the role of placebos in modern biomedicine. Students will do ethnographic work and practical explorations along with more traditional scholarly approaches to learning.  
Same as: HUMBIO 179S.

**ANTHRO 185A. Race and Biomedicine. 3-5 Units.**

Race, identity, culture, biology, and political power in biomedicine. Biological theories of racial ordering, sexuality and the medicalization of group difference. Sources include ethnography, film, and biomedical literature. Topics include colonial history and medicine, the politics of racial categorization in biomedical research, the protection of human subjects and research ethics, immigration health and citizenship, race-based models in health disparities research and policy, and recent developments in human genetic variation research.  
Same as: ASNAMST 185A.

**ANTHRO 192. Capstone Course: Careers in Anthropology. 3 Units.**

This course offers senior Anthropology majors the opportunity to explore various professional and career options open to trained anthropologists, while offering individualized support for postgraduate planning. Enrollment limited to Anthropology majors and minors, required of majors in EE, CS and MED tracks.

**ANTHRO 199. Senior and Master's Paper Writing Workshop. 1-2 Units.**

Techniques of interpreting data, organizing bibliographic materials, writing, editing and revising. Preparation of papers for conferences and publications in anthropology. Seniors register for 199; master's students register for 299.  
Same as: ANTHRO 299.

**ANTHRO 200C. STS Senior Capstone. 5 Units.**

Genetics, Ethics and Society. This course will explore three socially transforming components of genetics research that hold simultaneously liberating and constraining possibilities for populations and publics, both locally and globally. Typically the course will be divided into three sections. First, we will examine past and present issues dealing with the study of human subjects, as well as recent proposals to eventually bring full genome scans to every individual (personal genomics). Next we will learn of large-scale projects that aim to map the presence of environmental pathogens by their genetic signatures on a planetary scale and how different global populations may be affected. The last section of the course will focus on still other projects and policies that aim to expand the scope and capacity of state and international law enforcement through DNA-based forensics (the FBI CODIS database and the UK's Human Provenance Pilot Project). Projects like the latter also overlap with theories about community, families, and citizens who may or may not be linked through DNA. New concepts, such as the forensic "genetic informant" within a family unit, human DNA and isotope  $\zeta$ country matches $\zeta$  in cases of state asylum, and DNA based kinship rules for family reunification in many Western countries, will be explored. In all three sections we will also examine scientific ethics when subject populations are minorities, or somehow structurally disadvantaged globally. This capstone course will provide students with tools to explore and critically assess the various technical, social, and ethical positions of researchers, as well as the role of the state and certain publics in shaping scientific research agendas that promise to reorganize critical aspects of human life. Students will be encouraged to explore these dynamics within such important societal domains as health, law, markets of bio-surveillance, and the growing industry of disease and heritage DNA identity testing among others. We will read works from social scientists of science practice, ethicists, medial humanists and scientists. This course will equip students with tools to write about the intersection of science and society and to engage in a research project that relates to the topical foci of the course, broadly conceived.  
Same as: STS 200C.

**ANTHRO 201. Introduction to Cultural and Social Anthropology. 5 Units.**

Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films.  
Same as: ANTHRO 1.

**ANTHRO 202A. Ancient Civilizations: Complexity and Collapse. 3-5 Units.**

How archaeology contributes to understanding prehistoric civilizations. How and why complex social institutions arose, and the conditions and processes behind their collapse. The development of monumental architecture, craft specialization, trade and exchange, and social stratification using examples from the archaeological record. (HEF II, III; DA-B)  
Same as: ANTHRO 102A.

**ANTHRO 205. Ancient Cities in the New World. 3-5 Units.**

Preindustrial urbanism as exemplified by prehispanic New World societies. Case studies: the central and southern highlands of Mesoamerica, and the Maya region. Comparative material from highland S. America.  
Same as: ANTHRO 105.

**ANTHRO 206. Human Origins. 5 Units.**

The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them.  
Same as: ANTHRO 6, HUMBIO 6.

**ANTHRO 208A. Latin Americans in the Diaspora: Citizenship and Belonging Across Transnational Migration Regimes. 3-5 Units.**

In this course we will explore some of the dilemmas of citizenship and belonging in the  $\zeta$ era of migration $\zeta$ , from the point of view of Latin Americans across transnational migration regimes. While "Latin@s" may appear to be a social category specific to the U.S., Latin Americans are also migrating to the European Union, and most especially to Spain, the former colonial metropolis, where new linguistic, cultural and postcolonial issues arise. The course will review some crucial literature on diaspora and transnational studies to scrutinize how Latin Americans are shaping their cosmopolitan experience beyond the US. We will learn about the European Union migratory regime (and compare it to the US) from selected ethnographic material as well as documentary films, movies and biographic fictional narratives. Emphasis will be placed on understanding the challenges of the (de-) coupling of identity and rights in today's globalized societies through analysis of political and cultural practices of Latin Americans in the diaspora.  
Same as: ANTHRO 108A.

**ANTHRO 209. Archaeology: World Cultural Heritage. 5 Units.**

Focus is on issues dealing with rights to land and the past on a global scale including conflicts and ethnic purges in the Middle East, the Balkans, Afghanistan, India, Australia, and the Americas. How should world cultural heritage be managed? Who defines what past and which sites and monuments should be saved and protected? Are existing international agreements adequate? How can tourism be balanced against indigenous rights and the protection of the past?  
Same as: ANTHRO 109.

**ANTHRO 210. Examining Ethnographies. 5 Units.**

Eight or nine important ethnographies, including their construction, their impact, and their faults and virtues.

**ANTHRO 210A. Neandertals and Modern Humans: Origin, Evolution, Interactions. 3 Units.**

The expansion out of Africa of our species represents the last spectacular step in the course of Human Evolution. It resulted in the colonization of the whole planet and the replacement of archaic forms of humans in Eurasia. One way to investigate why *Homo sapiens* has been such a successful species is to compare its evolution with that of its closest relative, the Neandertals. Exploring the bio-cultural processes at work in the two lineages leads to examine some of the main issues in Paleoanthropology and the most recent methodological advances in the field.

Same as: ANTHRO 110A.

**ANTHRO 210B. Critical Theory and The Environment. 3-5 Units.**

Critical theoretical approaches (such as cultural studies, Marxism, postcolonial theory, cultural geography, feminism, and science studies) have generally been underutilized as methodologies for grappling with environmental situations, yet they hold much promise for addressing their complexity. This course asks: How does critical theory about the environment construe the current situation? What kinds of political or technological solutions do these theories call for or imply? The first half of the seminar introduces critical approaches and methodologies in relation to the environment. In the second section, we will use a variety of theoretical approaches to address environmental justice, water, agriculture, toxics, and animals.

Same as: AMSTUD 210, MTL 210.

**ANTHRO 211. Archaeology of Sex, Sexuality, and Gender. 5 Units.**

How archaeologists study sex, sexuality, and gender through the material remains left behind by past cultures and communities. Theoretical and methodological issues; case studies from prehistoric and historic archaeology.

Same as: ANTHRO 111.

**ANTHRO 211A. Archaeology of the Andes of Argentina. 3-5 Units.**

The aim of this course is to provide a panorama of the archaeology of the andean region of Argentina, along some main topics of past and current researches. North andean Argentina has been considered for a long time as subordinated to the major developments in the central Andes and Puna, as if it were in a marginal position that mirrored their history. More than a hundred years of research in the area have produced different insights, which put that affirmation in relative terms. The course will give an overview of major historical contributions and contemporary trends in the archaeological thinking in relation to themes such as time, the space, people, things and nature. An overview of the conceptions and construction of time. Space seen as cultural area; natural environment and built landscape; archaeological areas as national territory. Historical conceptions of people; bodies; social inequality; the past and present others in the archaeological research. Artefacts, classifications and typologies; material archaeological contexts as cultural units; from artefacts to things; past ontologies. Nature and environment; domestication; ecological approaches; agropastoralism; nature/culture. It is expected that by the end of the course students will gain a panorama of the major problems of the archaeology of andean Argentina with historically and theoretically informed perspectives.

Same as: ANTHRO 111A.

**ANTHRO 212. Public Archaeology: Market Street Chinatown Archaeology Project. 4-5 Units.**

This internship-style course centers on the practice and theory of historical archaeology research and interpretation through a focused study of San Jose's historic Chinese communities. The course includes classroom lectures, seminar discussion, laboratory analysis of historic artifacts, and participation in public archaeology events. Course themes include immigration, urbanization, material culture, landscape, transnational identities, race and ethnicity, gender, cultural resource management, public history, and heritage politics. The course includes required lab sections, field trips, and public service. Transportation will be provided for off-site activities.

Same as: ANTHRO 112, ASNAMST 112.

**ANTHRO 213. Faunal Analysis: Animal Remains for the Archaeologist. 5 Units.**

The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodological issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.

Same as: ANTHRO 113, BIO 166, BIO 266.

**ANTHRO 214. Prehistoric Stone Tools: Technology and Analysis. 5 Units.**

Archaeologists rely on an understanding of stone tools to trace much of what we know about prehistoric societies. How to make, illustrate, and analyze stone tools, revealing the method and theory intrinsic to these artifacts.

Same as: ANTHRO 114.

**ANTHRO 215A. The Aegean in the Neolithic and Bronze Age. 3-5 Units.**

This course provides a survey of Aegean prehistory (7th-2nd millennium BC), focusing on traditions that were picked up or renegotiated, instead of taking a standpoint that evaluates phenomena as steps leading up to a `state-like` palatial society. It will draw on the region's wealth of data, and will be set within a theoretically informed, problem-oriented framework, aiming to introduce students to current interpretations and debates, mainly through discussion of specific case-studies.

Same as: ANTHRO 115A, ARCHLGY 139, ARCHLGY 239.

**ANTHRO 216. Data Analysis for Quantitative Research. 5 Units.**

This course allows graduate and advanced undergraduate students in archaeology and anthropology to acquire practical skills in quantitative data analysis. Some familiarity with basic statistical methods is useful but not assumed; the structure of the course will be flexible enough to accommodate a range of student expertise and interests. Topics covered include: statistics and graphics in R; database design, resampling methods, diversity measures, contingency table analysis, and introductory methods in spatial analysis.

Same as: ANTHRO 116.



**ANTHRO 217. Acultural Animals as Proxies for Cultural Humans. 5 Units.**

The human-animal relationship is dynamic, all encompassing and durable. Without exception, all socio-cultural groups have evidenced complex interactions with the animals around them, both domesticated and wild. However, the individual circumstances of these interactions are hugely complicated, and involve much more than direct human-animal contact, going far beyond this to incorporate social, ecological and spiritual contexts. This course delves into this complexity, covering the gamut of social roles played by animals, as well as the methods and approaches to studying these, both traditional and scientific. While the notion of 'animals as social actors' is well acknowledged, their use as proxies for human autecology (the relationship between a species and its environment) is also increasingly recognised as a viable mechanism for understanding our cultural and economic past. The module presents an overview covering a broad timespan from the Pleistocene to the modern day. It will piece together the breadth of human-animal relationships using a wide geographic range of case studies.

Same as: ANTHRO 117.

**ANTHRO 221. Language and Prehistory. 3-5 Units.**

Language classification and its implications for human prehistory. The role of linguistic data in analyzing prehistoric populations, cultures, contact, and migrations. Comparison of linguistic and biological classifications. Reconstruction, proto-vocabularies, and culture. Archaeological decipherment and the origins and evolution of writing. Archaeological and genetic evidence for human migrations. (DA-A; HEF II,III)

Same as: ANTHRO 121.

**ANTHRO 223. Readings in Linguistic Anthropology. 2 Units.**

One or two major related works on language in its cultural context. Works for 2007-08 involve attempts to correlate linguistic and non-linguistic data for analysis of prehistoric human contact and migrations. May be repeated for credit.

Same as: ANTHRO 123.

**ANTHRO 225. Language and the Environment. 3-4 Units.**

Lecture course on vocabulary and grammar as keys to peoples; understanding and use of the environment. Ethnobotany, ethnobiology, and ethnosemantics in the analysis of the language of place, plants and animals, the earth, the body, and disease. Terminological gaps and gluts and what they imply. Language as a strategic resource in environmental management. Language contact and conflict in the modern global environment, with particular attention to the vocabularies of capitalism and property. Language extinction and its environmental implications. Anthropology concentration: CS, EE. No prerequisites.

Same as: ANTHRO 125.

**ANTHRO 230B. Introduction to GIS in Anthropology. 5 Units.**

How GIS and spatial tools can be applied in social research. Case studies and student projects address questions of social and cultural relevance using real data sets, including the collection of geospatial data and building of spatial evidence. Analytical approaches and how they can shape a social and cultural interpretation of space and place.

Same as: ANTHRO 130B.

**ANTHRO 234. Object Lessons. 5 Units.**

Human-object relations in the processes of world making. Objectification and materiality through ethnography, archaeology, material culture studies, and cultural studies. Interpretive connotations around and beyond the object, the unstable terrain of interrelationships between sociality and materiality, and the cultural constitution of objects. Sources include: works by Marx, Hegel, and Mauss; classic Pacific ethnographies of exchange, circulation, alienability, and fetishism; and material culture studies.

Same as: ANTHRO 134.

**ANTHRO 235. Cultural Studies. 5 Units.**

Identity, community, and culture; their interactions and formation. Same as: ANTHRO 135.

**ANTHRO 235A. The Anthropology of Security. 3-5 Units.**

This seminar begins by outlining the main theoretical and empirical challenges in the areas of surveillance studies and security studies. The seminar provides a space wherein students will be able to discuss these inter-disciplinary areas and develop their own Anthropology-informed perspectives. The seminar then discusses the work of Anthropologists who through their ethnographic and theoretical work have helped developed and important and emergent area: 'The Anthropology of Security'. Areas covered include, inter alia, national security, security and war, biometrics, gated-ness, and environmental and bio-security threats.

Same as: ANTHRO 135A.

**ANTHRO 236. The Anthropology of Global Supply Chains. 5 Units.**

This upper-division undergraduate seminar focuses on recent studies by anthropologists and scholars in related disciplines on global supply chains and consumption practices. The goal of the course is to assess concepts and methods for integrating a cultural analysis of transnational production with a cultural analysis of transnational consumption. We will review ethnographic studies of the production and consumption of commodities linked by transnational and global networks. The class will then pursue collaborative research on the global production, distribution, and consumption of a selected commodity. Prerequisite: junior or senior standing and previous coursework in cultural anthropology or permission of instructor.

Same as: ANTHRO 136.

**ANTHRO 237. The Politics of Humanitarianism. 5 Units.**

What does it mean to want to help, to organize humanitarian aid, in times of crisis? At first glance, the impulse to help issue generis a good one. Helping is surely preferable to indifference and inaction. This does not mean that humanitarian interventions entail no ethical or political stakes or that they are beyond engaged critique. We need to critique precisely that which we value, and to ask some hard questions, among them these: What are the differences among humanitarianism, charity, and philanthropy? What of social obligations and solidarities? How does the neoliberal world order currently create structural inequalities that ensure the reproduction of poverty and violence? How does the current order of things resemble or differ from the colonial world order? This course examines the history of humanitarian sensibilities and the emergence of organized action in the 'cause of humanity'. In the early years of humanitarian intervention, political neutrality was a key principle; it has now come under ever greater analytical and political scrutiny. We will examine the reasons for the politicization and militarization of aid -- be it humanitarian aid in natural disasters or political crises; development programs in the impoverished south ('the Third World'), or peace-keeping. We will end with a critical exploration of the concept of human rights, humanity, and personhood. The overall methodological aim of the course is to demonstrate what insights an ethnographic approach to the politics, ethics, and aesthetics of humanitarianism can offer.

Same as: ANTHRO 137.

**ANTHRO 240A. Ethnographic Archaeologies. 4-5 Units.**

How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

Same as: ANTHRO 140A, ARCHLGY 137.

**ANTHRO 241. The State in Africa. 5 Units.**

Postcolonial African states in historical and ethnographic context. Focus is on contemporary African states not as failures, but as the products of distinctive regional histories and political rationalities.

Same as: ANTHRO 141.

**ANTHRO 245A. Evolutionary Theory in Archaeology. 3-5 Units.**

The ability of scientific evolutionary theory to explain human behavior as represented in the archaeological record. Past attempts to apply evolutionary theory in archaeology are compared to more recent Darwinian efforts, as are current evolutionary approaches to human behavior in related fields. The ontological underpinnings and methodological requirements of a Darwinian archaeology and its potential contribution to archaeology as an explanatory system. (HEF I)

Same as: ANTHRO 145A.

**ANTHRO 247. Nature, Culture, Heritage. 5 Units.**

Seminar. Shared histories of natural and cultural heritage and their subsequent trajectories into the present. How thought about archaeological sites and natural landscapes have undergone transformations due to factors including indigenous rights, green politics, and international tourism. The development of key ideas including conservation, wilderness, sustainability, indigenous knowledge, non-renewability and diversity. Case studies draw on cultural and natural sites from Africa, the Americas and Australia.

Same as: ANTHRO 147.

**ANTHRO 249. South Asia: History, People, Politics. 5 Units.**

The South Asian subcontinent (comprising of India, Pakistan, Bangladesh, Nepal, Bhutan and Sri Lanka) is one of the most diverse and densely populated regions in the world and increasingly prominent in new global political and cultural economies. South Asia has also provided the inspiration for cutting edge theories about the colonial state, postcolonial studies, democracy, popular culture, and religious conflict. The course will provide an overview of major historical events and social trends in contemporary South Asia and focus on themes such as gender, religion, caste, migration and movement, new technologies, the urban and rural, the state, and new forms of consumption among others. Thus, the course will give students historically and theoretically informed perspectives on contemporary South Asia, as well as how to apply insights learned to larger debates within the political and social sciences.

Same as: ANTHRO 149.

**ANTHRO 251. Women, Fertility, and Work. 5 Units.**

How do choices relating to bearing, nursing, and raising children influence women's participation in the labor force? Cultural, demographic, and evolutionary explanations, using crosscultural case studies. Emphasis is on understanding fertility and work in light of the options available to women at particular times and places.

Same as: ANTHRO 151, HUMBIO 148W.

**ANTHRO 253A. Population and social trends in Japan. 3-5 Units.**

Anthropological theories and concepts as applied to Japan. Postwar demographic trends. Delayed marriage. Declining nuclear family. Restructuring of education and workplace. Problems for the seniors. Foreign laborers shaking fundamentals of Japan.

Same as: ANTHRO 153A.

**ANTHRO 255. Research Methods in Ecological Anthropology. 3-5 Units.**

The course prepare students for the methodological and practical aspects of doing ecologically oriented, quantitative anthropological field research. The primary goal is to explore what it means to ask anthropological questions in a systematic way. We will focus on understanding what can constitute an interesting question, how to frame a question in way that facilitates investigation, and how to design methods to begin investigating a question. In turn, the course will provide a format to refine research projects in preparation for doing more extensive fieldwork.

Same as: ANTHRO 155.

**ANTHRO 261. Human Behavioral Ecology. 3-5 Units.**

Theory, method, and application in anthropology. How theory in behavioral ecology developed to understand animal behavior is applied to questions about human economic decision making in ecological and evolutionary contexts. Topics include decisions about foraging and subsistence, competition and cooperation, mating, and reproduction and parenting.

Same as: ANTHRO 161, HUMBIO 117H.

**ANTHRO 261A. Human Ecology: Adaptations to Climate and Climate Change. 5 Units.**

Humans face essentially the same adaptive challenges as all organisms but are unique for having successfully adapted to virtually every environment on Earth. The resulting diversity of phenotypes and cultures; past and present; is key to understanding how interactions with environments shape the economic, social, and cultural lives of hunter-gatherers, pastoralists and agriculturalists. This course surveys the range of human adaptations from an ecological and evolutionary perspective to understand human adaptive capacity and vulnerability to climate change.

Same as: ANTHRO 161A.

**ANTHRO 262. Indigenous Peoples and Environmental Problems. 3-5 Units.**

The social and cultural consequences of contemporary environmental problems. The impact of market economies, development efforts, and conservation projects on indigenous peoples, emphasizing Latin America. The role of indigenous grass roots organizations in combating environmental destruction and degradation of homeland areas.

Same as: ANTHRO 162.

**ANTHRO 263. Conservation and Evolutionary Ecology. 5 Units.**

Environmental degradation resulting from human behavior, and what can be done about it. Patterns of interaction between people and environments, and why they vary over time and space. Topics include adaptation and behavior, resource acquisition and utilization, conflicts of interest, collective action problems, conspicuous consumption, waste, land management, and public policy.

Same as: ANTHRO 163.

**ANTHRO 268A. Risky Environments: The Nature of Disaster. 5 Units.**

This seminar explores topics including environmental movements and countercultures, human agency and geoengineering ecotourism, and indigenous perspectives of changing climates to query how humans view nature; in terms of stability, instability, risk and disaster in the 21st century. Case studies draw upon a broad range of geographical regions including the Arctic, Iceland, Australia, and the Americas. Discussions will draw upon film portrayals and interviews with researchers in addition to readings.

Same as: ANTHRO 168A.

**ANTHRO 269. The Ecology of Cuisine: Food, Nutrition, and the Evolution of the Human Diet. 3-5 Units.**

This course is an interdisciplinary approach to understanding human food consumption and nutrition, incorporating biological, evolutionary, ecological and social perspectives. Topics include a broad survey of primate diets and their physiological and behavioral correlates; fossil and archaeological evidence for early human diets; adaptations to dietary shifts since the Neolithic; infant and early child feeding practices and their role in shaping human social arrangements, metabolic syndrome, food security, food taboos; the origins of spices; cultural diversity in the social uses and meanings of food and the sharing of food; gathering, hunting and locavorism as high hipster cuisine. Emphasis is on understanding the diversity of human foodways through time and space: how biology, culture, and ecology interact to shape the food we eat, and how the food we eat shapes us.

Same as: ANTHRO 169.

**ANTHRO 272. Seminar on Cultural Evolution and Coevolution. 3-5 Units.**

Upper division/graduate seminar on recent approaches to the study of cultural evolution and coevolution. Critical evaluation of Darwinian and non-Darwinian theories, with special attention to the interplay of culture, genes, environment and society. Students will undertake projects of their own design to review, test, or improve current theoretical formulations. Prerequisite: a university-level course in evolution, ecology, or human behavioral biology.

Same as: ANTHRO 172.

**ANTHRO 274. Beginnings of Social Complexity. 5 Units.**

Models and examples of the social evolution of stratification and political centralization in prehistoric human societies. Inferences from the archaeological record concerning the forces and mechanisms behind the rise and fall of complex societies, particularly in S. America. (HEF II; DA-B)

Same as: ANTHRO 174.

**ANTHRO 275. Human Skeletal Anatomy. 5 Units.**

Study of the human skeleton (a. k. a. human osteology), as it bears on other disciplines, including medicine, forensics, archaeology, and paleoanthropology (human evolution). Basic bone biology, anatomy, and development, emphasizing hands-on examination and identification of human skeletal parts, their implications for determining an individual's age, sex, geographic origin, and health status, and for the evolutionary history of our species. Three hours of lecture and at least three hours of supervised and independent study in the lab each week.

Same as: ANTHRO 175, BIO 174, BIO 274, HUMBIO 180.

**ANTHRO 276. Cultures, Minds, and Medicine. 1 Unit.**

This workshop aims to bring together scholars from the social sciences, humanities, medicine and bio-science and technology to explore the ways that health and illness are made through complex social forces. We aim for informal, interactive sessions, full of debate and good will. We will meet every other week on Wednesday evening 5:30-7, starting on January 11, for dinner and conversation.

Same as: ANTHRO 176.

**ANTHRO 277. Japanese Society and Culture. 5 Units.**

Focus is on power, identity, and the politics of knowledge production. How transnational interactions influence Japanese identity. How anthropological knowledge has contributed to understanding Japanese culture and society. Gender, race and class; contemporary ethnographies. Modernity and globalization. Cultural politics, domestic work, labor management, city planning, ad images, anime, martial art, fashion, theater, leisure, and tourism.

Same as: ANTHRO 77.

**ANTHRO 279A. Health, Illness, and Healing in South Asia. 5 Units.**

This course has three related goals pertinent to medicine and healing in South Asia. The first is to understand the experiences of illness, and therapy in ordinary South Asian communities. How do social and economic inequality, religious commitments, available healing traditions, and community and family contexts shape the experience of illness and healing? The second goal is to think about South Asian medical systems using a broad historical perspective. How had biomedicine been used during the colonial period to manage the health of native populations? What is the legacy of this colonial history on current practices? What happens when South Asian medical traditions (such as Ayurveda) become global? Third, we will explore crucial health problems in South Asia from the perspective of medical anthropology. Possible topics for the third portion of the course include: child birth and maternal health, sex-selection technologies, malnutrition, metabolic diseases, the selling of organs, medical tourism, tuberculosis, HIV, suicide, and schizophrenia.

Same as: ANTHRO 179A.

**ANTHRO 282. Medical Anthropology. 3-5 Units.**

Emphasis is on how health, illness, and healing are understood, experienced, and constructed in social, cultural, and historical contexts. Topics: biopower and body politics, gender and reproductive technologies, illness experiences, medical diversity and social suffering, and the interface between medicine and science.

Same as: ANTHRO 82.

**ANTHRO 282A. Down and Out: Marginal Lives and Institutional Technologies. 5 Units.**

This course examines the neglect and management of socially marginalized persons including the mentally ill, youth runaways, child wards of the state, drug addicts and prisoners. In this course, we will approach the concept of marginality by investigating the spaces and institutions of decay, neglect and rehabilitation to which unwanted and indigent individuals are relegated. Readings are focused on qualitative research conducted within institutions of health, welfare, and reform. There will be two comparative public mental health sections in this course: one focused on South Asia and the second on Africa. This course is relevant for students interested in medical anthropology, applied anthropology, public health policy, or clinical careers in medicine, psychology, or social work.

Same as: ANTHRO 182A.

**ANTHRO 293B. Master's Thesis Writing Seminar. 2-4 Units.**

May be repeated for credit.

**ANTHRO 298B. Digital Methods in Archaeology. 3-5 Units.**

This is a course on digital technologies in archaeology used for documentation, visualization, and analysis of archaeological spaces and objects. Emphasizes hands-on approaches to image manipulation, virtual reality, GIS, CAD, and photogrammetry modeling methods.

Same as: ANTHRO 98B.

**ANTHRO 299. Senior and Master's Paper Writing Workshop. 1-2 Units.**

Techniques of interpreting data, organizing bibliographic materials, writing, editing and revising. Preparation of papers for conferences and publications in anthropology. Seniors register for 199; master's students register for 299. Same as: ANTHRO 199.

**ANTHRO 299. Senior and Master's Paper Writing Workshop. 1-2 Units.**

Techniques of interpreting data, organizing bibliographic materials, writing, editing and revising. Preparation of papers for conferences and publications in anthropology. Seniors register for 199; master's students register for 299. Same as: ANTHRO 199.

**ANTHRO 300. Reading Theory Through Ethnography. 5 Units.**

Required of and restricted to first-year ANTHRO Ph.D. students. Focus is on contemporary ethnography and related cultural and social theories generated by texts. Topics include agency, resistance, and identity formation, and discourse analysis. Prerequisite: consent of instructor.

**ANTHRO 301. History of Anthropological Theory, Culture and Society. 5 Units.**

Required of Anthropology Ph.D. students. The history of cultural and social anthropology in relation to historical and national contexts and key theoretical and methodological issues as these inform contemporary theory and practices of the discipline. Enrollment limited to 15. Prerequisite: consent of instructor.

**ANTHRO 301A. Foundations of Social Theory. 5 Units.**

The purpose of this course is to introduce key themes in social theory - the social, the modern subject, reason, autonomy, civility, interests, exchange, morality, life, the senses - through a reading of classic texts from Descartes up to psychoanalysis and phenomenology. Each section has original texts, commentaries, and background readings that place these texts in their deeper historical setting. Many of these commentaries trace how practical theories of 'lower' or minor selves - the subject people of the colonies, slaves, and other - were integral to the very development of ideas of the modern, autonomous and reasonable self in the western world.

**ANTHRO 302. History of Anthropological Theory, Ecology and Environment. 5 Units.**

Evolutionary and ecological theory from the 19th century to present. Theory and concepts from evolution and ecology, emphasizing anthropological applications. Evolutionary theories of human behavior, culture, and societies. Ecological theory behind carrying capacity, sustainable yield, and population growth. Emphasis is on tools of analysis and formulating research questions in anthropology today. Upper division undergrads require consent of instructor.

**ANTHRO 303. Introduction to Archaeological Theory. 5 Units.**

The history of archaeological thought emphasizing recent debates. Evolutionary theories, behavioral archaeology, processual and cognitive archaeology, and approaches termed feminist and post-processual archaeology in the context of wider debate in adjacent disciplines. The application and integration of theory on archaeological problems and issues. Prerequisite: consent of instructor.

**ANTHRO 304. Data Analysis for Quantitative Research. 5 Units.**

Univariate, multivariate, and graphical methods used for analyzing quantitative data in anthropological research. Archaeological and paleobiological examples. Recommended: algebra. Prerequisite: consent of instructor.

**ANTHRO 305. Research Methods in Ecological Anthropology. 5 Units.**

The course prepare students for the methodological and practical aspects of doing ecologically oriented, quantitative anthropological field research. The primary goal is to explore what it means to ask anthropological questions in a systematic way. We will focus on understanding what can constitute an interesting question, how to frame a question in way that facilitates investigation, and how to design methods to begin investigating a question. In turn, the course will provide a format to refine research projects in preparation for doing more extensive fieldwork.

**ANTHRO 306. Anthropological Research Methods. 5 Units.**

Required of ANTHRO Ph.D. students; open to all graduate students. Research methods and modes of evidence building in ethnographic research. Enrollment limited to 10. Prerequisite: consent of instructor.

**ANTHRO 307. Archaeological Methods and Research Design. 5 Units.**

Methodological aspects of field and laboratory practice from traditional archaeological methods to the latest interdisciplinary analytical techniques. The nature of archaeological data and inference; interpretive potential of these techniques. Prerequisite: consent of instructor. Same as: ARCHLGY 307.

**ANTHRO 308. Proposal Writing Seminar. 5 Units.**

Required of second-year Ph.D. students in the culture and society track. The conceptualization of dissertation research problems, the theories behind them, and the methods for exploring them. Participants draft a research prospectus suitable for a dissertation proposal and research grant applications. Limited enrollment. Prerequisite: consent of instructor.

**ANTHRO 309. Advanced Evolutionary Theory in Anthropological Sciences. 5 Units.**

History of evolutionary theory from the 19th century to present, emphasizing anthropological applications. Theory and concept in evolutionary biology; evolutionary theories of culture; and interactions of genetic, social, and cultural evolution and their implications. Emphasis is on tools of analysis and the value of evolutionary thinking for formulating research questions in anthropology today. Prerequisite: graduate standing or consent of instructor. (HEF II, III).

**ANTHRO 310C. Intersections. 5 Units.**

Themes of materiality and visibility, aesthetic and other forms of cultural production, and the meanings of creativity and convention. Ethnographic and archaeological material and case studies from worldwide cultural contexts. Prerequisite: consent of instructor.

**ANTHRO 310G. Introduction to Graduate Studies. 2 Units.**

Required graduate seminar. The history of anthropological theory and key theoretical and methodological issues of the discipline. Prerequisite: consent of instructor.

**ANTHRO 311. Ethnographic Writing. 3-5 Units.**

For graduate students writing or planning to write a dissertation using ethnographic methods. The choices made by the authors of ethnographies in constructing an argument, using data and speaking to an audience of readers. Readings include chapters written by class members currently writing dissertations. Prerequisite: consent of instructor.

**ANTHRO 311G. Introduction to Culture and Society Graduate Studies in Anthropology. 2 Units.**

Required graduate seminar for CS track. The history of anthropological theory and key theoretical and methodological issues in cultural anthropology. Prerequisites: for 1st year PhD students in the cultural and society track or by permission of the instructor.

**ANTHRO 312. Writing Across Audiences: Styles and Methods. 5 Units.**

This course examines the way anthropologists and others write to different audiences. What do you need to do communicate to a mainstream anthropology audience? How does that change when you write an editorial or place something in a popular venue? When you try to capture a non-anthropological medical audience? What methods might you consider adding to enable that cross-talk? We will examine a series of examples of people who have written across. Prerequisite: consent of instructor.

**ANTHRO 313. Anthropology of Neoliberalism. 5 Units.**

How is the recent worldwide restructuring under the name neoliberalism understood as a social, cultural, and economic phenomenon? Focus is on interrogation of analytic categories, and ethnographic explorations of social and political processes.

**ANTHRO 318. Democracy and Political Authority. 5 Units.**

Democracy is commonly defined in formalist terms as a form of government (involving the consent of the governed) and a procedure of governance (involving the rule of law). In place of a formalist definition, this course examines democracy as a historical and discursive form. In what ways have the rights of citizenship for some been premised on the domination of others (workers, women, the colonized, etc.)? What forms of violence are not only tolerated as practical necessity in the contemporary order of democratic states but sanctioned as morally just? What mechanisms of political authority operate by defining the boundaries between the tolerable and the intolerable, between citizenly belonging and terrorism—in short, between democracy and its others (e.g., an arbitrary despot, a feudal economy, a religious fundamentalism)? These questions require urgent interrogation in the present day: the past thirty years have witnessed a virtual explosion of new constitutions proclaiming democratic sovereignty across the world. What forms of global power and institutional domination are constitutive of the contemporary era of liberty, freedom, and equality? Readings are drawn from a variety of disciplines, including anthropology, political theory, and political philosophy. Prerequisite: consent of instructor.

**ANTHRO 319. South Asia: History, People, Politics. 5 Units.**

The South Asian subcontinent (comprising of India, Pakistan, Bangladesh, Nepal, Bhutan and Sri Lanka) is one of the most diverse and densely populated regions in the world and increasingly prominent in new global political and cultural economies. South Asia has also provided the inspiration for cutting edge theories about the colonial state, postcolonial studies, democracy, popular culture, and religious conflict. The course will provide an overview of major historical events and social trends in contemporary South Asia and focus on themes such as gender, religion, caste, migration and movement, new technologies, the urban and rural, the state, and new forms of consumption among others. Thus, the course will give students historically and theoretically informed perspectives on contemporary South Asia, as well as how to apply insights learned to larger debates within the political and social sciences. Prerequisite: consent of instructor.

**ANTHRO 320A. Race, Ethnicity, and Language. 3-4 Units.**

This seminar explores the linguistic construction of race and ethnicity across a wide variety of contexts and communities. Throughout the course, we will take a comparative perspective and highlight how different racial/ethnic formations participate in similar, yet different, ways of "doing race" through language, interaction and culture. Readings draw heavily from perspectives in (linguistic) anthropology and sociolinguistics. Prerequisite: consent of instructor.

Same as: EDUC 389X, LINGUIST 253.

**ANTHRO 321. Reading Marx, Reading Weber. 5 Units.**

This advanced graduate seminar is devoted to a critical reading of selected writings by two nineteenth century social theorists who continue to shape anthropology and social analysis more broadly. Prerequisites: Graduate standing in Anthropology or permission of the instructor. Previous graduate level coursework in cultural or social anthropology, social theory or cultural studies is required. No auditing is permitted. Maximum enrollment 12.

**ANTHRO 321A. Anthropology and Literature: Problems of Representation, Power, and Textuality. 5 Units.**

How are literary and social scientific forms of cultural description, evocation, and interpretation related? The seminar reads classic texts as well as recent experiments, addressing issues of genre, rhetoric, epistemology, translation, authority, and collaboration. The emphasis is on writing as a situated practice—embodied, relational, and historically circumscribed. Authors may include Malinowski, Mead, Benedict, Lévi-Strauss, Geertz, Taussig, Leiris, Conrad, Achebe, Said, Barthes, Kroeber, Le Guin, and selected contemporary ethnographies. Examples from film, visual culture, and performance art may also be included.

**ANTHRO 322. From Biopolitics to Necropolitics and Beyond. 5 Units.**

Scholarship produced and informed by Michel Foucault. Focus is on the final period of Foucault's life; how his discussions of biopolitics, subjectification, governmentality, and death have served as touchstones for recent empirical research. Key interventions initially made under these rubrics; how anthropologists and others have applied, challenged, and extended them. Prerequisite: consent of instructor.

**ANTHRO 324. Political Anthropology. 5 Units.**

An anthropological approach to politics through bringing anthropological ways of thinking and modes of analysis to bear on key presuppositions of modern Western political thought. Ideas of rights, the individual, society, liberty, democracy, equality, and solidarity; ethnographic accounts used to identify the limits of conventional analytical approaches and to document the forms of politics that such approaches either ignore or misunderstand. Prerequisite: consent of instructor.

**ANTHRO 326. Postcolonial and Indigenous Archaeologies. 5 Units.**

The role of postcolonial and Indigenous archaeologies as emergent disciplinary activities within contemporary society. Community based archaeologies; the roles of oral history, landscape, and memory; archaeology as political action; and history in archaeological projects. The emergence of Indigenous archaeology within N. America in relation to limitations imposed by processual or new archaeology; and NAGPRA, Kennewick, essentialism, and terminal narratives within this context. Prerequisite: consent of instructor.

**ANTHRO 327. Language and Political Economy. 5 Units.**

Theories of language: Saussure, Jakobson, Hymes, Marx, Foucault, Butler, and Derrida. The theorization of language in its linkages to power, social relations, and history. Prerequisites: Linguistics or Anthropology course work. Prerequisite: consent of instructor.

**ANTHRO 331. The Anthropology of Technology. 5 Units.**

Iconic discipline-building works of the last three decades; readings that lay out and intervene in contemporary debates. Prerequisite: consent of instructor.

**ANTHRO 331A. Ecology, Evolution, and Human Health. 3-5 Units.**

Ecology, Evolution, and Human Health Human ecology, environments, adaptation and plasticity, and their relationship to health and well-being considered in the broad comparative context. Topics include human population history, subsistence ecology, demography, reproductive decision making, urbanization, migration, infectious disease, the physiology of stress and the inflammatory response, social capital and social networks, nutrition, nutritional deficiencies, growth, and social inequalities. No prior course work in ecological or medical anthropology required.

Same as: ANTHRO 31.

**ANTHRO 332A. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

This seminar will explore foundational concepts currently employed within heritage practice and debates. Readings will examine the historically formative context of colonial-era and nationalist discourses on stewardship and culture, as well as postcolonial reformulations of such concepts as cultural property, cultural recognition and public history. The seminar will engage the question of the relationship between foundational concepts and the current cosmopolitan and internationalist vision for heritage, probing the enduring dynamics of North-South divides in heritage development and archaeological practice.

Same as: ARCHLGY 132, ARCHLGY 232, ARCHLGY 332.

**ANTHRO 333. Anthropologies of Evidence. 5 Units.**

Drawing on literature in Anthropology and Science and Technology Studies, this course will examine what kinds of artifacts and arguments count as evidence in intellectual and scientific debate.

**ANTHRO 333A. The Cultural Politics of Ambiguity. 5 Units.**

Contemporary conceptual approaches to understanding the politics and production of certainty, ambiguity, and doubt. The seemingly ambiguous nature of the science of industrial pollution and contamination exonerate corporate and government polluters from rising rates of cancer, while the science of liberal economic models seems to create no alternative to massive economic subsidies of the financial sector. How culpability, exoneration, transformative action, institutional stasis, and political rely on the production of certainty, ambiguity, and doubt. Prerequisite: consent of instructor.

**ANTHRO 334. Trauma and Healing. 5 Units.**

This course considers class and recent work on culture and psychiatry with an emphasis on trauma. We consider work on the main diagnostic categories like depression and schizophrenia, but also the work on dissociation, war combat, PTSD, and psychosis.

**ANTHRO 336. Anthropology of Rights. 5 Units.**

Ideas of rights at the center of contemporary politics around the world. An anthropological perspective on how rights are invoked, claimed, and translated into institutional policies in ethnographic cases. The limitations of liberal notions of rights and innovative forms of politics emerging within and against rights talk. Prerequisite: consent of instructor.

**ANTHRO 336A. The Posthumanistic Subject. 3-5 Units.**

The course will examine the need to rethink the traditional western idea of the strong subject. Through close readings of works by Agamben, Braidotti, Derrida, Deleuze, Hall, Haraway, Latour, Wolfe, among others, this course will explore posthumanist theories of individual and collective subjectivity that challenge traditional ways of defining the human and the non-human subject/person and promote fundamental reconsideration of issues such as agency, autonomy, essence, freedom, dignity, otherness, substance, personhood, sociality, and life itself. The course would consider, how we can empower the subject and community in order to develop a desired model of participatory democracy.

Same as: FRENGEN 320.

**ANTHRO 337. The Politics of Humanitarianism. 5 Units.**

What does it mean to want to help, to organize humanitarian aid, in times of crisis? At first glance, the impulse to help issues a good one. Helping is surely preferable to indifference and inaction. This does not mean that humanitarian interventions entail no ethical or political stakes or that they are beyond engaged critique. We need to critique precisely that which we value, and to ask some hard questions, among them these: What are the differences among humanitarianism, charity, and philanthropy? What of social obligations and solidarities? How does the neoliberal world order currently create structural inequalities that ensure the reproduction of poverty and violence? How does the current order of things resemble or differ from the colonial world order? This course examines the history of humanitarian sensibilities and the emergence of organized action in the cause of humanity. In the early years of humanitarian intervention, political neutrality was a key principle; it has now come under ever greater analytical and political scrutiny. We will examine the reasons for the politicization and militarization of aid -- be it humanitarian aid in natural disasters or political crises; development programs in the impoverished south (the Third World), or peace-keeping. We will end with a critical exploration of the concept of human rights, humanity, and personhood. The overall methodological aim of the course is to demonstrate what insights an ethnographic approach to the politics, ethics, and aesthetics of humanitarianism can offer.

**ANTHRO 338. Anthropological Approaches to Religion. 5 Units.****ANTHRO 339. Anthropology of Religion. 5 Units.**

This course presents classic and contemporary work on the anthropology of religion: Durkheim *Elementary Forms of the Religious Life*; Levy-Bruhl; *Primitive Mentality*; Douglas *Purity and Danger*; Evans Pritchard *Nuer Religion*; and recent ethnographies/scholarly work by Robbins, Keane, Keller, Boyer, Barrett, and others.

**ANTHRO 341. The Archaeology of Religious Crusading in Medieval Europe. 5 Units.**

This course will present a chronologically framed outline of the three main regions that witnessed the greatest impact of the crusading period. Commencing with the initial capture of Jerusalem and the subsequent establishment of a crusader kingdom in the Middle East in AD1099, till its eventual end in 1291, this will be followed by the pagan conversions of the Northern Baltic. Centred on Poland (Prussia) and Latvia (Livonia) from the 13th to 15th c., this example will also be compared with neighbouring Lithuania, which never fell under the political hegemony of the Monastic Orders. Finally, the course covers the Iberian case, where the Reconquista or reconquest - of lands from Muslim groups concluded with the fall of Granada and the unification of Spain in 1492. Through archaeological and historical evidence, the materials, technologies and ideas of the crusading groups will be compared and contrasted, with a particularly emphasis on bioarchaeological datasets. Ultimately, the course deals with the economic, social and practical mechanisms used by the religious orders to colonise, once the initial conquest had been achieved.

**ANTHRO 343. Culture as Commodity. 5 Units.**

Focus is on theories of commodification, interests in tourism, national cultures as marketable objects, and how identities are constituted through production and consumption. The formation of global style and taste. Prerequisite: consent of instructor.

**ANTHRO 344. Graphic Medicine. 5 Units.**

In this course students will study medical cultures through visual communication ranging from x-rays and PET scans to graphic novels. Course will also include literature on visual theory.

**ANTHRO 345. New Visions in Medical Anthropology. 5 Units.**

Recent experimental histories of the field. Emphasis is on how, working within anthropology's classic format, the ethnographic monograph, authors have innovatively responded to the challenges of representing amorphous, unspoken, and often violent relationships between the body and social change. The authors' expository techniques, and how they engage and extend theoretical debate. How to assess works within medical anthropology and its allied fields. Prerequisite: consent of instructor.

**ANTHRO 346A. Sexuality Studies in Anthropology. 5 Units.**

Current research on sexuality from perspectives including paleoanthropology, archaeology, ethnography, and linguistic anthropology. Readings paired with case studies that explore theoretical and methodological issues. Prerequisite: consent of instructor.

**ANTHRO 349. Anthropology of Capitalism. 5 Units.**

This advanced graduate seminar explores capitalism as an historically-situated and culturally-mediated articulation of practices rather than as an economic system or social structure governed by an internal logic. It draws on poststructural theories of culture, society and subjectivity to investigate the processes through which diverse capitalist practices are produced. Prerequisite: Graduate standing in Anthropology or permission of the instructor. Previous graduate level coursework in cultural anthropology, social theory or cultural studies is required. No auditing is permitted. Enrollment limited to 12.

**ANTHRO 352. Foucault: The Question of Method. 5 Units.**

Foucault as methodological exemplar for historical and social research. Emphasis is on his historical studies of clinical medicine, prisons, and sexuality, and on applying his methods to empirical studies of topics such as colonialism, race, and liberal governmental rationality.

**ANTHRO 355. Cities in Global Perspective. 5 Units.**

Interdisciplinary approach to examining global cities. The concept of the global city, and the interdependent processes that help produce urban spaces. Situating the transformation of urban spaces within globalization and its differential effects; current explanatory frameworks that pay attention to multiple scales of spatial and economic articulation. Prerequisite: graduate standing. Prerequisite: consent of instructor.

**ANTHRO 356. The Anthropology of Development. 5 Units.**

Multidisciplinary. Topics vary annually. Areas include Africa, S. Asia, and Latin America. Prerequisite: consent of instructor.

**ANTHRO 357. Other Minds: Puzzles in Psychiatric and Psychological Anthropology. 5 Units.**

Problems in the way anthropologists explore other minds anthropologically and the ways in which anthropologists seek to understand the models of other minds held by the people observed. Topics include theory of mind, witchcraft, belief, empathy, psychosis, trauma, Freud, Vygotsky, and cognitive dissonance. Prerequisite: consent of instructor. Under grads cannot take this class without permission of the instructor.

**ANTHRO 360. Social Structure and Social Networks. 5 Units.**

In this course, we will explore social network analysis, a set of methods and theories used in the analysis of social structure. The fundamental conceit underlying social network analysis is that social structure emerges from relationships between individuals. We will therefore concentrate in particular on the measurement of relationships, emphasizing especially practical methodology for anthropological fieldwork. This is a somewhat unusual course because of its focus on social network research coming out of anthropological and ethnological traditions. While most current practitioners of social network analysis are (probably) sociologists, many of both the methodological antecedents and theoretical justifications for the field can be found in these two traditions. A major goal of this course is to understand how the methods and perspectives of social network analysis can be usefully incorporated into contemporary approaches to ethnography and other anthropological modes of investigation.

**ANTHRO 361. Life and Death in Contemporary Latin America: An Anthropological Inquiry. 5 Units.**

This seminar explores life and death in contemporary Latin America. We will address anthropological understanding of the role of colonialism, migration, violence, urbanization, democratic transition and neoliberalism as they configure the experience of, and threshold between, vital and deadly processes. This is not a standard survey course, covering the region as a whole however. Instead, we will critically engage several recent ethnographies that explore, for example: the politics and practices of memory; border thinking and living; the political economy of death and desire; state violence and social movements; the relationship between the laboring city and body. We will supplement ethnographies with contemporary Latin American critical theory, film, and literary texts. Prerequisite: consent of instructor.

**ANTHRO 362. Human Spatial Dynamics: Seminar in Communicating Contemporary Science. 5 Units.**

This seminar is designed to bring together all students and faculty currently working on issues related to human use of land and spatially defined resources. The focus is to provide a forum for reporting on recent results and question development, providing students with vital skills in designing and communicating the results of research. Under grads by permission of instructor.

**ANTHRO 362A. Introduction to Human Evolution, Ecology, Genetics, and Culture. 5 Units.**

Themes and topics of lasting heuristic value in the anthropological sciences. Combines the lecture content of 2A and 2B with a discussion section for graduate students. Must be taken in the Autumn Quarter of a student's first year in the graduate program.

**ANTHRO 363. Demography and Life History Theory. 5 Units.**

Problems in demography and theoretical population biology applied to human systems. Emphasis is on establishing relationships between models in theoretical population biology and empirical demographic methodology. Topics include philosophy of models and model building, population dynamics, stable population theory, species interactions in human ecology, models of infectious diseases and their control, cultural evolution. Prerequisites: HUMBIO 137 or consent of instructor.

**ANTHRO 364. EcoGroup: Current Topics in Ecological, Evolutionary, and Environmental Anthropology. 5 Units.**

Seminar; restricted to graduate students. Topics vary with instructor. How to ask appropriate questions, how to derive research hypotheses from theory, how to design methodologies for testing hypotheses, and how to present results by reading and critiquing key contemporary papers in the field. Ph.D. students enrolling in this course to fulfill the department review course requirement must enroll in 5 units. Graduate students enrolling in this course to participate in a topical forum may enroll in 2 units. Course may be repeated for 2 units. Prerequisites: by consent of instructor.

**ANTHRO 365. The Theory of the Modern Subject. 5 Units.**

This course traces the emergence of a coherent theory of the modern subject through readings of philosophical works and social theory from 18th century to the 20th century.

**ANTHRO 366. Material Semiotics. 5 Units.**

This seminar will focus on the emerging body of literature on the materiality of the production, circulation, and mediation of paperwork as constitutive of modern forms of governance. We will discuss specific genres of paperworks; notes, memos, files, documents, as well as archives and other mnemonic technologies; both as cultural practices and reflexive objects, and examine how they produce modern social epistemologies of accountability, evidence, the fact, and truth in the fields of law, business, and public administration, as well as in civil society generally. Readings will include works by Max Weber, Bruno Latour, Jacques Derrida, Michel Foucault, Cornelia Vismann, Ann Stoler, and others.

**ANTHRO 367. The Anthropology of Science: Global Politics and Laboratory Life. 5 Units.**

Science and technology are important cultural products that often dramatically reorganize various aspects of human life. In this course we will explore how recent innovations in the life sciences and biomedicine may reconfigure crucial elements of social institutions, lend new structures to identity politics, and often change the way we interact with and conceive of nature. We will examine these issues in various global settings to explore how everyday politics shape politics of life in different locales.

**ANTHRO 370. Advanced Theory and Method in Historical Archaeology. 5 Units.**

Current debates about theory and method. Prerequisite: consent of instructor.

**ANTHRO 371. Proposal Writing for Archaeologists. 2 Units.**

Required of second-year Ph.D. students in the archaeology track. The conceptualization of dissertation research problems, the theories behind them, and the methods for exploring them. Participants draft a research prospectus suitable for a dissertation proposal and research grant applications. Limited enrollment. Prerequisite: consent of instructor. Same as: ARCHLGY 371.

**ANTHRO 373. Things: An Archaeology of the Relationships Between Humans and Things. 5 Units.**

This course examines a variety of approaches that claim to explore the relationships between humans and things. Some of the approaches include Marx and material culture studies; Heidegger; cognitive and phenomenological; Actor Network Theory. But there is a need also to examine behavioral and ecological and Darwinian approaches. Many of these approaches do not adequately deal with the physicality of things as objects and there is a need to seek a way to incorporate such aspects of things into social theory.

**ANTHRO 374. Archaeology of Colonialism/Postcolonialisms. 5 Units.**

Advanced graduate seminar focused on the archaeology of colonial and postcolonial contexts, both prehistoric and historic. Emphasis on intersections between archaeological research and and subaltern, postcolonial, and transnational feminist/queer theory. Prerequisite: consent of instructor.

**ANTHRO 375. Archaeology and Globalism. 4-5 Units.**

The emergence of archaeology as a discipline in the context of the rise of the nation state. Global economies and other issues have created a new context for archaeology. How are archaeology and heritage responding? The idea of world heritage. The impact of postcolonialism. The commodification of the past: the past as theme park, as travel tourism or nostalgia, as exotic and other. Conflict between uses of the past for identity and as theme park; between heritage and resource or play. The impact of the Goddess, New Age, and other movements. Archaeology and human rights issues including forensic archaeology. Prerequisite: consent of instructor.

**ANTHRO 380. Practice and Performance: Bourdieu, Butler, Giddens, de Certeau. 5 Units.**

Poststructuralist theories of iteration and mimesis used by social scientists to negotiate the tension between social structure and social practice: Giddens' structuration theory; Bourdieu's practice theory; Butler's theories of gender performativity; and de Certeau's analysis of tactics and strategies. Ethnographic and archaeological case studies that employ methodologies inspired by these approaches. Intersections and contradictions between these theorists' work; their use in anthropological practice. Issues of gender, sexuality, and ethnicity. Prerequisite: consent of instructor.

**ANTHRO 382. Advanced Topics in Medical Anthropology. 5 Units.**

Graduate seminar. The history and theories of medical anthropology. Focus is on medical anthropology's transformations in the 20th century: how medical anthropology has emerged as a field of inquiry, grown in dialogue with other areas of scholarships, and come to offer a unique array of theoretical positions and modes of ethnographic engagement. Emphasis is on debates within interpretive and critical medical anthropology, and how an understanding of these debates may be used to assess contemporary works within the field. Prerequisite: consent of instructor.

**ANTHRO 400. Dissertation Writers Seminar. 1-3 Units.**

Required of fifth-year Ph.D. students returning from dissertation field research and in the process of writing dissertations and preparing for professional employment. Prerequisite: consent of instructor.

**ANTHRO 401A. Qualifying Examination: Topic. 2-5 Units.**

Required of second- and third-year Ph.D. students writing the qualifying paper or the qualifying written examination.

**ANTHRO 401B. Qualifying Examination: Area. 2-5 Units.**

Required of second- and third-year Ph.D. students writing the qualifying paper or the qualifying written examination. May be repeated for credit one time.

**ANTHRO 440. Teaching Assistantship. 3-5 Units.**

Supervised experience as assistant in one undergraduate course.

**ANTHRO 441. Master's Research Thesis. 1-15 Units.**

Supervised work for terminal and coterminial master's students writing the master's project in the final quarter of the degree program.

**ANTHRO 442. Reading Group. 2-3 Units.**

Graduate student reading group on a thematic topic of interest. Intended for first or second-year cohort PhD students. Sections: Liisa Malkki, Sylvia Yanagisako, Thomas Hansen, Paulla Ebron, and Miyako Inoue.

**ANTHRO 444. Anthropology Colloquium: Graduate Seminar. 1 Unit.**

Department Colloquia Lecture Series. Lectures presented on a variety of anthropological topics. Enrollment is required and restricted to the Department of Anthropology Master's students and First and Second-year PhD students. May be repeated for credit.

**ANTHRO 445. Anthropology Brown Bag Series. 1 Unit.**

Current topics and trends in cultural/social anthropology, archaeology, and environmental and ecological anthropology. Enrollment in this noon-time series is restricted to the Department of Anthropology Master's students and First and Second-year PhD students.

**ANTHRO 446A. Method of Analysis Program in the Social Sciences. 1 Unit.**

Colloquium series. Creation and application of new methodological techniques for social science research. Presentations on methodologies of use for social scientists across departments at Stanford by guest speakers from Stanford and elsewhere. See <http://mapss.stanford.edu>. Same as: COMM 310.

**ANTHRO 450. Research Apprenticeship. 1-15 Units.**

Supervised work on a research project with an individual faculty member. May be repeated for credit.

**ANTHRO 451. Directed Individual Study. 1-15 Units.**

Supervised work for a qualifying paper, examination, or project with an individual faculty member.

**ANTHRO 452. Graduate Internship. 3-5 Units.**

Provides graduate students with the opportunity to pursue their area of specialization in an institutional setting such as a laboratory, clinic, research institute, or government agency.

**ANTHRO 801. TGR Project. 0 Unit.****ANTHRO 802. TGR Dissertation. 0 Unit.**

## Applied Physics Courses

**APPPHYS 77N. Functional Materials and Devices. 3 Units.**

Preference to freshmen. Exploration via case studies how functional materials have been developed and incorporated into modern devices. Particular emphasis on magnetic and dielectric materials and devices. Recommended: high school physics course including electricity and magnetism.

**APPPHYS 79N. Energy Options for the 21st Century. 3 Units.**

Preference to freshmen. Choices for meeting the future energy needs of the U.S. and the world. Basic physics of energy sources, technologies that might be employed, and related public policy issues. Trade-offs and societal impacts of different energy sources. Policy options for making rational choices for a sustainable world energy economy.



**APPPHYS 201. Electrons and Photons. 4 Units.**

Applied Physics Core course appropriate for graduate students and advanced undergraduate students with prior knowledge of elementary quantum mechanics, electricity and magnetism, and special relativity. Interaction of electrons with intense electromagnetic fields from microwaves to x-ray, including electron accelerators, x-ray lasers and synchrotron light sources, attosecond laser-atom interactions, and x-ray matter interactions. Mechanisms of radiation, free-electron lasing, and advanced techniques for generating ultrashort brilliant pulses. Characterization of electronic properties of advanced materials, prospects for single-molecule structure determination using x-ray lasers, and imaging attosecond molecular dynamics.

**APPPHYS 202. Quantum Probability and Quantum Information. 4 Units.**

Applied Physics Core course appropriate for graduate students and advanced undergraduate students with prior knowledge of elementary quantum mechanics, basic probability, and linear algebra. Quantum probability as a generalization of classical probability theory, with implications for information theory and computer science. Generalized quantum measurement theory, conditional expectation, and quantum noise theory with an emphasis on communications and precision measurements. Classical versus quantum correlations, entanglement and Bell's theorem. Introduction to quantum information processing including algorithms, error correction and communication protocols.

**APPPHYS 203. Atoms, Fields and Photons. 4 Units.**

Applied Physics Core course appropriate for graduate students and advanced undergraduate students with prior knowledge of elementary quantum mechanics, electricity and magnetism, and ordinary differential equations. Structure of single- and multi-electron atoms; electron correlation, atom-photon and atom-atom entanglement; fundamentals of laser spectroscopy and coherent control. Phenomenology and quantitative modeling of atoms in strong fields, with modern applications. Introduction to quantum optical theory of atom-photon interactions, including quantum trajectory theory.

**APPPHYS 204. Quantum Materials. 4 Units.**

Applied Physics Core course appropriate for graduate students and advanced undergraduate students with prior knowledge of elementary quantum mechanics. Introduction to materials of current interest, with an emphasis on quantum matter. Topics include superconductivity, magnetism, phase transitions, multiferroics, surface and interface states. Prerequisite: elementary course in quantum mechanics.

**APPPHYS 205. Introduction to Biophysics. 3-4 Units.**

Core course appropriate for advanced undergraduate students and graduate students with prior knowledge of calculus and a college physics course. Introduction to how physical principles offer insights into modern biology, with regard to the structural, dynamical, and functional organization of biological systems. Topics include the roles of free energy, diffusion, electromotive forces, non-equilibrium dynamics, and information in fundamental biological processes.  
Same as: BIO 126, BIO 226.

**APPPHYS 207. Laboratory Electronics. 4 Units.**

Lecture/lab emphasizing analog and digital electronics for lab research. RC and diode circuits. Transistors. Feedback and operational amplifiers. Active filters and circuits. Pulsed circuits, voltage regulators, and power circuits. Precision circuits, low-noise measurement, and noise reduction techniques. Circuit simulation tools. Analog signal processing techniques and modulation/demodulation. Principles of synchronous detection and applications of lock-in amplifiers. Common laboratory measurements and techniques illustrated via topical applications. Limited enrollment. Prerequisites: undergraduate device and circuit exposure.

**APPPHYS 208. Laboratory Electronics. 4 Units.**

Lecture/lab emphasizing analog and digital electronics for lab research. Continuation of APPPHYS 207 with emphasis on applications of digital techniques. Combinatorial and synchronous digital circuits. Design using programmable logic. Analog/digital conversion. Microprocessors and real time programming, concepts and methods of digital signal processing techniques. Current lab interface protocols. Techniques commonly used for lab measurements. Development of student lab projects during the last three weeks. Limited enrollment. Prerequisites: undergraduate device and circuit exposure. Recommended: previous enrollment in APPPHYS 207.

**APPPHYS 215. Numerical Methods for Physicists and Engineers. 4 Units.**

Review of basic numerical techniques with additional advanced material: derivatives and integrals; linear algebra; linear least squares fitting, FFT and wavelets, singular value decomposition, linear prediction; optimization, nonlinear least squares, maximum entropy methods; deterministic and stochastic differential equations, Monte Carlo methods.

**APPPHYS 216. X-Ray and VUV Physics. 3 Units.**

Research and classical concepts in photon science. Photon-electron interactions; x-ray absorption and Compton scattering. X-ray spectroscopy; EXAFS, SEXAFS, edge structure, magnetic circular dichroism, and linear dichroism. Photoemission spectroscopy and many-electron effects: angle-resolved and integrated photoemission, resonance photoemission, spin-polarized photoemission. Photoelectron diffraction and holography. X-ray interactions with condensed matter: diffraction and scattering. Photon sources: synchrotron, wigglers, and undulators. Photon and electron detectors and analyzers. Prerequisite: familiarity with quantum mechanics.

**APPPHYS 217. Estimation and Control Methods for Applied Physics. 4 Units.**

Recursive filtering, parameter estimation, and feedback control methods based on linear and nonlinear state-space modeling. Topics in: dynamical systems theory; practical overview of stochastic differential equations; model reduction; and tradeoffs among performance, complexity, and robustness. Numerical implementations in MATLAB. Contemporary applications in systems biology and quantum precision measurement. Prerequisites: linear algebra and ordinary differential equations.

**APPPHYS 219. Solid State Physics and the Energy Challenge. 3 Units.**

Technology issues for a secure energy future; role of solid state physics in energy technologies. Topics include the physics principles behind future technologies related to solar energy and solar cells, solid state lighting, superconductivity, solid state fuel cells and batteries, electrical energy storage, materials under extreme condition, nanomaterials.

**APPPHYS 220. Applied Electrodynamics. 3 Units.**

Techniques for general electrodynamics, illustrated by examples from geophysics, microwave engineering, optical devices, accelerators, antennas, and plasma physics. RF/microwave structure representations, scattering matrices, treatments for periodic systems. Perturbation and variational techniques applied to approximate solutions, fundamentals of numerical techniques. Analysis methods via expansions in terms of natural modes. Introduction to finite element methods via the application of variational techniques. Laboratory experiments including time domain and frequency domain methods. Solutions of inverse electrodynamic problems via perturbation techniques coupled with lab measurements (such as estimation of a physical structure via experimental measurements and formal models). Prerequisites: PHYSICS 121, MATH 106 and MATH 132, or equivalent experience.

**APPPHYS 223. Stochastic and Nonlinear Dynamics. 3 Units.**

Theoretical analysis of dynamical processes: dynamical systems, stochastic processes, and spatiotemporal dynamics. Motivations and applications from biology and physics. Emphasis is on methods including qualitative approaches, asymptotics, and multiple scale analysis. Prerequisites: ordinary and partial differential equations, complex analysis, and probability or statistical physics.  
Same as: BIO 223.

**APPPHYS 223B. Nonlinear Dynamics: This Side of Chaos. 3 Units.**

Linear dynamics, periodic systems, Hamiltonian motion and phase space. The physics of nonlinear motion: thinking in phase space. Perturbation theory, periodic orbits, resonances, stability and instability. Integrability and symplectic integration. The KAM theorem and renormalization description of the transition to chaos. Dissipation and bifurcation. Application of methods to nanoscience, lasers and accelerators, condensed matter physics and biophysics. Prerequisites: differential equations and classical mechanics.

**APPPHYS 227. Quantum Device Physics of Atomic and Semiconductor Systems. 3 Units.**

Concepts and constituent technologies of quantum information systems. Quantum cryptography: single photon and entangled photon-pair-based quantum key distributions, quantum teleportation, quantum repeater. Quantum computer: Deutsch-Josza algorithm, Grover algorithm, Shor algorithm, quantum simulation, quantum circuits. Quantum hardware: atomic physics, nuclear magnetic resonance, spintronics and quantum optics.

**APPPHYS 232. Advanced Imaging Lab in Biophysics. 4 Units.**

Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.  
Same as: BIO 132, BIO 232, BIOPHYS 232, MCP 232.

**APPPHYS 236. Biology by the Numbers: Evolution. 3 Units.**

Topics in biology from a quantitative perspective. Subjects vary. 2012-13 focus: evolution, from basic principles of evolutionary dynamics to fundamental quantitative questions that are far from being answered; from early life, metabolic processes, and molding of earth by microbes to spread of human epidemics; from analysis of genomes and molecular phylogenies to aspects of multi-cellular development. Prerequisite: familiarity with ordinary differential equations and probability. Biology background not required.  
Same as: BIOC 236.

**APPPHYS 240. From Atom Smashers to X-ray Lasers. 3 Units.**

Physics and impact of particle beams and accelerators from their origins up to the present state of the art. Accelerator fundamentals, special topic lectures by expert scientists, laboratory accelerator experiment using state of the art accelerators at SLAC. Prerequisites: Advanced undergraduate courses in Maxwell's equations, special relativity, mathematical physics, and introductory quantum mechanics.

**APPPHYS 270. Magnetism and Long Range Order in Solids. 3 Units.**

Cooperative effects in solids. Topics include the origin of magnetism in solids, crystal electric field effects and anisotropy, exchange, phase transitions and long-range order, ferromagnetism, antiferromagnetism, metamagnetism, density waves and superconductivity. Emphasis is on archetypal materials. Prerequisite: PHYSICS 172 or MATSCI 209, or equivalent introductory condensed matter physics course.

**APPPHYS 272. Solid State Physics. 3 Units.**

Introduction to the properties of solids. Crystal structures and bonding in materials. Momentum-space analysis and diffraction probes. Lattice dynamics, phonon theory and measurements, thermal properties. Electronic structure theory, classical and quantum; free, nearly-free, and tight-binding limits. Electron dynamics and basic transport properties; quantum oscillations. Properties and applications of semiconductors. Reduced-dimensional systems. (Graduate student enrollees will be required to complete additional assignments in a format determined by the instructor). Undergraduates should register for PHYSICS 172 and graduate students for APPPHYS 272. Prerequisites: PHYSICS 170 and PHYSICS 171, or equivalents.  
Same as: PHYSICS 172.

**APPPHYS 273. Solid State Physics II. 3 Units.**

Introduction to the many-body aspects of crystalline solids. Second quantization of phonons, anharmonic effects, polaritons, and scattering theory. Second quantization of Fermi fields. Electrons in the Hartree-Fock and random phase approximation; electron screening and plasmons. Magnetic exchange interactions. Electron-phonon interaction in ionic/covalent semiconductors and metals; effective attractive electron-electron interactions, Cooper pairing, and BCS description of the superconducting state. Prerequisite: APPPHYS 272 or PHYSICS 172.

**APPPHYS 280. Phenomenology of Superconductors. 3 Units.**

Phenomenology of superconductivity viewed as a macroscopic quantum phenomenon. Topics include the superconducting pair wave function, London and Ginzburg-Landau theories, the Josephson effect, type I type II superconductivity, and the response of superconductors to currents, magnetic fields, and RF electromagnetic radiation. Introduction to thermal fluctuation effects in superconductors and quantum superconductivity.

**APPPHYS 285. Physics of Disordered Systems. 3 Units.**

Topics include types of disorder, percolation, localization, glasses and spin glasses, fractals, self-organized criticality, aggregation, gelation, and other random processes leading to disordered media.

**APPPHYS 290. Directed Studies in Applied Physics. 1-15 Units.**

Special studies under the direction of a faculty member for which academic credit may properly be allowed. May include lab work or directed reading.

**APPPHYS 291. Practical Training. 3 Units.**

Opportunity for practical training in industrial labs. Arranged by student with research adviser's approval. Summary of activities required.

**APPPHYS 293. Theoretical Neuroscience. 3 Units.**

Introduction to fundamental theoretical ideas that provide conceptual insights into how networks of neurons cooperatively mediate important brain functions. Topics include basic mathematical models of single neurons, neuronal computation through feedforward and recurrent network dynamics, principles of associative memory, applications of information theory to early sensory systems, correlations and neural population coding, network plasticity and the self-organization of stimulus selectivity, and supervised and unsupervised learning through multiple mechanisms of synaptic plasticity. Emphasis on developing mathematical and computational skills to analyze complex neural systems. Prerequisites: calculus, linear algebra, and basic probability theory, or consent of instructor.

**APPPHYS 294. Cellular Biophysics. 3 Units.**

Physical biology of dynamical and mechanical processes in cells. Emphasis is on qualitative understanding of biological functions through quantitative analysis and simple mathematical models. Sensory transduction, signaling, adaptation, switches, molecular motors, actin and microtubules, motility, and circadian clocks. Prerequisites: differential equations and introductory statistical mechanics.  
Same as: BIO 294.

**APPPHYS 302. Experimental Techniques in Condensed Matter Physics. 4 Units.**

Cryogenics; low signal measurements and noise analysis; data collection and analysis; examples of current experiments. Prerequisites: PHYSICS 170, PHYSICS 171, and PHYSICS 172, or equivalents.

**APPPHYS 304. Lasers Laboratory. 4 Units.**

Theory and practice. Theoretical and descriptive background for lab experiments, detectors and noise, and lasers (helium neon, beams and resonators, argon ion, cw dye, titanium sapphire, semiconductor diode, and the Nd:YAG). Measurements of laser threshold, gain, saturation, and output power levels. Laser transverse and axial modes, linewidth and tuning, Q-switching and modelocking. Limited enrollment. Prerequisites: EE 231 and EE 232, or consent of instructor.

**APPPHYS 305. Advanced Nonlinear Optics Laboratory. 4 Units.**

Core concepts and experiments in the nonlinear interaction of laser light with matter. Experiments on second harmonic generation and optical parametric oscillation culminate with assembly and use of an optical frequency comb for student-defined, open-ended experiments. Supercontinuum light generation, carrier-envelope phase stabilization, and metrology and spectroscopy. Prerequisites: APPPHYS 304 and EE 346 or EE 231 and EE 232, or consent of instructor.

**APPPHYS 315. Methods in Computational Biology. 3 Units.**

Methods of bioinformatics and biomolecular modeling from the standpoint of biophysical chemistry. Methods of genome analysis; cluster analysis, phylogenetic trees, microarrays; protein, RNA and DNA structure and dynamics, structural and functional homology; protein-protein interactions and cellular networks; molecular dynamics methods using massively parallel algorithms.

**APPPHYS 324. Introduction to Accelerator Physics. 3 Units.**

Physics of particle beams in linear and circular accelerators. Transverse beam dynamics, acceleration, longitudinal beam dynamics, synchrotron radiation, free electron lasers, collective instabilities and nonlinear effects. Topics of current research in accelerator physics. Selected laboratory measurements at SLAC to augment the lecture material.

**APPPHYS 325. X-rays: Past, Present and Future. 3 Units.**

Introduction to the physics of bright x-ray sources. Topics include: physics and basic properties of short wavelength radiation, X-ray generation via incoherent Compton scattering and High Harmonic Generation (HHG), applications and impact of insertion devices in synchrotron radiation facilities and the development of x-ray free electron lasers. Includes selected laboratory tours of the Linac Coherent Light Source and/or measurements at SLAC. Prerequisite: graduate-level electrodynamics, or consent of instructor.

**APPPHYS 345. Advanced Numerical Methods for Data Analysis and Simulation. 3 Units.**

Gaussian and unit sphere quadrature, singular value decomposition and principal component analysis, Krylov methods, non-linear fitting and super-resolution, independent component analysis, 3d reconstruction, "shrink-wrap", hidden Markov methods, support vector machines, simulated annealing, molecular dynamics and parallel tempering, Markov state methods, Monte Carlo methods for constrained systems.

**APPPHYS 376. Literature of Ultracold Atomic Physics. 3 Units.**

Ultracold atomic gases in modern quantum optics, metrology, quantum information science, and quantum many-body physics. Review of basic concepts and survey of key literature in seminar format.

**APPPHYS 383. Introduction to Atomic Processes. 3 Units.**

Atomic spectroscopy, matrix elements using the Coulomb approximation, summary of Racah algebra, oscillator and line strengths, Einstein A coefficients. Radiative processes, Hamiltonian for two- and three-state systems, single- and multi-photon processes, linear and nonlinear susceptibilities, density matrix, brightness, detailed balance, and electromagnetically induced transparency. Inelastic collisions in the impact approximation, interaction potentials, Landau-Zener formulation. Continuum processes, Saha equilibrium, autoionization, and recombination.

**APPPHYS 387. Quantum Optics and Measurements. 3 Units.**

Basic concerns and fundamental postulates in quantum theory of measurements. Quantum non-demolition measurements, nonlinear measurements and continuous measurements. Non-local quantum correlation and Bell's inequality. Generation, detection, and application of single photons and entangled photon-pairs. Reservoir theory of an open dissipative system. Laser phase transition versus BCS transition in microcavities.

**APPPHYS 389. Bose-Einstein Condensation and Lasers. 3 Units.**

Topics include comparison of physics of Bose-Einstein Condensation (BEC) to physics of lasers, system differences and similarities between the quantum statistical properties of BEC and of lasers, BEC of non-interacting particles, Bogoliubov theory of interacting BEC and Gross-Pitaevskii equation, superfluidity and quantized vortices, quantum theory of laser, quantum noise and coherence functions, quantum correlation and squeezing.

**APPPHYS 390. Dissertation Research. 1-15 Units.****APPPHYS 392. Topics in Molecular Biophysics. 3 Units.**

Concepts from statistical mechanics applied to contemporary molecular biology: allosteric transitions; protein folding; molecular recognition; actin polymers and gels; molecular motors; lipids and membrane proteins; ion channels. Some of the basic models used to quantitate fundamental biomolecular functions. Prerequisites: elementary statistical mechanics and chemical kinetics.

**APPPHYS 470. Condensed Matter Seminar. 1 Units.**

Current research and literature; offered by faculty, students, and outside specialists. May be repeated for credit.

**APPPHYS 483. Optics and Electronics Seminar. 1 Units.**

Current research topics in lasers, quantum electronics, optics, and photonics by faculty, students, and invited outside speakers. May be repeated for credit.

**APPPHYS 802. TGR Dissertation. 0 Unit.**

## Arabic Language Courses

**ARABLANG 1. First-Year Arabic, First Quarter. 5 Units.**

(Formerly AMELANG 1A.) One-year sequence designed to develop beginning proficiency, with additional emphasis is on reading and writing standard Arabic (*fusha*).

**ARABLANG 1A. Accelerated First-Year Arabic, Part I. 5 Units.**

completes first-year sequence in two rather than three quarters. For students with previous knowledge of Arabic. Prerequisite: Placement Test or consent of instructor.

**ARABLANG 1H. First-Year Arabic for Heritage Learners, First Quarter. 5 Units.**

(Formerly AMELANG 1H). For students with home background or study/living experience in the Arab world. Designed to develop reading, writing, speaking and listening abilities in Arabic, as well as cultural knowledge. The course offers Arabic heritage and semi-heritage learners an opportunity to reactivate and expand their skills while studying both Modern Standard and Colloquial Arabic (Levantine Arabic) formally in an academic setting. Prerequisite: Placement Test or consent of instructor.

**ARABLANG 2. First-Year Arabic, Second Quarter. 5 Units.**

(Formerly AMELANG 1B.) One-year sequence designed to develop beginning proficiency, with additional emphasis is on reading and writing standard Arabic (*fusha*). Prerequisite: Placement Test, ARABLANG 1 or consent of instructor.

**ARABLANG 2A. Accelerated First-Year Arabic, Part II. 5 Units.**

Completes first-year sequence in two rather than three quarters. For students with previous knowledge of Arabic. Prerequisite: Placement Test, completion of ARABLANG 1A or consent of instructor. This course fulfills the University Foreign Language Requirement.

**ARABLANG 2H. First-Year Arabic for Heritage Learners, Second Quarter. 5 Units.**

(Formerly AMELANG 2H). Continuation of ARABLANG 1H. For students with home background or study/living experience in the Arab world. Designed to develop reading, writing, speaking and listening abilities in Arabic, as well as cultural knowledge. The course offers Arabic heritage and semi-heritage learners an opportunity to reactivate and expand their skills while studying both Modern Standard and Colloquial Arabic (Levantine Arabic) formally in an academic setting. Prerequisite: Placement Test, ARABLANG 1H or consent of instructor.

**ARABLANG 3. First-Year Arabic, Third Quarter. 5 Units.**

(Formerly AMELANG 1C.) Continuation of ARABLANG 2. One-year sequence designed to develop beginning proficiency, with additional emphasis on reading and writing standard Arabic (*fusha*). Fulfills the University Foreign Language Requirement. Prerequisite: Placement Test, ARABLANG 2 or consent of instructor.

**ARABLANG 3H. Beginning Arabic for Heritage Learners, Third Quarter. 5 Units.**

Continuation of ARABLANG 2H. For students with home background or study/living experience in the Arab world. Designed to develop reading, writing, speaking and listening abilities in Arabic, as well as cultural knowledge. The course offers Arabic heritage and semi-heritage learners an opportunity to reactivate and expand their skills while studying both Modern Standard and Colloquial Arabic (Levantine Arabic) formally in an academic setting. Prerequisite: ARABLANG 2H or consent of instructor.

**ARABLANG 10. Arabic Calligraphy. 2 Units.**

(Formerly AMELANG 30). Calligraphy requires no linguistic background, stipulates no artistic skill for one to appreciate it and is the supreme art form of the Islamic world. Other Islamic arts (architecture, metal work, ceramics, glass, and textiles) draw on calligraphy as their principal source of embellishment. Interactive lecture-workshop sketches its development and illustrates the forms of Arabic calligraphy in use today.

**ARABLANG 21. Second-Year Arabic, First Quarter. 5 Units.**

(Formerly AMELANG 11A.) One-year sequence designed to develop intermediate proficiency, with additional emphasis on functional applications and reading and writing standard Arabic. Prerequisite: Placement Test, ARABLANG 3 or consent of instructor.

**ARABLANG 21A. Accelerated Second-Year Arabic, Part I. 5 Units.**

Completes Second-year sequence in two rather than three quarters. For students with previous knowledge of Arabic. Prerequisite: Placement Test, ARABLANG 2A or consent of instructor.

**ARABLANG 21H. Second-Year Arabic for Heritage Learners, First Quarter. 5 Units.**

(Formerly AMELANG 11H). For students with home background or study/living experience in the Arab world. Designed to develop reading, writing, speaking and listening abilities in Arabic, as well as cultural knowledge. The course offers Arabic heritage and semi-heritage learners an opportunity to reactivate and expand their skills while studying both Modern Standard and Colloquial Arabic (Levantine Arabic) formally in an academic setting. Prerequisite: Placement Test, ARABLANG 3H, or consent of instructor.

**ARABLANG 22. second-Year Arabic, Second Quarter. 5 Units.**

(Formerly AMELANG 11B.) Continuation of ARABLANG 21. One-year sequence designed to develop intermediate proficiency, with additional emphasis on functional applications and reading and writing standard Arabic. Prerequisite: Placement Test, ARABLANG 21 or consent of instructor.

**ARABLANG 22A. Accelerated second-Year Arabic, Part II. 5 Units.**

Completes Second-year sequence in two rather than three quarters. For students with previous knowledge of Arabic. Prerequisite: Placement Test, ARABLANG 22A or consent of instructor.

**ARABLANG 22H. Second-Year Arabic for Heritage Learners, Second Quarter. 5 Units.**

(Formerly AMELANG 12H). Continuation of ARABLANG 21H. For students with home background or study/living experience in the Arab world. Designed to develop reading, writing, speaking and listening abilities in Arabic, as well as cultural knowledge. The course offers Arabic heritage and semi-heritage learners an opportunity to reactivate and expand their skills while studying both Modern Standard and Colloquial Arabic (Levantine Arabic) formally in an academic setting. Prerequisite: Placement Test, ARABLANG 21H or consent of instructor.

**ARABLANG 23. Second-Year Arabic, Third Quarter. 5 Units.**

(Formerly AMELANG 11C.) Continuation of ARABLANG 22. One-year sequence designed to develop intermediate proficiency, with additional emphasis on functional applications and reading and writing standard Arabic. Prerequisite: Placement Test, ARABLANG 22 or consent of instructor.

**ARABLANG 23H. Second-Year Arabic for Heritage Learners, Third Quarter. 5 Units.**

(Formerly AMELANG 13H). Continuation of ARABLANG 22H. For students with home background or study/living experience in the Arab world. Designed to develop reading, writing, speaking and listening abilities in Arabic, as well as cultural knowledge. The course offers Arabic heritage and semi-heritage learners an opportunity to reactivate and expand their skills while studying both Modern Standard and Colloquial Arabic (Levantine Arabic) formally in an academic setting. Prerequisite: Placement Test, ARABLANG 23H or consent of instructor.

**ARABLANG 125A. Colloquial Arabic, First Quarter. 2-4 Units.**

(Formerly AMELANG 25A.) Sources include authentic videotaped conversations with native speakers, conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: 2 years of Arabic or consent of instructor.

**ARABLANG 125B. Colloquial Arabic, Second Quarter. 2-4 Units.**

(Formerly AMELANG 25B.) Continuation of ARABLANG 125A. Sources include authentic videotaped conversations with native speakers, conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: ARABLANG 125A or consent of instructor.

**ARABLANG 125C. Colloquial Arabic, Third Quarter. 2-4 Units.**  
(Formerly AMELANG 25C.) Continuation of ARABLANG 125B. Sources include authentic videotaped conversations with native speakers, conversations, and texts of these conversations to enhance comprehension and improve aural skills. Prerequisite: ARABLANG 125B or consent of instructor.

**ARABLANG 126A. Media Arabic, First Quarter. 2-4 Units.**  
(Formerly AMELANG 26A.) Arabic language used today in the printed and electronic media, including the Internet. Emphasizes current vocabulary and structures used in different modes of media coverage. Prerequisite: 2 years of Arabic or consent of instructor.

**ARABLANG 126B. Media Arabic, Second Quarter. 2-4 Units.**  
(Formerly AMELANG 26B.) Continuation of ARABLANG 126A. Arabic language used today in the printed and electronic media, including the Internet. Emphasizes current vocabulary and structures used in different modes of media coverage. Prerequisite: ARABLANG 126A or consent of instructor.

**ARABLANG 126C. Media Arabic, Third Quarter. 2-4 Units.**  
(Formerly AMELANG 26C.) Continuation of ARABLANG 126B. Arabic language used today in the printed and electronic media, including the Internet. Emphasizes current vocabulary and structures used in different modes of media coverage. Prerequisite: ARABLANG 126B or consent of instructor.

**ARABLANG 131. Third-Year Arabic, First Quarter. 5 Units.**  
(Formerly AMELANG 21A.) Continuation of ARABLANG 23. One-year sequence designed to develop advanced proficiency with emphasis on complex and compound sentences through use of literary works, media Arabic, the Internet, and cultural productions. Prerequisite: Placement Test, ARABLANG 23 or consent of instructor.

**ARABLANG 131H. Third-Year Arabic for Heritage Learners, First Quarter. 5 Units.**  
Continuation of ARABLANG 23H. Prerequisite ARABLANG 23H or consent of instructor.

**ARABLANG 132. Third-Year Arabic, Second Quarter. 5 Units.**  
(Formerly AMELANG 21B.) Continuation of ARABLANG 131. One-year sequence designed to develop advanced proficiency with emphasis on complex and compound sentences through use of literary works, media Arabic, the Internet, and cultural productions. Prerequisite: Placement Test, ARAB;AMG 131 or consent of instructor.

**ARABLANG 132H. Third-Year Arabic for Heritage Learners, Second Quarter. 5 Units.**  
Continuation of ARABLANG 131H. Prerequisite: ARABLANG 131H or consent of instructor.

**ARABLANG 133. Third-Year Arabic, Third Quarter. 5 Units.**  
(Formerly AMELANG 21C.) Continuation of ARABLANG 132. One-year sequence designed to develop advanced proficiency with emphasis on complex and compound sentences through use of literary works, media Arabic, the Internet, and cultural productions. Prerequisite: Placement Test, ARABLANG 132 or consent of instructor.

**ARABLANG 133H. Third-Year Arabic for Heritage Learners, Third Quarter. 5 Units.**  
Continuation of ARABLANG 132H. Prerequisite: ARABLANG 132H or consent of instructor.

**ARABLANG 141. Fourth-Year Arabic, First Quarter. 3-4 Units.**  
(Formerly AMELANG 23A.) Prerequisite: three years of Arabic or consent of instructor.

**ARABLANG 142. Fourth-Year Arabic, Second Quarter. 3-4 Units.**  
(Formerly AMELANG 23B.) Continuation of ARABLANG 141. Prerequisite: ARABLANG 141 or consent of instructor.

**ARABLANG 143. Fourth-Year Arabic, Third Quarter. 3-4 Units.**  
(Formerly AMELANG 23C.) Continuation of ARABLANG 142. Prerequisite ARABLANG 142 or consent of instructor.

**ARABLANG 297. Directed Reading. 1-5 Units.**

**ARABLANG 395. Graduate Studies in Arabic. 2-5 Units.**  
Prerequisite: Consent of instructor.

## Archaeology Courses

**ARCHLGY 1. Introduction to Prehistoric Archeology. 3-5 Units.**  
Aims, methods, and data in the study of human society's development from early hunters through late prehistoric civilizations. Archaeological sites and remains characteristic of the stages of cultural development for selected geographic areas, emphasizing methods of data collection and analysis appropriate to each.  
Same as: ANTHRO 3.

**ARCHLGY 1. Introduction to Prehistoric Archeology. 3-5 Units.**  
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Same as: ANTHRO 3.

**ARCHLGY 12. Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years. 3-5 Units.**  
Fossil, genetic and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. This class introduces students to the data and issues regarding human dispersal, migration and colonization of continents and islands around the world. We explore problems related to the timing and cause of colonizing events, and investigate questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and our contemporary environmental crisis.  
Same as: ANTHRO 18, EARTHYSYS 21, HUMBIO 182.

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Same as: ANTHRO 18, EARTHYSYS 21, HUMBIO 182.

**ARCHLGY 55. Introduction to Archaeobotany. 5 Units.**

The aim of this course is to provide a short introduction to archaeobotany. An overview of types of archaeobotanical remains will include an examination of macrobotanical remains (seeds, charcoal), microfossil remains (starch, pollen, phytoliths) and molecular remains (aDNA, isotopes). The ways in which various types of plant remains have been used will be discussed through case studies. Major debates that archaeobotanical research has shed light on, including the origins of agriculture and issues around domestication will also be examined. Some practical work will allow students to gain familiarity with botanical nomenclature and some archaeobotanical protocols and plant identification techniques. Students will look at microfossil residues from local grinding slabs and write a short paper on the residues recovered. They will also look at seed remains from either Chinese or local flotation samples using microscopes in the lab. Same as: ANTHRO 55A.

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**ARCHLGY 64. Cultural Heritage and Human Rights. 1 Unitss.**

This interdisciplinary research workshop will critically engage the issue of the growing currency of human rights discourse within cultural heritage. Epistemological and practical areas of tension between rights discourse and cultural discourse will be surveyed within the context of current global challenges facing heritage practice, conservation and archaeology. Topics will include the inequities of cultural recognition between North-South globalizations, questions of cultural property and rights, the role of tourism, and the impact of environmental conservation discourse on cultural rights. Same as: ARCHLGY 164.

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**ARCHLGY 85. The Archaeology of Roman Imperialism. 3-5 Units.**

Analysis of the material culture of the early Roman empire (1st and 2nd c. CE). Focus is on new archaeological perspectives, theories and anthropological insights. Imperialism, colonialism and novel perspectives on centres, peripheries and frontiers. Imperial conceptualizations of time and space. Imperial landscapes: colonies, cities (private and public buildings), the country side, roads and ports. Imperial memories: the past in the past, ancestor cult in the house and the tomb, imperial funerals. Experiencing empire, discrepant identities (gender, age, the Roman 'others'). Same as: CLASSART 85.

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**ARCHLGY 99A. Historical Archaeology in the Archive, Lab, and Underground: Methods. 5 Units.**

The practice of historical archaeology through methodologies including archival research, oral history, material culture analysis, and archaeological excavation. Students use these methods to analyze the history and archaeology of a local park, the Thornewood Open Space Preserve.

**ARCHLGY 99A. Historical Archaeology in the Archive, Lab, and Underground: Methods. 5 Units.**

The practice of historical archaeology through methodologies including archival research, oral history, material culture analysis, and archaeological excavation. Students use these methods to analyze the history and archaeology of a local park, the Thornewood Open Space Preserve.

**ARCHLGY 102. Archaeological Methods. 5 Units.**

Methodological issues related to the investigation of archaeological sites and objects. Aims and techniques of archaeologists including: location and excavation of sites; dating of places and objects; analysis of artifacts and technology and the study of ancient people, plants, and animals. How these methods are employed to answer the discipline's larger research questions. Same as: ANTHRO 91A.

**ARCHLGY 102. Archaeological Methods. 5 Units.**

Methodological issues related to the investigation of archaeological sites and objects. Aims and techniques of archaeologists including: location and excavation of sites; dating of places and objects; analysis of artifacts and technology and the study of ancient people, plants, and animals. How these methods are employed to answer the discipline's larger research questions. Same as: ANTHRO 91A.

**ARCHLGY 103. History of Archaeological Thought. 5 Units.**

Introduction to the history of archaeology and the forms that the discipline takes today, emphasizing developments and debates over the past five decades. Historical overview of culture, historical, processual and post-processual archaeology, and topics that illustrate the differences and similarities in these theoretical approaches. Same as: ANTHRO 90A.

**ARCHLGY 103. History of Archaeological Thought. 5 Units.**

Introduction to the history of archaeology and the forms that the discipline takes today, emphasizing developments and debates over the past five decades. Historical overview of culture, historical, processual and post-processual archaeology, and topics that illustrate the differences and similarities in these theoretical approaches. Same as: ANTHRO 90A.

**ARCHLGY 104C. The Archaeology of Ancient China. 5 Units.**

Early China from the perspective of material remains unearthed from archaeological sites; the development of Chinese culture from early hominid occupation nearly 2 million years ago through the development of agriculture in the Neolithic period and complex society in the Bronze Age to the political unification of China under the Qin Dynasty. Continuity of Chinese culture from past to present, history of Chinese archaeology, relationships between archaeology and politics, and food in early China. Same as: ARCHLGY 304C.

**ARCHLGY 104C. The Archaeology of Ancient China. 5 Units.**

Early China from the perspective of material remains unearthed from archaeological sites; the development of Chinese culture from early hominid occupation nearly 2 million years ago through the development of agriculture in the Neolithic period and complex society in the Bronze Age to the political unification of China under the Qin Dynasty. Continuity of Chinese culture from past to present, history of Chinese archaeology, relationships between archaeology and politics, and food in early China. Same as: ARCHLGY 304C.

**ARCHLGY 105. Heritage: Theorizations of the Past. 3-5 Units.**

This course explores the emergence of heritage from within the broader field of modern historical thought. Readings explore how transformations in economic theory and changes in traditional philosophies of history have shaped how the historical event and historical figures are cast and recast within heritage. The distinctive modes by which archaeological sites and heritage sites are spatialized, linked and narrated are explored as these relate to corresponding turns in the modern concepts of freedom, inequality, personhood, sovereignty, community and culture.

Same as: ARCHLGY 205.

**ARCHLGY 105. Heritage: Theorizations of the Past. 3-5 Units.**

This course explores the emergence of heritage from within the broader field of modern historical thought. Readings explore how transformations in economic theory and changes in traditional philosophies of history have shaped how the historical event and historical figures are cast and recast within heritage. The distinctive modes by which archaeological sites and heritage sites are spatialized, linked and narrated are explored as these relate to corresponding turns in the modern concepts of freedom, inequality, personhood, sovereignty, community and culture.

Same as: ARCHLGY 205.

**ARCHLGY 106A. Museums and Collections. 5 Units.**

Practical, theoretical, and ethical issues which face museums and collections. Practical collections-based work, museum visits, and display research. The roles of the museum in contemporary society. Students develop their own exhibition and engage with the issues surrounding the preservation of material culture.

Same as: ARCHLGY 306A.

**ARCHLGY 106A. Museums and Collections. 5 Units.**

Practical, theoretical, and ethical issues which face museums and collections. Practical collections-based work, museum visits, and display research. The roles of the museum in contemporary society. Students develop their own exhibition and engage with the issues surrounding the preservation of material culture.

Same as: ARCHLGY 306A.

**ARCHLGY 107A. Archaeology as a Profession. 5 Units.**

Academic, contract, government, field, laboratory, museum, and heritage aspects of the profession.

Same as: ANTHRO 101A.

**ARCHLGY 107A. Archaeology as a Profession. 5 Units.**

Academic, contract, government, field, laboratory, museum, and heritage aspects of the profession.

Same as: ANTHRO 101A.

**ARCHLGY 111. Emergence of Chinese Civilization from Caves to Palaces. 3-4 Units.**

Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism.

Same as: CHINGEN 141, CHINGEN 241.

**ARCHLGY 111. Emergence of Chinese Civilization from Caves to Palaces. 3-4 Units.**

Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism.

Same as: CHINGEN 141, CHINGEN 241.

**ARCHLGY 124. Archaeology of Food: production, consumption and ritual. 3-5 Units.**

This course explores many aspects of food in human history from an archaeological perspective. We will discuss how the origins of agriculture helped to transform human society; how food and feasting played a prominent role in the emergence of social hierarchies and the development of civilization; and how various foodways influenced particular cultures. We will also conduct experimental studies to understand how certain methods of food procurement, preparation, and consumption can be recovered archaeologically.

Same as: ARCHLGY 224.

**ARCHLGY 124. Archaeology of Food: production, consumption and ritual. 3-5 Units.**

This course explores many aspects of food in human history from an archaeological perspective. We will discuss how the origins of agriculture helped to transform human society; how food and feasting played a prominent role in the emergence of social hierarchies and the development of civilization; and how various foodways influenced particular cultures. We will also conduct experimental studies to understand how certain methods of food procurement, preparation, and consumption can be recovered archaeologically.

Same as: ARCHLGY 224.

**ARCHLGY 125. ARCHAEOLOGICAL SURVEY METHODS. 3-5 Units.**

Practicum applying a variety of survey techniques to discover, map, and record prehistoric and historic archaeological sites on Stanford's 8180 acres. Basic cartographic skills for archaeologists and an introduction to GIS tools, GPS instruments, and geophysical techniques. Participants should be able to walk 3-4 miles in uneven terrain or make special arrangements with the instructor for transportation.

Same as: ARCHLGY 225.

**ARCHLGY 125. ARCHAEOLOGICAL SURVEY METHODS. 3-5 Units.**

Practicum applying a variety of survey techniques to discover, map, and record prehistoric and historic archaeological sites on Stanford's 8180 acres. Basic cartographic skills for archaeologists and an introduction to GIS tools, GPS instruments, and geophysical techniques. Participants should be able to walk 3-4 miles in uneven terrain or make special arrangements with the instructor for transportation.

Same as: ARCHLGY 225.

**ARCHLGY 127. Introduction to bioarchaeological Method and Theory. 3-5 Units.**

This course deals with the skeletal biology of past populations, covering both the theoretical approaches and methods used in the study of skeletal and dental remains. Issues surrounding the reconstruction of the individual and population, which include age, sex and other paleodemographic factors, will be explored. The health and disease of teeth and bones, and the biomechanical and chemical analyses of bone will also be explored to illustrate how the variety of methods available to bioarchaeologists can be used to reconstruct past lifeways. While this course will be of primary interest to students interested in skeletal biology and archaeology, it is not exclusive to those pursuing careers in biological anthropology. The emphasis is on critical analysis, research skills, and communication skills that can be useful to students pursuing careers in other sub-disciplines of anthropology, laboratory research, or other lateral health-related fields. Required readings will be selected from current literature, and in some classes there will be practical material/exercises so that students can learn some of these techniques. The class is intended to be an interactive learning process in discussion format, and students are required to take an active part in class along with lectures.  
Same as: ARCHLGY 227.

**ARCHLGY 127. Introduction to bioarchaeological Method and Theory. 3-5 Units.**

This course deals with the skeletal biology of past populations, covering both the theoretical approaches and methods used in the study of skeletal and dental remains. Issues surrounding the reconstruction of the individual and population, which include age, sex and other paleodemographic factors, will be explored. The health and disease of teeth and bones, and the biomechanical and chemical analyses of bone will also be explored to illustrate how the variety of methods available to bioarchaeologists can be used to reconstruct past lifeways. While this course will be of primary interest to students interested in skeletal biology and archaeology, it is not exclusive to those pursuing careers in biological anthropology. The emphasis is on critical analysis, research skills, and communication skills that can be useful to students pursuing careers in other sub-disciplines of anthropology, laboratory research, or other lateral health-related fields. Required readings will be selected from current literature, and in some classes there will be practical material/exercises so that students can learn some of these techniques. The class is intended to be an interactive learning process in discussion format, and students are required to take an active part in class along with lectures.  
Same as: ARCHLGY 227.

**ARCHLGY 129. Archaeology, Heritage, and the Contemporary Middle East. 3-5 Units.**

This course will explore the influence of the Ancient Near East on the Modern Middle East in terms of the religious, ethnic, racial and national identities of indigenous and diaspora communities and tourists. The goal is to understand today's issues and the current cultural character of the region in terms of its past. It will utilize anthropological and archaeological methodologies to show these connections, through examination of people, places, artifacts and ideologies. Among the concepts to be explored in the course will be the significance of sacred sites, migrations, exodus myths, conquest ideologies, East/West conflicts, imperialism, nationalism, identities, dichotomies and archaeology as expressed through heritage sites and symbolism. As an exploration of archaeology and human heritage, the curriculum focuses on modern peoples and their connections to the past rather than on the physical remains of past cultures, which is the central concern of traditional archaeology. Class sessions will combine presentations by the professor as well as specific topical papers given by students after consultation. Students will also be expected to participate and comment at the end of presentations. The following lecture outlines and readings may be slightly modified according to scheduling.  
Same as: ARCHLGY 229.

**ARCHLGY 129. Archaeology, Heritage, and the Contemporary Middle East. 3-5 Units.**

This course will explore the influence of the Ancient Near East on the Modern Middle East in terms of the religious, ethnic, racial and national identities of indigenous and diaspora communities and tourists. The goal is to understand today's issues and the current cultural character of the region in terms of its past. It will utilize anthropological and archaeological methodologies to show these connections, through examination of people, places, artifacts and ideologies. Among the concepts to be explored in the course will be the significance of sacred sites, migrations, exodus myths, conquest ideologies, East/West conflicts, imperialism, nationalism, identities, dichotomies and archaeology as expressed through heritage sites and symbolism. As an exploration of archaeology and human heritage, the curriculum focuses on modern peoples and their connections to the past rather than on the physical remains of past cultures, which is the central concern of traditional archaeology. Class sessions will combine presentations by the professor as well as specific topical papers given by students after consultation. Students will also be expected to participate and comment at the end of presentations. The following lecture outlines and readings may be slightly modified according to scheduling.  
Same as: ARCHLGY 229.

**ARCHLGY 130. To the Gods of the Underworld: Roman Funerary Archaeology. 3-5 Units.**

Contextual study of archaeological objects linked to funerary practices and traditions during the late Roman Republic and the early Empire (2nd c. BCE-1st c. CE). Funerary rituals and ritualization of space, the outskirts of the city. Beautiful and dangerous dead. Ancestor cult and ancestor representation. Funerary landscapes: monumental and not so monumental tombs. Grave offerings and grave assemblages. Public personas and funerary iconography: gender, age, occupation. Death in Rome and death in the provinces.  
Same as: CLASSART 125.

**ARCHLGY 130. To the Gods of the Underworld: Roman Funerary Archaeology. 3-5 Units.**

Contextual study of archaeological objects linked to funerary practices and traditions during the late Roman Republic and the early Empire (2nd c. BCE-1st c. CE). Funerary rituals and ritualization of space, the outskirts of the city. Beautiful and dangerous dead. Ancestor cult and ancestor representation. Funerary landscapes: monumental and not so monumental tombs. Grave offerings and grave assemblages. Public personas and funerary iconography: gender, age, occupation. Death in Rome and death in the provinces.  
Same as: CLASSART 125.

**ARCHLGY 132. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

This seminar will explore foundational concepts currently employed within heritage practice and debates. Readings will examine the historically formative context of colonial-era and nationalist discourses on stewardship and culture, as well as postcolonial reformulations of such concepts as cultural property, cultural recognition and public history. The seminar will engage the question of the relationship between foundational concepts and the current cosmopolitan and internationalist vision for heritage, probing the enduring dynamics of North-South divides in heritage development and archaeological practice.  
Same as: ANTHRO 332A, ARCHLGY 232, ARCHLGY 332.



**ARCHLGY 132. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

This seminar will explore foundational concepts currently employed within heritage practice and debates. Readings will examine the historically formative context of colonial-era and nationalist discourses on stewardship and culture, as well as postcolonial reformulations of such concepts as cultural property, cultural recognition and public history. The seminar will engage the question of the relationship between foundational concepts and the current cosmopolitan and internationalist vision for heritage, probing the enduring dynamics of North-South divides in heritage development and archaeological practice.

Same as: ANTHRO 332A, ARCHLGY 232, ARCHLGY 332.

**ARCHLGY 135. Constructing National History in East Asian Archaeology. 3-5 Units.**

Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.

Same as: ARCHLGY 235, CHINGEN 118, CHINGEN 218.

**ARCHLGY 135. Constructing National History in East Asian Archaeology. 3-5 Units.**

Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.

Same as: ARCHLGY 235, CHINGEN 118, CHINGEN 218.

**ARCHLGY 137. Ethnographic Archaeologies. 4-5 Units.**

How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

Same as: ANTHRO 140A, ANTHRO 240A.

**ARCHLGY 137. Ethnographic Archaeologies. 4-5 Units.**

How have ethnographic and archaeological methods been combined in anthropological research? What methodological and theoretical implications do these kinds of projects generate? Seminar topics will include ethnoarchaeology, ethnographies of archaeological practice, public archaeology and heritage ethics. Lecture and discussion.

Same as: ANTHRO 140A, ANTHRO 240A.

**ARCHLGY 139. The Aegean in the Neolithic and Bronze Age. 3-5 Units.**

This course provides a survey of Aegean prehistory (7th-2nd millennium BC), focusing on traditions that were picked up or renegotiated, instead of taking a standpoint that evaluates phenomena as steps leading up to a "state-like" palatial society. It will draw on the region's wealth of data, and will be set within a theoretically informed, problem-oriented framework, aiming to introduce students to current interpretations and debates, mainly through discussion of specific case-studies.

Same as: ANTHRO 115A, ANTHRO 215A, ARCHLGY 239.

**ARCHLGY 139. The Aegean in the Neolithic and Bronze Age. 3-5 Units.**

This course provides a survey of Aegean prehistory (7th-2nd millennium BC), focusing on traditions that were picked up or renegotiated, instead of taking a standpoint that evaluates phenomena as steps leading up to a "state-like" palatial society. It will draw on the region's wealth of data, and will be set within a theoretically informed, problem-oriented framework, aiming to introduce students to current interpretations and debates, mainly through discussion of specific case-studies.

Same as: ANTHRO 115A, ANTHRO 215A, ARCHLGY 239.

**ARCHLGY 142. Lost and found: Roman Coinage. 4-5 Units.**

New trends in Roman numismatics (from the late Republic to the early Empire, 3rd c. BCE-1st c. CE). Archaeology from coins. Barter, money and coinage. The introduction of coinage in Rome and the provinces. Making money (coin production), using money (monetary, non-monetary and ritual uses), losing money (coin circulation, hoards, single finds): contextual interpretations. Monetary systems: coins from Rome and coins from the provinces. Coinage and identity. False coinage.

Same as: ARCHLGY 242, CLASSART 132, CLASSART 232.

**ARCHLGY 142. Lost and found: Roman Coinage. 4-5 Units.**

New trends in Roman numismatics (from the late Republic to the early Empire, 3rd c. BCE-1st c. CE). Archaeology from coins. Barter, money and coinage. The introduction of coinage in Rome and the provinces. Making money (coin production), using money (monetary, non-monetary and ritual uses), losing money (coin circulation, hoards, single finds): contextual interpretations. Monetary systems: coins from Rome and coins from the provinces. Coinage and identity. False coinage.

Same as: ARCHLGY 242, CLASSART 132, CLASSART 232.

**ARCHLGY 148. Ceramic Analysis for Archaeologists. 3-5 Units.**

The analysis and interpretation of ceramic remains allow archaeologists to accomplish varied ends: establish a time scale, document interconnections between different areas, and suggest what activities were carried out at particular sites. The techniques and theories used to bridge the gap between the recovery of ceramics and their interpretation within archaeological contexts is the focus of this seminar.

Same as: ARCHLGY 248.

**ARCHLGY 148. Ceramic Analysis for Archaeologists. 3-5 Units.**

The analysis and interpretation of ceramic remains allow archaeologists to accomplish varied ends: establish a time scale, document interconnections between different areas, and suggest what activities were carried out at particular sites. The techniques and theories used to bridge the gap between the recovery of ceramics and their interpretation within archaeological contexts is the focus of this seminar.

Same as: ARCHLGY 248.

**ARCHLGY 164. Cultural Heritage and Human Rights. 1 Unitss.**

This interdisciplinary research workshop will critically engage the issue of the growing currency of human rights discourse within cultural heritage. Epistemological and practical areas of tension between rights discourse and cultural discourse will be surveyed within the context of current global challenges facing heritage practice, conservation and archaeology. Topics will include the inequities of cultural recognition between North-South globalizations, questions of cultural property and rights, the role of tourism, and the impact of environmental conservation discourse on cultural rights.

Same as: ARCHLGY 64.

**ARCHLGY 164. Cultural Heritage and Human Rights. 1 Unitss.**

This interdisciplinary research workshop will critically engage the issue of the growing currency of human rights discourse within cultural heritage. Epistemological and practical areas of tension between rights discourse and cultural discourse will be surveyed within the context of current global challenges facing heritage practice, conservation and archaeology. Topics will include the inequities of cultural recognition between North-South globalizations, questions of cultural property and rights, the role of tourism, and the impact of environmental conservation discourse on cultural rights.

Same as: ARCHLGY 64.

**ARCHLGY 190. Archaeology Directed Reading/Independent Study. 1-5 Units.****ARCHLGY 190. Archaeology Directed Reading/Independent Study. 1-5 Units.****ARCHLGY 195. Independent Study/Research. 1-5 Units.**

Students conducting independent study and or research with archaeology faculty members.

**ARCHLGY 195. Independent Study/Research. 1-5 Units.**

Students conducting independent study and or research with archaeology faculty members.

**ARCHLGY 199. Honors Independent Study. 5 Units.**

Independent study with honors faculty adviser.

**ARCHLGY 199. Honors Independent Study. 5 Units.**

Independent study with honors faculty adviser.

**ARCHLGY 224. Archaeology of Food: production, consumption and ritual. 3-5 Units.**

This course explores many aspects of food in human history from an archaeological perspective. We will discuss how the origins of agriculture helped to transform human society; how food and feasting played a prominent role in the emergence of social hierarchies and the development of civilization; and how various foodways influenced particular cultures.

We will also conduct experimental studies to understand how certain methods of food procurement, preparation, and consumption can be recovered archaeologically.

Same as: ARCHLGY 124.

**ARCHLGY 224. Archaeology of Food: production, consumption and ritual. 3-5 Units.**

This course explores many aspects of food in human history from an archaeological perspective. We will discuss how the origins of agriculture helped to transform human society; how food and feasting played a prominent role in the emergence of social hierarchies and the development of civilization; and how various foodways influenced particular cultures.

We will also conduct experimental studies to understand how certain methods of food procurement, preparation, and consumption can be recovered archaeologically.

Same as: ARCHLGY 124.

**ARCHLGY 225. ARCHAEOLOGICAL SURVEY METHODS. 3-5 Units.**

Practicum applying a variety of survey techniques to discover, map, and record prehistoric and historic archaeological sites on Stanford's 8180 acres. Basic cartographic skills for archaeologists and an introduction to GIS tools, GPS instruments, and geophysical techniques. Participants should be able to walk 3-4 miles in uneven terrain or make special arrangements with the instructor for transportation.

Same as: ARCHLGY 125.

**ARCHLGY 225. ARCHAEOLOGICAL SURVEY METHODS. 3-5 Units.**

Practicum applying a variety of survey techniques to discover, map, and record prehistoric and historic archaeological sites on Stanford's 8180 acres. Basic cartographic skills for archaeologists and an introduction to GIS tools, GPS instruments, and geophysical techniques. Participants should be able to walk 3-4 miles in uneven terrain or make special arrangements with the instructor for transportation.

Same as: ARCHLGY 125.

**ARCHLGY 227. Introduction to bioarchaeological Method and Theory. 3-5 Units.**

This course deals with the skeletal biology of past populations, covering both the theoretical approaches and methods used in the study of skeletal and dental remains. Issues surrounding the reconstruction of the individual and population, which include age, sex and other paleodemographic factors, will be explored. The health and disease of teeth and bones, and the biomechanical and chemical analyses of bone will also be explored to illustrate how the variety of methods available to bioarchaeologists can be used to reconstruct past lifeways. While this course will be of primary interest to students interested in skeletal biology and archaeology, it is not exclusive to those pursuing careers in biological anthropology. The emphasis is on critical analysis, research skills, and communication skills that can be useful to students pursuing careers in other sub-disciplines of anthropology, laboratory research, or other lateral health-related fields. Required readings will be selected from current literature, and in some classes there will be practical material/exercises so that students can learn some of these techniques. The class is intended to be an interactive learning process in discussion format, and students are required to take an active part in class along with lectures.

Same as: ARCHLGY 127.

**ARCHLGY 227. Introduction to bioarchaeological Method and Theory. 3-5 Units.**

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Same as: ARCHLGY 127.

**ARCHLGY 229. Archaeology, Heritage, and the Contemporary Middle East. 3-5 Units.**

This course will explore the influence of the Ancient Near East on the Modern Middle East in terms of the religious, ethnic, racial and national identities of indigenous and diaspora communities and tourists. The goal is to understand today's issues and the current cultural character of the region in terms of its past. It will utilize anthropological and archaeological methodologies to show these connections, through examination of people, places, artifacts and ideologies. Among the concepts to be explored in the course will be the significance of sacred sites, migrations, exodus myths, conquest ideologies, East/West conflicts, imperialism, nationalism, identities, dichotomies and archaeology as expressed through heritage sites and symbolism. As an exploration of archaeology and human heritage, the curriculum focuses on modern peoples and their connections to the past rather than on the physical remains of past cultures, which is the central concern of traditional archaeology. Class sessions will combine presentations by the professor as well as specific topical papers given by students after consultation. Students will also be expected to participate and comment at the end of presentations. The following lecture outlines and readings may be slightly modified according to scheduling.

Same as: ARCHLGY 129.

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**ARCHLGY 232. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

This seminar will explore foundational concepts currently employed within heritage practice and debates. Readings will examine the historically formative context of colonial-era and nationalist discourses on stewardship and culture, as well as postcolonial reformulations of such concepts as cultural property, cultural recognition and public history. The seminar will engage the question of the relationship between foundational concepts and the current cosmopolitan and internationalist vision for heritage, probing the enduring dynamics of North-South divides in heritage development and archaeological practice.

Same as: ANTHRO 332A, ARCHLGY 132, ARCHLGY 332.

**ARCHLGY 232. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

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Same as: ANTHRO 332A, ARCHLGY 132, ARCHLGY 332.

**ARCHLGY 235. Constructing National History in East Asian Archaeology. 3-5 Units.**

Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.

Same as: ARCHLGY 135, CHINGEN 118, CHINGEN 218.

**ARCHLGY 235. Constructing National History in East Asian Archaeology. 3-5 Units.**

Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.

Same as: ARCHLGY 135, CHINGEN 118, CHINGEN 218.

**ARCHLGY 239. The Aegean in the Neolithic and Bronze Age. 3-5 Units.**

This course provides a survey of Aegean prehistory (7th-2nd millennium BC), focusing on traditions that were picked up or renegotiated, instead of taking a standpoint that evaluates phenomena as steps leading up to a `state-like` palatial society. It will draw on the region's wealth of data, and will be set within a theoretically informed, problem-oriented framework, aiming to introduce students to current interpretations and debates, mainly through discussion of specific case-studies.

Same as: ANTHRO 115A, ANTHRO 215A, ARCHLGY 139.

**ARCHLGY 239. The Aegean in the Neolithic and Bronze Age. 3-5 Units.**

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Same as: ANTHRO 115A, ANTHRO 215A, ARCHLGY 139.

**ARCHLGY 242. Lost and found: Roman Coinage. 4-5 Units.**

New trends in Roman numismatics (from the late Republic to the early Empire, 3rd c. BCE-1st c. CE). Archaeology from coins. Barter, money and coinage. The introduction of coinage in Rome and the provinces. Making money (coin production), using money (monetary, non-monetary and ritual uses), losing money (coin circulation, hoards, single finds): contextual interpretations. Monetary systems: coins from Rome and coins from the provinces. Coinage and identity. False coinage.

Same as: ARCHLGY 142, CLASSART 132, CLASSART 232.

**ARCHLGY 242. Lost and found: Roman Coinage. 4-5 Units.**

New trends in Roman numismatics (from the late Republic to the early Empire, 3rd c. BCE-1st c. CE). Archaeology from coins. Barter, money and coinage. The introduction of coinage in Rome and the provinces. Making money (coin production), using money (monetary, non-monetary and ritual uses), losing money (coin circulation, hoards, single finds): contextual interpretations. Monetary systems: coins from Rome and coins from the provinces. Coinage and identity. False coinage.

Same as: ARCHLGY 142, CLASSART 132, CLASSART 232.

**ARCHLGY 248. Ceramic Analysis for Archaeologists. 3-5 Units.**

The analysis and interpretation of ceramic remains allow archaeologists to accomplish varied ends: establish a time scale, document interconnections between different areas, and suggest what activities were carried out at particular sites. The techniques and theories used to bridge the gap between the recovery of ceramics and their interpretation within archaeological contexts is the focus of this seminar.

Same as: ARCHLGY 148.

**ARCHLGY 248. Ceramic Analysis for Archaeologists. 3-5 Units.**

The analysis and interpretation of ceramic remains allow archaeologists to accomplish varied ends: establish a time scale, document interconnections between different areas, and suggest what activities were carried out at particular sites. The techniques and theories used to bridge the gap between the recovery of ceramics and their interpretation within archaeological contexts is the focus of this seminar.

Same as: ARCHLGY 148.

**ARCHLGY 270. Heritage Ecologies: Heritage, Culture, and the Environment. 3-5 Units.**

Conceptual and theoretical approaches to examine cultural and natural heritage from an interdisciplinary perspective. We ask: What are heritage ecologies? How are natural and cultural heritages interpreted, managed, and defined? Do heritage managers privilege nature and conservation over cultural heritage? This course uses archaeological data, ethnographic methods, archival analysis, and guest lectures to examine case studies representing key issues including conservation, indigenous rights, cultural landscapes, heritage in conflict, international heritage policy, and the use of expert knowledge in heritage contexts.

Same as: ARCHLGY 170.

**ARCHLGY 270. Heritage Ecologies: Heritage, Culture, and the Environment. 3-5 Units.**

Conceptual and theoretical approaches to examine cultural and natural heritage from an interdisciplinary perspective. We ask: What are heritage ecologies? How are natural and cultural heritages interpreted, managed, and defined? Do heritage managers privilege nature and conservation over cultural heritage? This course uses archaeological data, ethnographic methods, archival analysis, and guest lectures to examine case studies representing key issues including conservation, indigenous rights, cultural landscapes, heritage in conflict, international heritage policy, and the use of expert knowledge in heritage contexts.

Same as: ARCHLGY 170.

**ARCHLGY 299. INDEPENDENT STUDY/RESEARCH. 1-5 Units. INDEPENDENT STUDY/RESEARCH.****ARCHLGY 299. INDEPENDENT STUDY/RESEARCH. 1-5 Units. INDEPENDENT STUDY/RESEARCH.****ARCHLGY 304C. The Archaeology of Ancient China. 5 Units.**

Early China from the perspective of material remains unearthed from archaeological sites; the development of Chinese culture from early hominid occupation nearly 2 million years ago through the development of agriculture in the Neolithic period and complex society in the Bronze Age to the political unification of China under the Qin Dynasty. Continuity of Chinese culture from past to present, history of Chinese archaeology, relationships between archaeology and politics, and food in early China.

Same as: ARCHLGY 104C.

**ARCHLGY 304C. The Archaeology of Ancient China. 5 Units.**

Early China from the perspective of material remains unearthed from archaeological sites; the development of Chinese culture from early hominid occupation nearly 2 million years ago through the development of agriculture in the Neolithic period and complex society in the Bronze Age to the political unification of China under the Qin Dynasty. Continuity of Chinese culture from past to present, history of Chinese archaeology, relationships between archaeology and politics, and food in early China.

Same as: ARCHLGY 104C.

**ARCHLGY 306A. Museums and Collections. 5 Units.**

Practical, theoretical, and ethical issues which face museums and collections. Practical collections-based work, museum visits, and display research. The roles of the museum in contemporary society. Students develop their own exhibition and engage with the issues surrounding the preservation of material culture.

Same as: ARCHLGY 106A.

**ARCHLGY 306A. Museums and Collections. 5 Units.**

Practical, theoretical, and ethical issues which face museums and collections. Practical collections-based work, museum visits, and display research. The roles of the museum in contemporary society. Students develop their own exhibition and engage with the issues surrounding the preservation of material culture.

Same as: ARCHLGY 106A.

**ARCHLGY 307. Archaeological Methods and Research Design. 5 Units.**

Methodological aspects of field and laboratory practice from traditional archaeological methods to the latest interdisciplinary analytical techniques. The nature of archaeological data and inference; interpretive potential of these techniques. Prerequisite: consent of instructor.

Same as: ANTHRO 307.

**ARCHLGY 307. Archaeological Methods and Research Design. 5 Units.**

Methodological aspects of field and laboratory practice from traditional archaeological methods to the latest interdisciplinary analytical techniques. The nature of archaeological data and inference; interpretive potential of these techniques. Prerequisite: consent of instructor.

Same as: ANTHRO 307.

**ARCHLGY 308. Hispania: The Making of a Roman Province. 4-5 Units.**

Overview of the archaeology of early Roman Spain (3rd c. BCE-1st c. CE) and the processes involved in the creation of the Roman provinces. What is a province? Critical (postcolonial) analysis of the "Romanization" paradigm. Study of the role of the army, early Roman settlements and Roman provincial capitals in tying province and metropolis together. Change and the persistence of local heritage (temples, houses, tombs, coins). Hispania in Rome and Rome in Hispania.

Same as: CLASSART 308.

**ARCHLGY 308. Hispania: The Making of a Roman Province. 4-5 Units.**

Overview of the archaeology of early Roman Spain (3rd c. BCE-1st c. CE) and the processes involved in the creation of the Roman provinces. What is a province? Critical (postcolonial) analysis of the "Romanization" paradigm. Study of the role of the army, early Roman settlements and Roman provincial capitals in tying province and metropolis together. Change and the persistence of local heritage (temples, houses, tombs, coins). Hispania in Rome and Rome in Hispania.

Same as: CLASSART 308.

**ARCHLGY 319. Theory for Arch and Classics. 3-5 Units.**

TBA

Same as: CLASSART 319.

**ARCHLGY 319. Theory for Arch and Classics. 3-5 Units.**

TBA

Same as: CLASSART 319.

**ARCHLGY 332. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

This seminar will explore foundational concepts currently employed within heritage practice and debates. Readings will examine the historically formative context of colonial-era and nationalist discourses on stewardship and culture, as well as postcolonial reformulations of such concepts as cultural property, cultural recognition and public history. The seminar will engage the question of the relationship between foundational concepts and the current cosmopolitan and internationalist vision for heritage, probing the enduring dynamics of North-South divides in heritage development and archaeological practice.

Same as: ANTHRO 332A, ARCHLGY 132, ARCHLGY 232.

**ARCHLGY 332. The Anthropology of Heritage: Concepts, Contexts and Critique. 3-5 Units.**

This seminar will explore foundational concepts currently employed within heritage practice and debates. Readings will examine the historically formative context of colonial-era and nationalist discourses on stewardship and culture, as well as postcolonial reformulations of such concepts as cultural property, cultural recognition and public history. The seminar will engage the question of the relationship between foundational concepts and the current cosmopolitan and internationalist vision for heritage, probing the enduring dynamics of North-South divides in heritage development and archaeological practice.

Same as: ANTHRO 332A, ARCHLGY 132, ARCHLGY 232.

**ARCHLGY 371. Proposal Writing for Archaeologists. 2 Units.**

Required of second-year Ph.D. students in the archaeology track.

The conceptualization of dissertation research problems, the theories behind them, and the methods for exploring them. Participants draft a research prospectus suitable for a dissertation proposal and research grant applications. Limited enrollment. Prerequisite: consent of instructor.

Same as: ANTHRO 371.

**ARCHLGY 371. Proposal Writing for Archaeologists. 2 Units.**

Required of second-year Ph.D. students in the archaeology track.

The conceptualization of dissertation research problems, the theories behind them, and the methods for exploring them. Participants draft a research prospectus suitable for a dissertation proposal and research grant applications. Limited enrollment. Prerequisite: consent of instructor.

Same as: ANTHRO 371.

## Art History Courses

**ARTHIST 1. Introduction to the Visual Arts: History of Western Art from the Renaissance to the Present. 5 Units.**

This course surveys the history of Western painting from the start of the 14th century to the late 20th century and our own moment. Lectures introduce important artists (Giotto, Rembrandt, Velazquez, Goya, Manet, Matisse, Pollock, and others), and major themes associated with the art of particular periods and cultures. The course emphasizes training students to look closely at - and to write about - works of art. WIM Course.

**ARTHIST 2. Asian Art and Culture. 5 Units.**

The religious and philosophical ideas and social attitudes of India, China, and Japan and how they are expressed in architecture, painting, woodblock prints, sculpture, and in such forms as garden design and urban planning. Same as: JAPANGEN 60.

**ARTHIST 3. Introduction to the History of Architecture. 5 Units.**

From antiquity to the 20th century, mostly Western with some non-Western topics. Buildings and general principles relevant to the study of architecture.

**ARTHIST 99A. Student Guides at the Cantor Center for the Visual Arts. 2 Units.**

Open to all Stanford students. Public speaking, inquiry methods, group dynamics, theme development, and art-related vocabulary. Introduction to museum administration; art registration, preparation and installation; rights and reproduction of images; exhibition planning; and art storage, conservation, and security. Students research, prepare, and present discussions on art works of their choice.

**ARTHIST 101. Archaic Greek Art. 4 Units.**

The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientalizing phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E.

Same as: ARTHIST 301, CLASSART 101, CLASSART 201.

**ARTHIST 102. Empire and Aftermath: Greek Art from the Parthenon to Praxiteles. 4 Units.**

The course explores the art and architecture of the Athenian Empire in the age of Pericles, and then considers the effects of civil war and plague on Greek art and society in the later 5th and early 4th centuries.

Same as: ARTHIST 302, CLASSART 102.

**ARTHIST 105. Art & Architecture in the Medieval Mediterranean. 4 Units.**

Chronological survey of Byzantine, Islamic, and Western Medieval art and architecture from the early Christian period to the Gothic age. Broad art-historical developments and more detailed examinations of individual monuments and works of art. Topics include devotional art, court and monastic culture, relics and the cult of saints, pilgrimage and crusades, and the rise of cities and cathedrals.

Same as: ARTHIST 305, CLASSART 115, CLASSART 215.

**ARTHIST 107A. St. Petersburg, a Cultural Biography: Architecture, Urban Planning, the Arts. 4 Units.**

The most premeditated city in the whole world, according to Dostoevsky; created in 1703 by Peter the Great as a counterpoise to Moscow and old Russian culture; planned as a rational, west-European-appearing capital city of the Russian Empire. St. Petersburg's history through works of its artists, architects, urban planners, writers, and composers.

Same as: REES 207A.

**ARTHIST 108. Virginity and Power: Mary in the Middle Ages. 4 Units.**

The most influential female figure in Christianity whose state cult was connected with the idea of empire. The production and control of images and relics of the Virgin and the development of urban processions and court ceremonies though which political power was legitimized in papal Rome, Byzantium, Carolingian and Ottonian Germany, Tuscany, Gothic France, and Russia.

Same as: ARTHIST 308.

**ARTHIST 109. The Book in the Medieval World. 4 Units.**

Studying the design and function of books in medieval society from the 7th to the 15th century, and the ways in which manuscripts are designed to meet (and shape) the cultural and intellectual demands of their readers. Major themes are the relationships between text and image, and between manuscripts and other media; the audience and production context of manuscripts; and changing ideas about pictorial space, figural style, page design, and progression through the book. Final project may be either a research paper or an original artist's book.

Same as: ARTHIST 309.

**ARTHIST 111. Introduction to Italian Renaissance, 1420-1580. 4 Units.**

New techniques of pictorial illusionism and the influence of the humanist revival of antiquity in the reformulation of the pictorial arts in 15th-century Italy. How different Italian regions developed characteristic artistic cultures through mutual interaction and competition.

Same as: ARTHIST 311.

**ARTHIST 118. Titian, Veronese, Tintoretto. 4 Units.**

The course addresses the ways in which Venetian painters of the sixteenth century redefined paradigms of color, disegno, and invention. Themes to be examined include civic piety, new kinds of mythological painting, the intersection between naturalism and eroticism, and the relationship between art and rituals of church and statecraft.

Same as: ARTHIST 318.

**ARTHIST 120. Living in a Material World: Seventeenth-century Dutch and Flemish Painting. 4 Units.**

Painting and graphic arts by artists in Flanders and Holland from 1600 to 1680, a period of political and religious strife. Historical context; their relationship to developments in the rest of Europe and contributions to the problem of representation. Preferences for particular genres such as portraits, landscapes, and scenes of everyday life; the general problem of realism as manifested in the works studied.

Same as: ARTHIST 320.

**ARTHIST 121. 18th-Century Art in Europe, ca 1660-1780. 4 Units.**

Major developments in painting across Europe including the High Baroque illusionism of Bernini, the founding of the French Academy, and the revival of antiquity during the 1760s, with parallel developments in Venice, Naples, Madrid, Bavaria, and London. Shifts in themes and styles amidst the emergence of new viewing publics. Artists: the Tiepolos, Giordano, Batoni, and Mengs; Ricci, Pellegrini, and Thornhill; Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien, Fragonard, and the first works by David. Additional discussion for graduate students.

Same as: ARTHIST 321.

**ARTHIST 124. The Age of Naturalism, ca 1830-1874. 4 Units.**

The origins, development, and triumph of naturalist painting in Europe. The creative tensions that emerged between traditional forms of history painting and the challenge of modern subjects drawn from contemporary life. Emphasis is on the development of open-air painting as an alternative to traditional studio practice, and to the rise of new imaging technologies, such as lithography and photography, as popular alternatives to the hand-wrought character and elitist appeal of high art.

Same as: ARTHIST 324.

**ARTHIST 126. Post-Naturalist Painting. 4 Units.**

How conceptual models from language, literature, new technologies, and scientific theory affected picture making following the collapse of the radical naturalism of the 1860s and 1870s. Bracketed in France by the first Impressionist exhibition (1874) and the first public acclamation of major canvases by Matisse and Picasso (1905), the related developments in England, Germany, Belgium, and Austria. Additional weekly discussion for graduate students. Recommended: some prior experience with 19th-century art.

Same as: ARTHIST 326.

**ARTHIST 142. Architecture Since 1900. 4 Units.**

The development of competing versions of modern and postmodern architecture and design in Europe and America, from the early 20th century to the present. Recommended: 141.

Same as: ARTHIST 342.

**ARTHIST 143A. American Architecture. 4 Units.**

A historically based understanding of what defines American architecture. What makes American architecture American, beginning with indigenous structures of pre-Columbian America. Materials, structure, and form in the changing American context. How these ideas are being transformed in today's globalized world.

Same as: ARTHIST 343A.

**ARTHIST 145. Culture Wars: Art and Social Conflict in the USA, 1890-1950. 4 Units.**

This course examines social conflicts and political controversies in American culture through the lens of visual art and photography. We consider how visual images both reflect and participate in the social and political life of the nation and how the terms of citizenship have been represented; and, at times, contested; by artists throughout the first half of the 20th century. The class explores the relation between American art and the body politic by focusing on issues of poverty, war, censorship, consumerism, class identity, and racial division.

Same as: ARTHIST 345.

**ARTHIST 147. The Visual Culture of Modernism and its Discontents. 4 Units.**

The development of modern art and visual culture in Europe and the US, beginning with Paris in the period of Haussmann, Baudelaire and Manet, and ending with Surrealism in the 1920s and 30s. Modernism in art, architecture and design (e.g., Gauguin, Picasso, Duchamp, Tatlin, Le Corbusier, Breuer, Dali) will be presented as a compelling dream of utopian possibilities involving multifaceted and often ambivalent, even contradictory responses to the changes brought about by industrialization, urbanization, and the rise of mass culture.

Same as: ARTHIST 347.

**ARTHIST 156. American and European Art, 1945-1968. 4 Units.**

Examines the pivotal figures, movements, themes and practices of art in the United States and Europe, from the conclusion of World War 2 to the end of the 1960s. Emphasis is on the changed nature of the avant-garde after the catastrophic events of midcentury. Topics include: modern art, ideology and the Cold War; the rise of consumer society and the "Society of the Spectacle"; concepts of medium specificity; the impact of new media and technologies on postwar art making; the role of the artist as worker and activist. Movements include: Abstract Expressionism, Art Informel, Pop, minimalism, process, performance conceptual art. An introductory art history course is recommended.

Same as: ARTHIST 356.

**ARTHIST 157A. Histories of Photography. 4 Units.**

This course investigates multiple histories of photography. It begins in early nineteenth-century Europe with the origins of the medium and ends in the United States on September 11, 2001, a day that demonstrated the limits of photographic seeing. Rather than stabilizing any single trajectory of technological iterations, the course is more interested in considering the work performed by photography. Through historical case studies, it considers how to photograph is to order and to construct the world; to incite action and to persuade; to describe and to document; to record and to censor; to wound; to heal.

Same as: ARTHIST 357A.

**ARTHIST 159. American Photographs, 1839-1971: A Cultural History. 4 Units.**

This course concentrates on many important American photographers, from the era of daguerreotypes to near the end of the pre-digital era. We study photographs of the Civil War, western exploration, artistic subjects, urban and rural poverty, skyscrapers, crime, fashion, national parks, and social protest, among other topics. Among the photographers we study: Carleton Watkins, Eadweard Muybridge, Walker Evans, Dorothea Lange, Garry Winogrand, and Diane Arbus. Emphasis on developing students' abilities to discuss and write about photography; to see it.

Same as: AMSTUD 159X, ARTHIST 359.

**ARTHIST 164A. Technology and the Visual Imagination. 4 Units.**

An exploration of the dynamic relationship between technology and the ways we see and represent the world. The course examines technologies from the Renaissance through the present day, from telescopes and microscopes to digital detectors, that have changed and enhanced our visual capabilities as well as shaped how we imagine the world. We also consider how these technologies influenced and inspired the work of artists. Special attention is paid to how different technologies such as linear perspective, photography, cinema, and computer screens translate the visual experience into a representation; the automation of vision; and the intersection of technology with conceptions of time and space.

Same as: ARTHIST 364A, FILMSTUD 164A, FILMSTUD 364A.

**ARTHIST 165A. Fashion Shows: From Lady Godiva to Lady Gaga. 4 Units.**

This course considers the complex and interdependent relationship between fashion and art. Topics covered will include: the ways in which artists have used fashion in different art forms as a means to convey social status, identity, and other attributes of the wearer; the interplay between fashion designers and various art movements, especially in the twentieth century; the place of prints, photography, and the internet in fashion, in particular how different media shape how clothes are seen and perceived. We will discuss texts by Thorstein Veblen, Roland Barthes, Dick Hebdige, and other theorists of fashion.

Same as: ARTHIST 365A.

**ARTHIST 173. Issues in Contemporary Art. 4 Units.**

Major figures, themes, and movements of contemporary art from the 80s to the present. Readings on the neo-avant garde; postmodernism; art and identity politics; new media and technology; globalization and participatory aesthetics. Prerequisite: ARTHIST 155, or equivalent with consent of instructor.

Same as: ARTHIST 373.

**ARTHIST 176. Feminism and Contemporary Art. 4 Units.**

(Same as ARTHIST 176) The impact of second wave feminism on art making and art historical practice in the 70s, and its reiteration and transformation in contemporary feminist work. Topics: sexism and art history, feminist studio programs in the 70s, essentialism and self-representation, themes of domesticity, the body in feminist art making, bad girls, the exclusion of women of color and lesbians from the art historical mainstream, notions of performativity.

Same as: ARTHIST 376.

**ARTHIST 184. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting. 4 Units.**

Changes marking the transition from medieval to early modern Japanese society that generated a revolution in visual culture, as exemplified in subjects deemed fit for representation; how commoners joined elites in pictorializing their world, catalyzed by interactions with the Dutch.

Same as: ARTHIST 384, JAPANGEN 184, JAPANGEN 384.

**ARTHIST 187. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868. 4 Units.**

Narratives of conflict, pacification, orthodoxy, nostalgia, and novelty through visual culture during the change of episteme from late medieval to early modern, 16th through early 19th centuries. The rhetorical messages of castles, teahouses, gardens, ceramics, paintings, and prints; the influence of Dutch and Chinese visuality; transformation in the roles of art and artist; tensions between the old and the new leading to the modernization of Japan.

Same as: ARTHIST 387, JAPANGEN 185.

**ARTHIST 188A. The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism. 4 Units.**

The recent rapid urbanization and architectural transformation of Asia; focus is on the architecture of Japan and China since the mid-19th century. History of forms, theories, and styles that serve as the foundation for today's buildings and cityscapes. How Eastern and Western ideas of modernism have merged or diverged and how these forces continue to shape the future of Japanese and Chinese architecture and urban form.

Same as: ARTHIST 388A.

**ARTHIST 200N. The Artist in Ancient Greek Society. 3 Units.**

Given the importance of art to all aspects of their lives the Greeks had reason to respect their artists. Yet potters, painters and even sculptors possessed little social standing. Why did the Greeks value the work of craftsmen but not the men themselves? Why did Herodotus dismiss those who worked with their hands as "mechanics?" What prompted Homer to claim that, "there is no greater glory for a man, than what he achieves with his own hands," provided that he was throwing a discus and not a vase on a wheel? Painted pottery was essential to the religious and secular lives of the Greeks. Libations to the gods and to the dead required vases from which to pour them. Economic prosperity depended on the export of wine and oil in durable clay containers. At home, vases depicting gods and heroes reinforced Greek values and helped parents to educate their children. Ceramic sets with scenes of Dionysian excess were reserved for elite symposia from which craftsmen were excluded. Sculptors were less lowly but even those who carved the Parthenon's pediments and frieze were still "mechanics," with soft bodies and soft minds (Xenophon), "indifferent to higher things" (Plutarch). The seminar addresses these issues. Students will read and discuss texts, write response papers and present slide lectures on aspects of the artist's profession.

Same as: CLASSART 22N.

**ARTHIST 203. Greek Art In and Out of Context. 4-5 Units.**

The cultural contexts in which art served religious, political, commercial, athletic, sympotic, and erotic needs of Greek life.

Same as: CLASSART 109.

**ARTHIST 205. Cairo: Architecture and Urbanism from the Middle Ages to the 19th century. 5 Units.**

This undergraduate seminar introduces students to the architectural and urban history of Cairo (Egypt) one of the major political, cultural, and economic centers of the Islamic world. Beginning with the conquest of Egypt by Arab Muslims in the early seventh century CE, the seminar will show how the newly founded city was established, and subsequently became a crucial urban center in the Middle East. Discussing the history of the city from the initial conquest, to the breakup of central Abbasid power, the establishment of the Fatimid Shi'i caliphate in the 10th to 12th centuries, the return of Sunni rule under the Ayyubids in the late 12th century, and the rule of the Mamluks from the 1260s to the early sixteenth century based on existing monuments as well as medieval Arabic sources will provide a double perspective on this development. The final weeks will focus on the urban development of Cairo under Ottoman rule from 1517 until the 19th century, colonialism, and issues of preservation of the historical city since the mid-19th century.

**ARTHIST 205A. Islamic Painting: Landscape, Body, Power. 5 Units.**

This seminar focuses on the production of paintings, mostly but not exclusively miniatures in books, in the Islamic world. A particular focus lies on the Muslim Empires of the sixteenth to eighteenth centuries, namely the Ottoman, Safavid, and Mughal realms, together stretching from the Balkans to India. During this period, illustrated books were popular objects of high-level patronage, and numerous examples have survived that allow a detailed study of the implications of these images. Themes discussed include: figural representation in Islam, patronage and court culture; gender and the body; illustrations of literature and history; images of Sufis ceremonies; portraiture; images of animals and nature; the impact of European prints and paintings; space and landscape. A field-trip to the Museum of Asian Art in San Francisco to view Mughal paintings from India is planned.

**ARTHIST 208. Hagia Sophia. 5 Units.**

By employing a methodology based in psychoacoustics, semiotics, and phenomenology, this course explores the relationship among sound, water, marble, meaning, and religious experience in the sixth-century church of Hagia Sophia built by emperor Justinian in Constantinople. We will read medieval sources describing the interior and ritual, make short movies exploring the shimmer of marble in buildings on campus, and study the acoustics of domed buildings through computer auralization done at Stanford's CCRMA (Center for Computer Research in Music and Acoustics)

Same as: CLASSART 118.

**ARTHIST 209. Art and Religious Experience in Byzantium and Islam. 5 Units.**

This course presents a comparative study of Christian and Islamic paradigms (sixth to the thirteenth centuries) in the construction of religious experience through the material fabric of the building, the interior decor, objects, and rituals. We will read medieval ekphrastic texts and poetry, which stirred the viewer/participant to experience the building/object as animate. Among the sites we will study are: Hagia Sophia, the Ka'ba, the Dome of the Rock, the Mosque at Damascus and at Cordoba. We will read Byzantine and Arabic writers such as Paul the Silentiary, Patriarch Germanos, Maximus Confessor, Shahrawardi, and Ibn Arabi.

Same as: CLASSART 139.

**ARTHIST 212. Renaissance Florence, 1440-1540. 5 Units.**

Notions of cultural superiority in light of changes in Florentine society as it went from being a republic to a duchy ruled by the Medici. Artists and architects such as Donatello, Brunelleschi, Botticelli, Michelangelo, and Pontormo praised as having revived the arts and returned them to a level of ancient splendor. The role of the sacred in daily life and uses of the pagan past for poetic and scholarly expressions and as vehicles for contemporary experience.

**ARTHIST 213. Renaissance Print Culture: From Durer to Goltzius. 5 Units.**

Prints became vehicles for the spreading of artistic inventions as well as political and religious propaganda during the societal upheavals of the 16th century. How the new medium of reproducible images changed attitudes towards visuality. Prints as self-reflective performances of virtuosity. Class taught at the Cantor Arts Center.

**ARTHIST 232B. Design Theory. 4 Units.**

This seminar focuses on the key themes, histories, and methods of architectural theory -- a form of architectural practice that establishes the aims and philosophies of architecture. Architectural theory is primarily written, but it also incorporates drawing, photography, film, and other media. One of the distinctive features of modern and contemporary architecture is its pronounced use of theory to articulate its aims. One might argue that modern architecture is modern because of its incorporation of theory. This course focuses on those early-modern, modern, and late-modern writings that have been and remain entangled with contemporary architectural thought and design practice. Rather than examine the development of modern architectural theory chronologically, it is explored architecturally through thematic topics. These themes enable the student to understand how certain architectural theoretical concepts endure, are transformed, and can be furthered through his/her own explorations.

Same as: CEE 32B.

**ARTHIST 232Q. Place: Making Space Now. 3 Units.**

This seminar argues that architects are ultimately "placemakers," and questions what that means in the contemporary world. Part I investigates the meaning of the word "place." Additional background for understanding contemporary place making will include a critique of the history of modern place-making through an examination of modern form. Part II examines two traditional notions of place by scale: from "home" to "the city." What elements give these conceptions of space a sense of place? To answer this question, themes such as memory, mapping, and boundary, among others, will be investigated. Part III presents challenges to the traditional notions of place discussed in Part II. Topics addressed include: What does it mean to be "out of place"? What sense of place does a nomad have, and how is this represented? What are the "non-places" and how can architects design for these spaces? Part IV addresses the need to re-conceptualize contemporary space. The role of digital and cyber technologies, the construction of locality in a global world, and the in-between places that result from a world in flux are topics discussed in this section of the seminar. Learning goals: Specific goals include close reading of texts, understanding of philosophical thinking and writing, argument under uncertainty, and developed concepts of place, space and architecture.

Same as: CEE 32Q.

**ARTHIST 240N. Couture Culture: Fashion, Art & Modernism from Manet to Mondrian. 3-4 Units.**

This course examines the ways in which fashion has figured in the construction of modern experience and how it has been represented in the visual arts, primarily in Europe and the United States between about 1850 and 1965. Alongside the emergence of haute couture, the rise of the ready-to-wear industry during this period coincided with the consolidation of the department store; these institutions contributed to the development of a culture of consumption and display that continues to shape our lives today. Manet, Degas and other Impressionist painters were sensitive to the nuances of fashion, which they, like Baudelaire, saw as an aspect of modernity indispensable to their art. Clothing was no less significant in the context of the Russian revolution, when Alexander Rodchenko, for example, outfitted himself in a home-made version of workers' overalls in order to reinforce his identification with factory laborers and thereby to suggest the breaking down of class distinctions. The course also explores the significance of fashion for an abstract painter like Piet Mondrian, but, more to the point, we look at how Mondrian's work was appropriated to the world of fashion by Yves Saint-Laurent, who assured that Mondrian's signature geometric style would become instantly recognizable and eventually function as a hugely popular brand. The circuits through which we can trace the historical trajectory of fashion will illuminate its importance for understanding many facets of modern culture.

**ARTHIST 244. The Visual Culture of the American Home Front, 1941-1945. 5 Units.**

How does home front of WWII look now? What sort of meanings appear with the vantage of more than sixty years' distance? Examining Hollywood films from those years - films made during the war but mostly not directly about the war - the seminar focuses on developing students' abilities to write emotion-based criticism and history. Weekly short papers, each one in response to a film screening, are required. Among the films screened: *Shadow of a Doubt*, *Gaslight*, *I Walked with a Zombie*, *The Best Years of Our Lives*.

Same as: AMSTUD 244.

**ARTHIST 245. Art, Business & the Law. 5 Units.**

This course examines the intersection of art, business, and the law from a number of different angles, focusing on issues that impact our understanding of works of art and their circulation in the modern and contemporary periods. Topics range from individual case studies (e.g., Leonardo da Vinci; Richard Serra) to the consolidation of the art market, and include cultural heritage issues, problems of censorship, and conceptions of authorship and intellectual property.



**ARTHIST 246A. California Dreaming: West Coast Art and Visual Culture, 1848 - present. 5 Units.**

This seminar examines art, photography, and other forms of cultural production (e.g. film, advertisements, postcards) in and about California from the middle of the 19th century to the present. It approaches California as a contested political, historical and geographical site and as a series of images and alternative "lifestyles." How have artists pictured the state's diverse landscapes, both natural and commercial, as well as its complex history of labor, immigration, ethnicity, tourism, and social division?.

**ARTHIST 262. Office of Metropolitan Architecture: Workshop of the New. 4-5 Units.**

This seminar investigates all aspects of the work of the Office of Metropolitan Architecture (OMA) and its leader Rem Koolhaas. Topics for class research and inquiry include but are not be limited to: Koolhaas's early work at the Architectural Association and the founding of OMA, the publications of OMA and their style of presentation and theoretical foundations, the importance of AMO, and the architects who have left OMA and founded their own practices and how these differ from OMA. Each student completes an in-depth research paper and an in-class presentation.

Same as: CEE 132Q.

**ARTHIST 264A. Picturing the Cosmos. 5 Units.**

This seminar explores the place of images in how we understand and imagine the universe. The course draws on art, science, and popular culture, and pays particular attention to the ways they inform each other. Examples include: star maps, science fiction films, appropriated astronomical images, and telescopic views of stars, planets, and nebulae. Using these representations as well as accompanying readings we will discuss the importance of aesthetics for conceptions of the cosmos; the influence of technology on representations; strategies for representing concepts that exceed the limits of human vision; and the ways that views of the universe reflect and shape their cultural context. Open to undergraduates and graduates.

**ARTHIST 287. Pictures of the Floating World: Images from Japanese Popular Culture. 5 Units.**

Printed objects produced during the Edo period (1600-1868), including the Ukiyo-e (pictures of the floating world) and lesser-studied genres such as printed books (ehon) and popular broadsheets (kawaraban). How a society constructs itself through images. The borders of the acceptable and censorship; theatricality, spectacle, and slippage; the construction of play, set in conflict against the dominant neo-Confucian ideology of fixed social roles.

Same as: JAPANLIT 287.

**ARTHIST 287A. The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime. 5 Units.**

The tea ceremony, a premodern multimedia phenomenon, integrates architecture, garden design, ceramics, painting, calligraphy, and treasured objects into a choreographed ritual wherein host, objects, and guests perform roles on a tiny stage. Aesthetic, philosophical, and political dimensions. The evolution of tea taste including its inception in Zen monasteries, use for social control during the 16th century, the development of a class of tea connoisseurs, and 20th-century manipulation by the emerging industrialist class.

Same as: JAPANGEN 287A.

**ARTHIST 288B. The Enduring Passion for Ink: Contemporary Chinese Ink Painting. 5 Units.**

Contemporary Chinese ink painters are exploring new ground. They push the limits of the medium, creating installations and performances, mixing ink with other media, and advancing age-tested brushstrokes and compositions. The recent flurry of exhibitions attests to contemporary ink painting's increasing importance. This seminar introduces major figures (Xu Bing, Liu Dan, Zheng Chongbin, Li Huasheng, etc.) and movements in contemporary Chinese ink art. Emphasis is placed on improving writing abilities and on in-class reports and discussion. Topics for discussion include readings, individual works of art, and broad issues in contemporary art. Prerequisite: courses in Art History and/or Studio Art OR permission of instructor. open to undergraduates and graduates.

**ARTHIST 295. Visual Arts Internship. 1-5 Units.**

Professional experience in a field related to the Visual Arts for six to ten weeks. Internships may include work for galleries, museums, art centers, and art publications. Students arrange the internship, provide a confirmation letter from the hosting institution, and must receive consent from the faculty coordinator to enroll in units. To supplement the internship students maintain a journal and write a research paper related to the experience and their area of academic interest. Evaluations from the student and the supervisor are submitted at the end of the internship. Restricted to declared majors and minors. May be repeated for credit.

**ARTHIST 296. Junior Seminar: Methods & Historiography of Art History. 5 Units.**

Historiography and methodology.

**ARTHIST 297. Honors Thesis Writing. 1-5 Units.**

May be repeated for credit.

**ARTHIST 298. Individual Work: Art History. 1-15 Units.**

For approved independent research with individual faculty members. Letter grades only. May be repeated for credit.

**ARTHIST 301. Archaic Greek Art. 4 Units.**

The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientaling phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E.

Same as: ARTHIST 101, CLASSART 101, CLASSART 201.

**ARTHIST 302. Empire and Aftermath: Greek Art from the Parthenon to Praxiteles. 4 Units.**

The course explores the art and architecture of the Athenian Empire in the age of Pericles, and then considers the effects of civil war and plague on Greek art and society in the later 5th and early 4th centuries.

Same as: ARTHIST 102, CLASSART 102.

**ARTHIST 305. Art & Architecture in the Medieval Mediterranean. 4 Units.**

Chronological survey of Byzantine, Islamic, and Western Medieval art and architecture from the early Christian period to the Gothic age. Broad art-historical developments and more detailed examinations of individual monuments and works of art. Topics include devotional art, court and monastic culture, relics and the cult of saints, pilgrimage and crusades, and the rise of cities and cathedrals.

Same as: ARTHIST 105, CLASSART 115, CLASSART 215.

**ARTHIST 308. Virginity and Power: Mary in the Middle Ages. 4 Units.**

The most influential female figure in Christianity whose state cult was connected with the idea of empire. The production and control of images and relics of the Virgin and the development of urban processions and court ceremonies though which political power was legitimized in papal Rome, Byzantium, Carolingian and Ottonian Germany, Tuscany, Gothic France, and Russia.

Same as: ARTHIST 108.

**ARTHIST 309. The Book in the Medieval World. 4 Units.**

Studying the design and function of books in medieval society from the 7th to the 15th century, and the ways in which manuscripts are designed to meet (and shape) the cultural and intellectual demands of their readers. Major themes are the relationships between text and image, and between manuscripts and other media; the audience and production context of manuscripts; and changing ideas about pictorial space, figural style, page design, and progression through the book. Final project may be either a research paper or an original artist's book.

Same as: ARTHIST 109.

**ARTHIST 311. Introduction to Italian Renaissance, 1420-1580. 4 Units.**

New techniques of pictorial illusionism and the influence of the humanist revival of antiquity in the reformulation of the pictorial arts in 15th-century Italy. How different Italian regions developed characteristic artistic cultures through mutual interaction and competition.

Same as: ARTHIST 111.

**ARTHIST 318. Titian, Veronese, Tintoretto. 4 Units.**

The course addresses the ways in which Venetian painters of the sixteenth century redefined paradigms of color, disegno, and invention. Themes to be examined include civic piety, new kinds of mythological painting, the intersection between naturalism and eroticism, and the relationship between art and rituals of church and statecraft.

Same as: ARTHIST 118.

**ARTHIST 320. Living in a Material World: Seventeenth-century Dutch and Flemish Painting. 4 Units.**

Painting and graphic arts by artists in Flanders and Holland from 1600 to 1680, a period of political and religious strife. Historical context; their relationship to developments in the rest of Europe and contributions to the problem of representation. Preferences for particular genres such as portraits, landscapes, and scenes of everyday life; the general problem of realism as manifested in the works studied.

Same as: ARTHIST 120.

**ARTHIST 321. 18th-Century Art in Europe, ca 1660-1780. 4 Units.**

Major developments in painting across Europe including the High Baroque illusionism of Bernini, the founding of the French Academy, and the revival of antiquity during the 1760s, with parallel developments in Venice, Naples, Madrid, Bavaria, and London. Shifts in themes and styles amidst the emergence of new viewing publics. Artists: the Tiepolos, Giordano, Batoni, and Mengs; Ricci, Pellegrini, and Thornhill; Watteau and Boucher; Chardin and Longhi; Reynolds and West; Hogarth and Greuze; Vien, Fragonard, and the first works by David. Additional discussion for graduate students.

Same as: ARTHIST 121.

**ARTHIST 324. The Age of Naturalism, ca 1830-1874. 4 Units.**

The origins, development, and triumph of naturalist painting in Europe. The creative tensions that emerged between traditional forms of history painting and the challenge of modern subjects drawn from contemporary life. Emphasis is on the development of open-air painting as an alternative to traditional studio practice, and to the rise of new imaging technologies, such as lithography and photography, as popular alternatives to the hand-wrought character and elitist appeal of high art.

Same as: ARTHIST 124.

**ARTHIST 326. Post-Naturalist Painting. 4 Units.**

How conceptual models from language, literature, new technologies, and scientific theory affected picture making following the collapse of the radical naturalism of the 1860s and 1870s. Bracketed in France by the first Impressionist exhibition (1874) and the first public acclamation of major canvases by Matisse and Picasso (1905), the related developments in England, Germany, Belgium, and Austria. Additional weekly discussion for graduate students. Recommended: some prior experience with 19th-century art.

Same as: ARTHIST 126.

**ARTHIST 342. Architecture Since 1900. 4 Units.**

The development of competing versions of modern and postmodern architecture and design in Europe and America, from the early 20th century to the present. Recommended: 141.

Same as: ARTHIST 142.

**ARTHIST 343A. American Architecture. 4 Units.**

A historically based understanding of what defines American architecture. What makes American architecture American, beginning with indigenous structures of pre-Columbian America. Materials, structure, and form in the changing American context. How these ideas are being transformed in today's globalized world.

Same as: ARTHIST 143A.

**ARTHIST 345. Culture Wars: Art and Social Conflict in the USA, 1890-1950. 4 Units.**

This course examines social conflicts and political controversies in American culture through the lens of visual art and photography. We consider how visual images both reflect and participate in the social and political life of the nation and how the terms of citizenship have been represented; and, at times, contested; by artists throughout the first half of the 20th century. The class explores the relation between American art and the body politic by focusing on issues of poverty, war, censorship, consumerism, class identity, and racial division.

Same as: ARTHIST 145.

**ARTHIST 347. The Visual Culture of Modernism and its Discontents. 4 Units.**

The development of modern art and visual culture in Europe and the US, beginning with Paris in the period of Haussmann, Baudelaire and Manet, and ending with Surrealism in the 1920s and 30s. Modernism in art, architecture and design (e.g., Gauguin, Picasso, Duchamp, Tatlin, Le Corbusier, Breuer, Dali) will be presented as a compelling dream of utopian possibilities involving multifaceted and often ambivalent, even contradictory responses to the changes brought about by industrialization, urbanization, and the rise of mass culture.

Same as: ARTHIST 147.

**ARTHIST 356. American and European Art, 1945-1968. 4 Units.**

Examines the pivotal figures, movements, themes and practices of art in the United States and Europe, from the conclusion of World War 2 to the end of the 1960s. Emphasis is on the changed nature of the avant-garde after the catastrophic events of midcentury. Topics include: modern art, ideology and the Cold War; the rise of consumer society and the "Society of the Spectacle"; concepts of medium specificity; the impact of new media and technologies on postwar art making; the role of the artist as worker and activist. Movements include: Abstract Expressionism, Art Informel, Pop, minimalism, process, performance conceptual art. An introductory art history course is recommended.

Same as: ARTHIST 156.

**ARTHIST 357A. Histories of Photography. 4 Units.**

This course investigates multiple histories of photography. It begins in early nineteenth-century Europe with the origins of the medium and ends in the United States on September 11, 2001, a day that demonstrated the limits of photographic seeing. Rather than stabilizing any single trajectory of technological iterations, the course is more interested in considering the work performed by photography. Through historical case studies, it considers how to photograph is to order and to construct the world; to incite action and to persuade; to describe and to document; to record and to censor; to wound; to heal.

Same as: ARTHIST 157A.

**ARTHIST 359. American Photographs, 1839-1971: A Cultural History. 4 Units.**

This course concentrates on many important American photographers, from the era of daguerreotypes to near the end of the pre-digital era. We study photographs of the Civil War, western exploration, artistic subjects, urban and rural poverty, skyscrapers, crime, fashion, national parks, and social protest, among other topics. Among the photographers we study: Carleton Watkins, Eadweard Muybridge, Walker Evans, Dorothea Lange, Garry Winogrand, and Diane Arbus. Emphasis on developing students' abilities to discuss and write about photography; to see it.

Same as: AMSTUD 159X, ARTHIST 159.

**ARTHIST 364A. Technology and the Visual Imagination. 4 Units.**

An exploration of the dynamic relationship between technology and the ways we see and represent the world. The course examines technologies from the Renaissance through the present day, from telescopes and microscopes to digital detectors, that have changed and enhanced our visual capabilities as well as shaped how we imagine the world. We also consider how these technologies influenced and inspired the work of artists. Special attention is paid to how different technologies such as linear perspective, photography, cinema, and computer screens translate the visual experience into a representation; the automation of vision; and the intersection of technology with conceptions of time and space.

Same as: ARTHIST 164A, FILMSTUD 164A, FILMSTUD 364A.

**ARTHIST 365A. Fashion Shows: From Lady Godiva to Lady Gaga. 4 Units.**

This course considers the complex and interdependent relationship between fashion and art. Topics covered will include: the ways in which artists have used fashion in different art forms as a means to convey social status, identity, and other attributes of the wearer; the interplay between fashion designers and various art movements, especially in the twentieth century; the place of prints, photography, and the internet in fashion, in particular how different media shape how clothes are seen and perceived. We will discuss texts by Thorstein Veblen, Roland Barthes, Dick Hebdige, and other theorists of fashion.

Same as: ARTHIST 165A.

**ARTHIST 373. Issues in Contemporary Art. 4 Units.**

Major figures, themes, and movements of contemporary art from the 80s to the present. Readings on the neo-avant garde; postmodernism; art and identity politics; new media and technology; globalization and participatory aesthetics. Prerequisite: ARTHIST 155, or equivalent with consent of instructor.

Same as: ARTHIST 173.

**ARTHIST 376. Feminism and Contemporary Art. 4 Units.**

(Same as ARTHIST 176) The impact of second wave feminism on art making and art historical practice in the 70s, and its reiteration and transformation in contemporary feminist work. Topics: sexism and art history, feminist studio programs in the 70s, essentialism and self-representation, themes of domesticity, the body in feminist art making, bad girls, the exclusion of women of color and lesbians from the art historical mainstream, notions of performativity.

Same as: ARTHIST 176.

**ARTHIST 384. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting. 4 Units.**

Changes marking the transition from medieval to early modern Japanese society that generated a revolution in visual culture, as exemplified in subjects deemed fit for representation; how commoners joined elites in pictorializing their world, catalyzed by interactions with the Dutch.

Same as: ARTHIST 184, JAPANGEN 184, JAPANGEN 384.

**ARTHIST 387. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868. 4 Units.**

Narratives of conflict, pacification, orthodoxy, nostalgia, and novelty through visual culture during the change of episteme from late medieval to early modern, 16th through early 19th centuries. The rhetorical messages of castles, teahouses, gardens, ceramics, paintings, and prints; the influence of Dutch and Chinese visuality; transformation in the roles of art and artist; tensions between the old and the new leading to the modernization of Japan. Same as: ARTHIST 187, JAPANGEN 185.

**ARTHIST 388A. The History of Modern and Contemporary Japanese and Chinese Architecture and Urbanism. 4 Units.**

The recent rapid urbanization and architectural transformation of Asia; focus is on the architecture of Japan and China since the mid-19th century. History of forms, theories, and styles that serve as the foundation for today's buildings and cityscapes. How Eastern and Western ideas of modernism have merged or diverged and how these forces continue to shape the future of Japanese and Chinese architecture and urban form. Same as: ARTHIST 188A.

**ARTHIST 405. Art, Ekphrasis, and Music in Byzantium and Islam. 5 Units.**

Focus is on the interrelation of art, architecture, verbal description, poetry, and music (including the singing of psalms and recitation of the Qur'an). We explore how ekphrasis - the style of writing vividly intended to transform the listeners into spectators - structures the perception of and response to artistic production be it an art object, building, or a musical performance. More specifically, we will study the role of ekphrasis in animating the inanimate and the importance of breath and spirit, which become manifest in visual, acoustic, olfactory, and gustatory terms. The material covers both religious and courtly settings: Hagia Sophia, The Great Palace of Constantinople, The Dome of the Rock, The palaces of Baghdad and Samarra, the mosque at Cordoba, Medinat al-Zahra and the Alhambra. We will read Greek and Arabic writers on ekphrasis in translation, juxtaposing the medieval material to the ancient theories of ekphrasis and modern scholarship.

Same as: CLASSART 305.

**ARTHIST 415. Baroque: 1900-2000. 5 Units.**

The seminar, which is largely methodological and historiographic, problematizes issues of periodization. The course examines different approaches to the question of "what is baroque," from Alois Riegl and Erwin Panofsky to Michel Foucault, Svetlana Alpers and Giovanni Careri.

**ARTHIST 426. NARRATIVE THEORY & VISUAL FORM. 5 Units.**

The theoretical terrain of narrative studies in literary criticism and historiography. The critical implications of narrative analysis for the writing of history in general. Readings integrated with students' current research projects.

**ARTHIST 442. Looking at Violence. 5 Units.**

Violence in the media and its effects upon viewers, especially the young, is an issue of national concern that has produced legislation for the ratings of movies, television shows, and computer/video games. Parental control software makes it possible to program cable boxes and computers to censor what broadcasts or websites are accessible to children. These are political and technical fixes to a perceived social problem. They do not ask why one is drawn to watch violence in the first place, nor why certain kinds of violent imagery is compelling. Debates about how such measures should be implemented usually proceed from the given that images of violence are subjectspecific, with little or no consideration of their formal qualities or visual protocols. This seminar assumes that the tools and categories of visual analysis specific to the History of Art might enrich our thinking about the attraction and impact of violence across media and across time. The seminar proposes to situate its topic at the intersection of social, philosophic, and visual traditions so as to allow productive points of view to emerge. Readings will include texts from the history of aesthetics, psychology, and moral philosophy. Research projects will encourage analysis of all forms of visual media: painting, sculpture, prints, photographs, film, video, and computer graphics.

**ARTHIST 445. What's not American about American Art?. 5 Units.**

This seminar focuses on American art as a history of migration (of people but also of visual objects) across national and continental boundaries. We examine trans-Atlantic and trans-Pacific dialogues and consider how anxieties about foreigners, immigrants, and political dissidents shaped American art and culture at particular moments in the 20th century. In the second half of the course, we consider a series of museum exhibitions that repositioned American art as a history of social conflict and exclusion.

**ARTHIST 447. Piet Mondrian: Art, History and Historiography. 5 Units.**

Taking Mondrian as a case study, this seminar will examine some of the salient factors that shape how a modern artist emerges into history. Participants will explore Mondrian's work and ideas, attending not only to his own self-fashioning but also to the myriad forces that have shaped his reception since his death in New York in 1944, including scholarship, museum exhibitions, the art market, the responses of innumerable subsequent artists, and the wide circulation of his work in popular culture.

**ARTHIST 449. Flesh and Metal: Art History in the Museum and the Academy. 5 Units.**

This course is designed to anticipate an exhibition, also entitled *Flesh and Metal*, of works by major European and American modern artists, ca. 1914-1955, from the collection of the San Francisco Museum of Modern Art that will be on loan to the Cantor Art Center from November 2013 to March 2014. Artists include Bellmer, Brancusi, Calder, Dalí, De Kooning, Duchamp, Gorky, Moholy-Nagy, Mondrian, Picasso, Man Ray, Rodchenko, Sheeler, Tauber-Arp, among many others. Inspired by the concept of institutional critique, the seminar will examine theoretical and historical problems of exhibition installation, presentation, display, labeling, funding, etc. The reconstruction of historical works (e.g., Duchamp's *Fountain* and Dalí's *Surrealist object that functions symbolically*, *Gala's Shoe*, both in the show) will also receive attention. The conventions and possibilities of museum-based art history will be interrogated in part through examination of museum records and research into the works of art to be included in the Cantor exhibition.

**ARTHIST 461. The American Civil War: An Experiential History. 5 Units.**

Can one write a history of lived experience, of ephemeral states that never were represented? Can one look at representations of paintings, photographs, and literature to see where these ephemeral states might be trapped, or might otherwise be pictured? Feeling that the real war did not get in the books (for the most part), the course examines those books and other representations and so many things that never attained so exalted a form to look at the war anew. Methodological readings as well as readings about the Civil War.

**ARTHIST 470. Globalization and the Visual Arts. 5 Units.**

Enrollment restricted to graduate students. Globalization as the most important paradigm for the production, circulation, and reception of contemporary art since the 1990s. The expanding terrain of the art world; biennial culture; new economies of scale and the art market along with its critique in the discourses of empire and multitudes. Debates on the thematics of hybridity; post-Fordism; the flat world and capital flows; exteriority and site specificity; and new models of collectivism in recent art.

**ARTHIST 485. The Situation of the Artist in Traditional Japan. 5 Units.**

Topics may include: workshop production such as that of the Kano and Tosa families; the meaning of the signature on objects including ceramics and tea wares; the folk arts movement; craft guilds; ghost painters in China; individualism versus product standardization; and the role of lineage. How works of art were commissioned; institutions supporting artists; how makers purveyed their goods; how artists were recognized by society; the relationship between patrons, desires and artists, modes of production. Same as: JAPANGEN 220.

**ARTHIST 489. Connoisseurship Studies of Chinese Painting, Calligraphy, and Seals. 5 Units.**

This course focuses on taking connoisseurship out of the classroom and into the collecting world. With many classes being held at the Asian Art Museum and private collections in the Bay Area, students will learn not only what the role connoisseurship plays in the current art landscape, but how a museum works. Combines case studies in the field, reading material, eyes-on experience, and discussion, this class will address the topics of utilizing resources, conducting research, cultivating collectors, building collections, and curating exhibitions through the lens of connoisseurship.

**ARTHIST 490. Curatorial Activism in the Arts of Africa. 5 Units.**

Enrollment restricted to graduate students and advanced undergraduates. What is contemporary in African art and how does one curate the contemporary in and through African art? The course examines curatorial practices and activist projects. Topics include redefining museum exhibitions and collections of African art at the Cantor Arts Center and museums around the world; breaking away from stereotypical representations of the arts and cultures of Africa; controversial issues and dilemmas; curatorial activities directed toward cultural, social, and political activism; strategic modes of display and design; subjectivity vs. objectivity; and fostering critical dialogues about the arts and cultures of Africa.

**ARTHIST 502. Methods and Debates in Art History: The Writer's Voice. 5 Units.**

This course introduces graduate students to a range of interpretive methods within art history and visual culture studies. In addition to scrutinizing multiple schools of thought and critical debates within the field, the seminar pays particular attention to the style and strategies of writing taken up by individual critics and scholars. How and to whom--does the art historian's voice speak in different moments, visual contexts, and interpretive communities?

**ARTHIST 600. Art History Bibliography and Library Methods. 1 Unit.****ARTHIST 610. Teaching Praxis. 1-5 Units.****ARTHIST 620. Area Core Examination Preparation. 5 Units.**

For Art History Ph.D. candidates. Prerequisite: consent of instructor.

**ARTHIST 640. Dissertation Proposal Preparation. 5 Units.**

(Staff).

**ARTHIST 650. Dissertation Research. 5 Units.**

(Staff).

**ARTHIST 660. Independent Study. 1-15 Units.**

For graduate students only. Approved independent research projects with individual faculty members.

**ARTHIST 660E. Extended Seminar. 4 Units.**

May be repeated for credit. (Staff).

**ARTHIST 670. Dissertation Seminar. 3-5 Units.**

For graduate students writing and researching dissertations and dissertation proposals. How to define research projects, write grant proposals, and organize book-length projects.

**ARTHIST 802. TGR Dissertation. 0 Unit.**

## Art Studio Courses

**ARTSTUDI 4SI. Beginner Ceramics. 1-2 Units.**

Student Initiated Course - Introduction to Ceramics. Students learn basic hand-building and wheel techniques using stoneware clay, including how to throw cups, mugs, bowls, plates, and a lidded vessel. Class held in the Stanford Ceramics Studio (Elliot Program Center). \$50 lab fee covers clay, glaze, tools, and firing costs. All levels of experience welcome. Register on AxBess (limit 10 students). Please check <http://ceramics.stanford.edu> for any updates.

**ARTSTUDI 10AX. Filmmaking. 2 Units.**

Production skills and project development in documentary filmmaking. The fundamentals of filmmaking using digital video production techniques focused on documentary storytelling. Shooting in mini-DV format and editing with Final Cut Pro software, students actualize their ideas in an audiovisual medium from conceptualization through post-production and exhibition.

**ARTSTUDI 11A. Drawing: Means & Alternate Means. 2 Units.**

The first half of the quarter students explore more traditional ways of drawing (still life, models, etc..) to develop a hand/eye relationship. The class will focus on seeing and documenting what is in front of them. The second half of the quarter expands into using alternative means of mark making to deconstruct and re-construct ideas learned in the first half of the quarter. String, tape, body parts and shadows are all fair game. This will be a lively class. The students are graded on their attendance, participation, weekly assignments and one final assignment consisting of two finished works, one being traditional, the other experimental.

**ARTSTUDI 11AX. Digital Art and Design in Practice. 2 Units.**

Hands-on exploration of art and design using digital tools. Overview of contemporary digital art and design including fine art, graphic design, film, and animation. Analysis of new work in these areas and visits to Bay Area production and artist studios. Demos will focus on 2D and time-based techniques, but students interested in procedural or 3D computer graphic are welcome. Students will complete a multi-part visual project to be included in a final exhibit.

**ARTSTUDI 12AX. Drawing Intensive: Revisiting Nature. 2 Units.**

As increasing technological advances can further separate us from direct impressions of nature, this class is designed to reconnect and enhance our relationship to the natural world and our surrounding environment. To do this we will develop visual skills and critical thinking through careful observation and classical drawing techniques. Inspired by Stanford's natural and manicured landscapes, students will enjoy the great outdoors while learning elements of perspective, composition, light, and form. Students will learn about master landscape artists, investigate the built and natural environment of the campus, and experiment with various drawing techniques, mediums, and styles.

**ARTSTUDI 13A. Fundamentals of Oil Painting. 2 Units.**

This course is an introduction to oil painting. Students concentrate primarily on the technical aspects of the medium (i.e. how to paint as opposed to what to paint.) We examine color: how to mix it, how it establishes spatial relationships, light, and shadow. The class progresses through a series of problems designed to develop a sensitivity to paint application and surface quality; as well as to value, composition, volume, light, and space as the necessary elements of recreating perceptual experience. By the end of the course, students are able to apply some sophisticated techniques to visual problem solving. The aim of the course is to demonstrate the mechanical structure of oil painting.

**ARTSTUDI 13AX. Photography. 2 Units.**

This hands-on course in photography will emphasize the techniques, aesthetics, and conceptual considerations of traditional black and white photography. Students will also explore photography's history and applications as an expressive tool, with the power to communicate ideas and move the viewer. Throughout the course, students will master the use of their own manual 35mm camera and process the film themselves in our lab. They will also learn the techniques needed to make quality black and white prints in the darkroom. Students will coordinate an exhibition and present their finest work in a professional manner.

**ARTSTUDI 17A. Black and White Darkroom. 2 Units.**

A beginning black & white darkroom photography class with an emphasis on project conceptualization and the utilization of local environments. Students in addition to learning photography basics, will complete a cohesive, short body(s) of work. Students work collectively to realize a group exhibition. Theme and title of the exhibition are chosen at the beginning of the quarter and projects will be developed within its framework.

**ARTSTUDI 122E. Art in the Streets: Identity in Murals, Site-specific works, and Interventions in Public Spaces. 4 Units.**

This class will introduce students to both historical and contemporary public art practices and the expression of race and identity through murals, graffiti, site-specific works and performative interventions in public spaces. Involving lectures, guest speakers, field trips, and hands-on art practice, students will be expected to produce both an individual and group piece as a final project.  
Same as: CSRE 122E.

**ARTSTUDI 130. Interactive Art: Making it with Arduino. 4 Units.**

Students use electronics and software to create kinetic and interactive elements in artwork. No prior knowledge of electronics or software is required. Students learn to program the Arduino, a small easy-to-use microprocessor control unit ( see <http://www.arduino.cc/> ). Learn to connect various sensors such as light, motion, sound and touch and use them to control software. Learn to interface actuators like motors, lights and solenoids to create movement. Learn to connect the Arduino to theMAX/MSP/Jitter programming environment to create media-intensive video and audio environments. Explore the social dimensions of electronic art. (lower level).

**ARTSTUDI 131. Sound Art I. 4 Units.**

Acoustic, digital and analog approaches to sound art. Familiarization with techniques of listening, recording, digital processing and production. Required listening and readings in the history and contemporary practice of sound art. (lower level)  
Same as: MUSIC 154A.

**ARTSTUDI 138. Sound and Image. 4 Units.**

Practices that combine audio and visual media. Topics include synesthesias, visual music, film soundtracks, and immersive multimedia practices that combine sound, music, still and moving images, projections, and performance. (lower level).

**ARTSTUDI 140. Drawing I. 4 Units.**

Functional anatomy and perspective as they apply to problems of drawing the form in space. Individual and group instruction as students work from still life set-ups, nature, and the model. Emphasis is on the development of critical skills and perceptual drawing techniques for those with little or no previous experience with pastels, inks, charcoal, conte, and pencil. Lectures alternate with studio work. (lower level).

**ARTSTUDI 145. Painting I. 4 Units.**

Introduction to techniques, materials, and vocabulary in oil painting. Still life, landscape, and figure used as subject matter. Emphasis is on painting and drawing from life. (lower level).

**ARTSTUDI 147. Artist's Book. 4 Units.**

Explores contemporary aesthetic interpretations of the book as an art object while invigorating traditional artistic practices of the art of the book. Through the medium of drawing, collage, and mixed media students produce their own artist's book. The course familiarizes students with bookbinding and the various techniques used, as well as exploring the narrative, text and image, and the book as a sculptural object.

**ARTSTUDI 147S. Painting and Drawing. 4 Units.****ARTSTUDI 148. Monotype. 4 Units.**

Introduction to printmaking using monotype, a graphic art medium used by such artists as Blake, Degas, Gauguin, and Pendergast. May be repeated for credit. Prerequisite: 140. (lower level). May be repeated 2 times for total of 8 units.

**ARTSTUDI 148A. Lithography. 4 Units.**

The classic technique of printing from limestones. Techniques to draw an image on the stone, etch and fix the image on the stone, and print it in numbered editions. Students work on a variety of stone sizes. Field trips to local publishers of lithography or lithography exhibitions. (lower level).

**ARTSTUDI 148B. Introduction to Printmaking Techniques. 4 Units.**

Techniques such as monotype, monoprint, photocopy transfers, linocut and woodcut, intaglio etching. Demonstrations of these techniques. Field trips to local print collections or print exhibitions. (lower level).

**ARTSTUDI 151. Sculpture I. 4 Units.**

Traditional and non-traditional approaches to sculpture production through working with materials including wood, metal, and plaster. Conceptual and technical skills, and safe and appropriate use of tools and materials. Impact of material and technique upon form and content; the physical and expressive possibilities of diverse materials. Historical and contemporary forming methods provide a theoretical basis for studio work. Field trips; guest lecturers.

**ARTSTUDI 160. Design I : Fundamental Visual Language. 3-4 Units.**

Formal elements of visual expression (color, composition, space, and process) through hands-on projects. Two- and three-dimensional media. Emphasis is on originality and inventiveness. Content is realized abstractly. Centered in design; relevant to visual art study and any student seeking to develop visual perception. (lower level).

**ARTSTUDI 161. Catalysts for Design. 3-4 Units.**

Nature and science as sources of design inspiration. Projects in natural pattern formation, biological growth and form, Fibonacci numbers and the golden section, planar and spatial symmetry, mechanics, chaos, and fractals. Emphasis is on importance of creative synthesis to the design process. Projects take the form of physical constructions as opposed to renderings or computer models. Field trips. (lower level).

**ARTSTUDI 166. Design in Motion. 3-4 Units.**

Design areas for which movement and transformation are essential. Experimentation with mechanical means such as linking, hinging, inflating, and rotating. Projects in lighting, automata, tools and utensils, chain reactions, toys and games, festival props, and quasi-architecture emphasize the creation of works in which motion is a significant agent for aesthetic gratification. No experience in mechanical engineering required. (lower level).

**ARTSTUDI 167. Introduction to Animation. 3-4 Units.**

Projects in animation techniques including flipbook, cutout/collage, stop-motion such as claymation, pixilation, and puppet animation, rotoscoping, and time-lapse. Films. Computers used as post-production tools, but course does not cover computer-generated animation. (lower level).

**ARTSTUDI 170. Introduction to Photography. 4 Units.**

Critical, theoretical, and practical aspects of creative photography through camera and lab techniques. Field work. Cantor Art Center and Art Gallery exhibitions. Course requires the use of a 35mm camera. The Department will supply if necessary. (lower level).

**ARTSTUDI 177. Video Art I. 4 Units.**

Students create experimental video works. Conceptual, formal, and performance-based approaches to the medium. The history of video art since the 70s and its influences including experimental film, television, minimalism, conceptual art, and performance and electronic art. Topics: camera technique, lighting, sound design, found footage, cinematic conventions, and nonlinear digital editing. (lower level).

**ARTSTUDI 178. Art and Electronics. 4 Units.**

Analog electronics and their use in art. Basic circuits for creating mobile, illuminated, and responsive works of art. Topics: soldering; construction of basic circuits; elementary electronics theory; and contemporary electronic art. (lower level).

**ARTSTUDI 179. Digital Art I. 4 Units.**

Contemporary electronic art focusing on digital media. Students create works exploring two- and three-dimensional, and time-based uses of the computer in fine art. History and theoretical underpinnings. Common discourse and informative resources for material and inspiration. Topics: imaging and sound software, web art, and rethinking the computer as interface and object. (lower level).

**ARTSTUDI 180. Color. 3-4 Units.**

Hands-on study of color to develop color sensitivity and the ability to manipulate color to exploit its expressive potential. Guided experimentation and observation. Topics include color relativity, color and light, color mixing, color harmony, and color and content. (lower level).

**ARTSTUDI 230. Interdisciplinary Art Survey. 4 Units.**

This course is designed to develop diversity of concepts and strategies within the student's artistic practice. The course includes a survey of artists using different media taught in the department's studio program such as painting, drawing, video and digital art, printmaking, photography, and sculpture. This seminar-style class seeks to expand the artistic practice outside of traditional media boundaries and focuses on the translation of concepts across various media. Priority to Art Practice majors and minors. (upper level).

**ARTSTUDI 236. Future Media, Media Archaeologies. 3-4 Units.**

Hand-on. Media technologies from origins to the recent past. Students create artworks based on Victorian era discoveries and inventions, early developments in electronic media, and orphaned technologies. Research, rediscover, invent, and create devices of wonder and impossible objects. Readings in history and theory. How and what media technologies mediate. Same as: MUSIC 236.

**ARTSTUDI 240. Drawing II. 4 Units.**

Intermediate/advanced. Observation, invention, and construction. Development of conceptual and material strategies, with attention to process and purpose. May be repeated for credit. Prerequisite: 140 or consent of instructor. (upper level).

**ARTSTUDI 245. Painting II. 4 Units.**

Symbolic, narrative, and representational self-portraits. Introduction to the pictorial strategies, painting methods, and psychological imperatives of Dürer, Rembrandt, Cézanne, Kahlo, Beckmann, Schiele, and Munch. Students paint from life, memory, reproductions, and objects of personal significance to create a world in which they describe themselves. May be repeated for credit. Prerequisites: 140, 145, or consent of instructor. (upper level).

**ARTSTUDI 246. Individual Work: Drawing and Painting. 1-15 Units.**  
Prerequisites: two quarters of painting or drawing and consent of instructor.**ARTSTUDI 249. Advanced Undergraduate Seminar. 3-4 Units.**

Capstone experience for majors in Art Practice. Interdisciplinary. Methods of research, cross-media critiques, and strategies for staging and presenting work, including a group exhibition for Commencement. Guest artists from the Bay Area. Minors may interview for possible inclusion. (upper level).

**ARTSTUDI 250. Individual Work: Sculpture. 1-15 Units.**  
May be repeated for credit.**ARTSTUDI 252. Sculpture II. 4 Units.**

Builds upon 151. Installation and non-studio pieces. Impact of material and technique upon form and content; the physical and expressive possibilities of diverse materials. Historical and contemporary forming methods provide a theoretical basis for the studio work. Field trips; guest lecturers. (upper level).

**ARTSTUDI 254. Kinetic Sculpture. 3-4 Units.**

Students will work with visiting artist Bernie Lubell and Assistant Professor Berlier in the design and construction of a large-scale collaborative kinetic sculpture. Students will use both the Sculpture Lab facilities and the Product Realization Lab. Students will work in four teams of four throughout the quarter. The finished sculpture will be exhibited at the Exploratorium in San Francisco in the summer of 2013.

**ARTSTUDI 260. Design II: The Bridge. 3-4 Units.**

The historical spectrum of design including practical and ritual. The values and conceptual orientation of visual fundamentals. Two- and three-dimensional projects grouped to relate design theory to application, balancing imaginative and responsible thinking. Prerequisite: ARTSTUDI 160. Corequisite: ME 203 (upper level). May be repeated for credit.

**ARTSTUDI 261. Individual Work: Design. 1-15 Units.**  
May be repeated for credit.**ARTSTUDI 262. The Chair. 3-4 Units.**

Students design and fabricate a highly refined chair. The process is informed and supported by historical reference, anthropometrics, form studies, user testing, material investigations, and workshops in fiberglass molding, wood steam-bending, plywood forming, metal tube bending, TIG & MIG welding, upholstery & sewing. Prerequisites: ARTSTUDI 260 and ME 203, or consent of instructor. (upper level).

**ARTSTUDI 263. Paper. 3-4 Units.**

Beyond conventional use of paper as a foundation for mark making to its potential as a medium in its own right. Students experiment with papers to develop facility with techniques of folding, scoring, curling, cutting, tearing, piercing, embossing, layering, and binding to create three-dimensional forms, patterned/textured surfaces, reliefs, interactive dynamic structures such as pop-ups, containers, and book forms. (upper level). May be repeated for credit.

**ARTSTUDI 270. Advanced Photography Seminar. 1-5 Units.**

Student continues with own work, showing it in weekly seminar critiques. May be repeated for credit. (upper level).

**ARTSTUDI 271. The View Camera: Its Uses and Techniques. 4 Units.**

For students of photography who wish to gain greater control and refine skills in image making. 4x5 view cameras provided. Enrollment limited to 8. (upper level).

**ARTSTUDI 272. Individual Work: Photography. 1-5 Units.**

Student continues with own work, showing it in weekly seminar critiques. May be repeated for credit.

**ARTSTUDI 273. Individual Work: Experimental Media Art. 1-15 Units.**

May be repeated for credit.

**ARTSTUDI 274. Alternative Processes. 4 Units.**

Priority to advanced students. Technical procedures and the uses of primitive and hand-made photographic emulsions. Enrollment limited to 10. Prerequisites: 170, 270, or consent of instructor. (upper level).

**ARTSTUDI 275. Introduction to Digital Photography and Visual Images. 4 Units.**

Students use Adobe Lightroom to organize and edit images, manipulate and correct digital files, print photographs, create slide shows, and post to the Internet. How to use digital technology to concentrate on visual thinking rather than darkroom techniques. (upper level). May be repeated 2 times for a total of 8 units.

**ARTSTUDI 276. The Photographic Book. 4 Units.**

Grouping and sequencing photographic images to produce a coherent body of work with a thematic structure. (lower level).

**ARTSTUDI 277. Projects in Photography. 4 Units.**

Students pursue a topic of their own definition. Further exploration of darkroom and other printing techniques; contemporary theory and criticism. (lower level). May be repeated for credit 2 times for a maximum of 8 units.

**ARTSTUDI 278. Intermediate Black and White Photography. 4 Units.**

This course explores several intermediate-level topics and techniques in film based photography. These include medium format photography utilizing the school's cameras; fine printing techniques using fiber paper; the full range of black and white films currently available; and alternative black and white techniques such as pinhole photography, photograms, and Holga cameras. We briefly discuss basic lighting techniques. The course emphasizes improving the student's image content and sequencing of images.

**ARTSTUDI 279A. Digital Art II. 4 Units.**

Advanced. Interactive art works using multimedia scripting software. Experimental interfaces, computer installation work, and mobile technologies. Contemporary media art theory and practice. (upper level).

**ARTSTUDI 284. Art and Biology. 4 Units.**

The relationship between biology and art. Rather than how art has assisted the biological sciences as in medical illustration, focus is on how biology has influenced art making practice. New technologies and experimental directions, historical shifts in artists' relationship to the living world, the effects of research methods on the development of theory, and changing conceptions of biology and life. Projects address these themes and others that emerge from class discussions and presentations. (upper level).

**ARTSTUDI 310A. Directed Reading: Studio. 1-15 Units.****ARTSTUDI 310B. Directed Reading: Studio. 1-15 Units.****ARTSTUDI 310C. Directed Reading: Studio. 1-15 Units.**

**ARTSTUDI 342. MFA Project: Studio. 1-15 Units.**

Two weekly seminars, studio practice, and individual tutorials. Object seminar: student work is critiqued on issues of identity, presentation, and the development of coherent critical language. Concept seminar: modes of conceptualization to broaden the base of cognitive and generative processes. May be repeated for credit.

**ARTSTUDI 350A. Art in Context I: Post-Readymade Production. 3 Units.**

This class introduces key concepts of contemporary art for first-year graduate Design students. From art installations that function as storefronts to works that directly address the intersections of art, design and technology, visual artists are increasingly blurring the boundaries between the disciplines of applied and fine art. What were the historical roots of this intersection and how are artists responding with new forms? How can these conceptual and material tactics contribute to an expanded mode of design thinking? A series of readings and project assignments will be given, with time implemented for discussion and reflection. Field trips to sites such as The Exploratorium in San Francisco and the Zero1 Art & Technology Biennial in San Jose are planned, as well as talks by artists working in the field. Students will be asked to examine their own methods and materials of design and situate themselves within the larger context of art practice in order to consider an expanded field of concept, innovation, and audience.

**ARTSTUDI 350B. Art in Context II: Expanded Forms, Alternative Functions. 3 Units.**

This class introduces key concepts of contemporary art for first-year graduate Design students. From art installations that function as storefronts to works that directly address the intersections of art, design and technology, visual artists are increasingly blurring the boundaries between the disciplines of applied and fine art. What were the historical roots of this intersection and how are artists responding with new forms? How can these conceptual and material tactics contribute to an expanded mode of design thinking? A series of readings and project assignments will be given, with time implemented for discussion and reflection. Field trips to sites such as The Exploratorium in San Francisco and the Zero1 Art & Technology Biennial in San Jose are planned, as well as talks by artists working in the field. Students will be asked to examine their own methods and materials of design and situate themselves within the larger context of art practice in order to consider an expanded field of concept, innovation, and audience.

**ARTSTUDI 360A. Master's Project: Design. 2-4 Units.**

Students enroll concurrently in ME 316. Over the course of the year, students create and present two master's theses involving the synthesis of aesthetics and technological concerns in the service of human need and possibility. May be repeated for credit.

**ARTSTUDI 360B. Master's Project: Design. 2-4 Units.**

Students enroll concurrently in ME 316. Over the course of the year, students create and present two master's theses involving the synthesis of aesthetics and technological concerns in the service of human need and possibility.

**ARTSTUDI 360C. Master's Project: Design. 2-4 Units.**

Students enroll concurrently in ME 316. Over the course of the year, students create and present two master's theses involving the synthesis of aesthetics and technological concerns in the service of human need and possibility.

**ARTSTUDI 801. TGR Project. 0 Unit.**

## Asian American Studies Courses

**ASNAMST 74N. Race and Ethnicity in Contemporary American Fiction: Boundaries and Border Crossings. 3 Units.**

The question of "place" and "locality" in studies of identity and racial formation. Goal is to engage and examine texts with a critical eye both toward the social contexts represented and to the imaginative aesthetic techniques that American writers of color offer to bring their fictional worlds to life. Theme of border hopping and boundary crossing in works by authors including Charles Johnson, Toni Morrison, Alejandro Morales, Julie Otsuka, Stephen Graham Jones, and Lan Samantha Chang. Same as: ENGLISH 74N.

**ASNAMST 88N. Graphic Novels Asian American Style. 3 Units.**

Though genre fiction has occasionally been castigated as a lowbrow form only pandering to the uneducated masses, this course reveals how Asian American writers transform the genre to speak to issues of racial difference and social inequality. Same as: ENGLISH 88N.

**ASNAMST 100C. EAST House Seminar: Current Issues and Debates in Education. 1 Units.**

Education and Society Theme (EAST) House seminar. In fall quarter, faculty from around the University discuss the latest issues, debates, and research in Education. In winter quarter, research and practice pertaining to gender, sexuality, and education are covered by scholars from around the University and beyond. In the spring, the seminar revolves around higher education and political activism through the lens of race and ethnicity. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice. Same as: EDUC 100C.

**ASNAMST 112. Public Archaeology: Market Street Chinatown Archaeology Project. 4-5 Units.**

This internship-style course centers on the practice and theory of historical archaeology research and interpretation through a focused study of San Jose's historic Chinese communities. The course includes classroom lectures, seminar discussion, laboratory analysis of historic artifacts, and participation in public archaeology events. Course themes include immigration, urbanization, material culture, landscape, transnational identities, race and ethnicity, gender, cultural resource management, public history, and heritage politics. The course includes required lab sections, field trips, and public service. Transportation will be provided for off-site activities.

Same as: ANTHRO 112, ANTHRO 212.

**ASNAMST 146S. Asian American Culture and Community. 3-5 Units.**

An examination of the history, art and culture of Vietnamese Americans, and their contemporary experiences in the South Bay. The course will combine in-class learning with a major conference featuring prominent artists and scholars on the Vietnamese Diasporic community. A service learning component requires community work at a service organization in San Jose. Service Learning Course (certified by Haas Center). Course can be repeated once.

Same as: AMSTUD 146, COMPLIT 146, CSRE 146S.

**ASNAMST 158. Screening Asian America. 5 Units.**

This course examines the history of Asian Americans on the screen and behind the camera. Class discussion will cover early Edison shorts, Griffith's Broken Blossoms, and the work of Sessue Hayakawa and Anna May Wong. The course then explores independent Asian American filmmaking and surveys key works in documentary, experimental, and avant-garde film and video production by Asian Americans. Films include Wayne Wang's *Chan is Missing*, Rea Tajiri's *History and Memory*, Richard Fung's *Sea in the Blood*.



**ASNAMST 161. Asian American Immigration and Health. 3-5 Units.**

Employing a critical medical anthropological approach, this course focuses on the health of Asian and Pacific Islander immigrants to the United States. This course explores the construction of the Asian immigrant in biomedical discourse and governmental policies. Beginning with an historical study of Asian immigrants as feared sources of disease and contagion, this course addresses the impact of immigration status, language, health beliefs, gender, age, and definitions of community on health programs and policies.

**ASNAMST 174S. When Half is Whole: Developing Synergistic Identities and Mestiza Consciousness. 5 Units.**

This is an exploration of the ways in which individuals construct whole selves in societies that fragment, label, and bind us in categories and boxes. We examine identities that overcome the destructive dichotomies of  $\zeta$ us $\zeta$  and  $\zeta$ them,  $\zeta$  crossing borders of race, ethnicity, culture, nation, sex, and gender. Our focus is on the development of hybrid and synergistic forms of identity and mestiza consciousness in which the whole is greater than the sum of its parts.

Same as: CSRE 174S.

**ASNAMST 185A. Race and Biomedicine. 3-5 Units.**

Race, identity, culture, biology, and political power in biomedicine. Biological theories of racial ordering, sexuality and the medicalization of group difference. Sources include ethnography, film, and biomedical literature. Topics include colonial history and medicine, the politics of racial categorization in biomedical research, the protection of human subjects and research ethics, immigration health and citizenship, race-based models in health disparities research and policy, and recent developments in human genetic variation research.

Same as: ANTHRO 185A.

**ASNAMST 187. Geography, Time, and Trauma in Asian American Literature. 5 Units.**

The notion that homes can be stable locations for cultural, racial, ethnic, and similarly situated identity categories. The possibility that there really is no place like home for Asian American subjects. How geography, landscape, and time situate traumas within fictional Asian American narratives.

Same as: AMSTUD 261A, ENGLISH 261A.

**ASNAMST 188. Gender and Sexuality in Asian American Literature. 5 Units.**

How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face  $\zeta$ multiple negations $\zeta$  that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings will include literary criticism, feminist and queer theory.

Same as: AMSTUD 261F, ENGLISH 261F, FEMST 261F, FEMST 361F.

**ASNAMST 200R. Directed Research. 1-5 Units.**

May be repeated for credit.

**ASNAMST 200W. Directed Reading. 1-5 Units.**

(Staff).

**ASNAMST 261B. East Goes West: Transnational Asia/Pacific Spatial Geographies. 5 Units.**

East goes west as a metaphor to invoke the conceptions of fantasy and desire that play out in transnational scope. What attracts diasporic Asian/American subjects to the locations that they travel to, whether it be an identified homeland with which a character attaches a strong affinity, or to a new country where the promise of economic possibilities await?

Same as: AMSTUD 261B, ENGLISH 261B.

**ASNAMST 295F. Race and Ethnicity in East Asia. 4-5 Units.**

Historical, cultural, political and theoretical perspectives. Commonly misunderstood as an ethnically homogeneous country, the People's Republic of China is home to 55 officially recognized minority groups, many of whom inhabit the strategic border regions of the country. How similar assumptions of ethnic and racial homogeneity in Taiwan, Japan, and Korea are being reexamined by scholars in disciplines including anthropology, history, and political science.

Same as: HISTORY 295F, HISTORY 395F.

## Asian Languages Courses

ASNLANG 1. 1ST YR JPNESE. 0-60 Units.

## Astronomy Courses

## Athletics, Physical Education, Recreation Courses

**ATHLETIC 1. Alcohol & Health in College Life. 1 Unitss.**

This course centers on alcohol issues from both a health and psychological perspective focusing on college alcohol issues and concerns.

**ATHLETIC 2. Abs and Glutes. 1 Unitss.**

Lower body workout to strengthen glutes and thighs, and abdominal training. Fee. (AU).

**ATHLETIC 3M. Aikido. 1 Unitss.****ATHLETIC 4C. Archery Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU) (Staff).

**ATHLETIC 10. Band, Sports Activity. 1 Unitss.**

(AU).

**ATHLETIC 12V. Baseball, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 14. Basketball Skills. 1 Unitss.**

Although this course is designed for players of intermediate to advance skill level, it is open to anyone hoping to learn more about the game and to improve as a player. Focus will be placed on the fundamentals of basketball with an emphasis on dribbling, passing and shooting. Time will be spent on defensive principles and team concepts will be addressed as the course progresses.

**ATHLETIC 14V. Basketball, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 15V. Basketball, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 18. Strengthening the Heart through Compassion. 1 Unitss.**

Guided practices and simple evidence based strategies to develop self-compassion, experience genuine happiness, reduce stress and negative thoughts, resolve differences with difficult others and take compassionate action that makes a difference in the world. Sponsored by Stanford's Center for Compassion and Altruism Research and Education (CCARE) and following the Stanford Compassion Training program. Each week includes: meditation, group discussion, current research and its real world application.

**ATHLETIC 20M. Capoeira Club. 1 Unitss.****ATHLETIC 22C. Competitive Cheer Club. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member.

**ATHLETIC 23. Core Training. 1 Unitss.**

Exercises to build muscular strength and body core endurance, focusing on balance and stability. Equipment includes stability and medicine balls. Fee. (AU).

**ATHLETIC 25V. Crew, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 26V. Crew, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 27. Cross Training Fitness. 1 Unitss.**

Cross training fitness class will focus on combining different types of exercises to work the body as a whole to develop cardiovascular fitness, strength and power. All fitness levels are welcome. Class sessions will include exercises such as: indoor cycling, plyometrics, rowing, jump rope, circuit training, and various other exercises.

**ATHLETIC 28V. Cross Country, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 29V. Cross Country, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 30. Cycling: Indoor. 1 Unitss.**

Get a fantastic cardio workout on our stationary bikes. All levels and abilities welcome. Instructors motivate participants through intervals, hill climbs and coasts for the ultimate workout.

**ATHLETIC 31C. Cycling Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 33. Diving, Springboard. 1 Unitss.**

Basic techniques and mechanics of springboard and platform diving. Five basic categories of dives will be introduced: front, back, inward, reverse and twist. Competitive aspects of diving. Fee.

**ATHLETIC 34V. Diving, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 35V. Diving, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 37C. Equestrian Club Team. 1 Unitss.**

(AU).

**ATHLETIC 38M. Eskrima. 1 Unitss.****ATHLETIC 39. Fencing: Beginning. 1 Unitss.**

The sport of swordsmanship develops quick hands, strong legs, and a strategic mind. Footwork, handwork, and bouting. Emphasis is on foil technique. All equipment provided. Fee. (AU).

**ATHLETIC 40. Fencing, Intermediate. 1 Unitss.**

Continuation of 39; learn advanced footwork and handwork. Strategy and bouting. Introduction to epee and saber. All equipment provided. Prerequisite: 39. Fee. (AU).

**ATHLETIC 41V. Fencing, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 42V. Fencing, Varsity Women. 1-2 Units.**

(AU) (Milgram).

**ATHLETIC 43. Futsal. 1 Unitss.**

Futsal is a variant of soccer that is played on a smaller playing surface and mainly played indoors. Soccer greats such as Kaka, Ronaldo, Ronaldinho, Marta and Messi grew up playing Futsal and credit it for developing their incredible skills. Learn quick reflexes, fast thinking and pin-point passing. With five-a-side play and a special low bounce ball, Futsal will improve your game through its intense pace and rapid execution.

**ATHLETIC 45. Field Hockey, Indoor. 1 Unitss.**

Learn the game and rules of indoor field hockey, prior outdoor field hockey experience required.

**ATHLETIC 46. Field Hockey, Intermediate. 1 Unitss.**

For those with prior experience. Techniques, skills, and strategy. Scrimmages and game-like scenarios. Fee. (AU).

**ATHLETIC 47V. Field Hockey, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 48V. Football, Varsity. 1-2 Units.**

(AU).

**ATHLETIC 51. Golf: Beginning. 1 Unitss.**

Fundamentals of the golf swing; putting, chipping, and sand play. Golf etiquette and rules. Fee. (AU).

**ATHLETIC 52. Golf: Advanced Beginning. 1 Unitss.**

Further development of the golf swing and short game. How to practice. Rules and etiquette. Prerequisite: 51 or golf experience. Fee. (AU).

**ATHLETIC 53. Golf: Intermediate. 1 Unitss.**

Drills and practice on all facets of golf. How to lower scores and manage the game on the course. Prerequisite: 52 or equivalent. Fee. (AU).

**ATHLETIC 54. Golf: Advanced. 1 Unitss.**

Goal is to refine the golf swing and increase power, distance, and accuracy. Course management, mental preparation, visualization techniques. Prerequisites: 53 or experience playing and practicing, and the ability to hit shots with relative accuracy and distance. Fee. (AU).

**ATHLETIC 55V. Golf, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 56V. Golf, Varsity Women. 1-2 Units.**

AU.

**ATHLETIC 58. Gymnastics: Beginning. 1 Unitss.**

Fundamental gymnastics movement for men and women, including flexibility and strength exercises taught on the Olympic apparatus including floor, balance beam, bars, and rings. Fee. (AU).

**ATHLETIC 59. Gymnastics: Intermediate. 1 Unitss.**

For students who have completed 58 or have a background in gymnastics. Emphasis is on tumbling and somersaulting. Group work and individualized instruction for men and women. Limited apparatus work. Fee. (AU).

**ATHLETIC 60V. Gymnastics, Varsity Men. 1-2 Units. (AU).****ATHLETIC 61V. Gymnastics, Varsity Women. 1-2 Units. (AU).****ATHLETIC 63. Hip Hop. 1 Unitss.**

Funky, jazzy, hip hop dance for fun and cardiovascular fitness. Fee. (AU).

**ATHLETIC 65. Horsemanship: Beginning Riding. 1 Unitss.**

No experience needed. Basic horsemanship and riding at the walk, trot and canter. Fee. (AU).

**ATHLETIC 66. Horsemanship: Advanced Beginning Riding. 1 Unitss.**

Horsemanship and horse care; the canter and basic jumping. Prerequisite: 65 or equivalent. Fee. (AU).

**ATHLETIC 67. Horsemanship: Intermediate Riding. 1 Unitss.**

Basic veterinary skills and barn management. Riding at all gaits and completing horsemanship patterns (Western) or jumping basic courses (English). Fee. Prerequisite: 66 or equivalent. (AU).

**ATHLETIC 68. Horsemanship: Student Assistant. 1 Unitss. (Bartsch).****ATHLETIC 69. Leadership: Assertiveness and Creativity. 1 Unitss.**

This class will teach leadership techniques for maximizing creativity in a group setting through facilitated interaction with horses. Students will practice increasing personal and situational mind/body awareness, develop an authentic, assertive leadership style, and access creativity in challenging circumstances. No experience needed. Fee.

**ATHLETIC 70. Horsemanship. 1 Unitss.**

This course explores the basics of horsemanship and provides the necessary foundation for beginning riding. Topics include, but are not limited to, general horse care, handling techniques, horse health and disease, and stable management. This is an un-mounted course. No experience needed. Fee.

**ATHLETIC 70C. Horse Polo Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 72C. Ice Hockey Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. Men (AU).

**ATHLETIC 73M. JKA Shotokan Karate. 1 Unitss.****ATHLETIC 74C. Judo Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 75M. Jujitsu Self Defense. 1 Unitss.****ATHLETIC 76. Kickboxing. 1 Unitss.**

High intensity cardio workout incorporating kicks, punches, and elbow/knee and other combinations inspired by martial arts and boxing. Fee. (AU).

**ATHLETIC 77C. Lacrosse Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU) Same as: Men.

**ATHLETIC 78M. Kenpo Karate. 1 Unitss.****ATHLETIC 78V. Lacrosse, Varsity Women. 1-2 Units. (AU).****ATHLETIC 80. Lifeguard Training. 2 Units.**

Priority to those wanting to guard at Stanford during the year. Lifeguard characteristics and responsibilities, recognition of hazards and emergencies, patron and facility surveillance, interaction with the public, rescue skills. Community first aid and CPR for the professional rescuer. Fee. Prerequisite: pass swim test (swimmer/advanced swimmer level).

**ATHLETIC 81M. Muay Thai. 1 Unitss.****ATHLETIC 82. Manager: Athletic Team. 1 Unitss.**

For student managers of intercollegiate teams. Prerequisite: consent of respective varsity team head coach. (AU).

**ATHLETIC 87. Learn to Row. 1 Unitss.**

This class is an introduction to the sport of rowing using ergometer machines. The fundamentals of proper form, technique and workouts to develop cardiovascular fitness will be taught.

**ATHLETIC 88. Beginning Rowing for Women. 1 Unitss.**

This class is an introduction to the sport of rowing using ergometer machines. The fundamentals of proper form, technique and workouts to develop cardiovascular fitness will be taught. If you are interested in trying out for the Women's Rowing team this is an excellent class to give you the basics.

**ATHLETIC 90. Pilates Mat. 1 Unitss.**

Balanced sequence of exercises emphasizing grace and balance. Breath work and precision separate Pilates from traditional conditioning methods. Fee. (AU).

**ATHLETIC 91C. Rugby Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU) Same as: Men.

**ATHLETIC 92C. Rugby Club Team. 1 Unitss.**

(AU)

Same as: Women.

**ATHLETIC 98. Sailing, Beginning. 1 Unitss.**

Skills, theory, and techniques to enable beginners to sail with confidence in small centerboard boats. Fee. (AU).

**ATHLETIC 99. Sailing, Advanced Beginning. 1 Unitss.**

Continuation of ATHLETIC 98. For those with some sailing experience but not yet ready for intermediate sailing. Fee. May be repeated for credit. Prerequisites: ATHLETIC 98 or consent of instructor.

**ATHLETIC 100. Sailing, Intermediate. 1 Unitss.**

Refine skills. Introduction to racing. Prerequisite: ATHLETIC 99 or consent of instructor. Fee. (AU).

**ATHLETIC 104V. Sailing, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 105V. Sailing, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 107C. Ski Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 109. Social Dance, Beginning. 1 Unitss.**

Introduction to modern ballroom partner dancing. We'll cover steps, styling, technique, and rhythms in the five most popular social ballroom dances: Waltz, Foxtrot, Tango, Rumba, Cha-Cha. No experience or partner necessary. Fee.

**ATHLETIC 112. Soccer: Intermediate/Advanced. 1 Unitss.**

For the player with club or high school experience. Small group offensive and defensive tactics. Drills and small-sided games. Fee.

**ATHLETIC 113. Soccer: Indoor, Beginning/Intermediate. 1 Unitss.**

For those with little or no playing experience. Skills, rules, small sided games. Fee. (AU).

**ATHLETIC 114. Soccer, Indoor: Intermediate/Advanced. 1 Unitss.**

Smaller ball and playing area. Emphasis is on individual ball skills through small sided games. Fee. (AU).

**ATHLETIC 115. Soccer: Advanced for Men. 1 Unitss.**

Techniques under pressure; small group and team tactics. Fitness for the soccer player. Prerequisites: consent of instructor, tryouts. Fee. (AU).

**ATHLETIC 116. Soccer: Advanced for Women. 1 Unitss.**

Techniques under pressure; small group and team tactics. Fitness for the soccer player. Prerequisites: consent of instructor, tryouts. Fee. (AU).

**ATHLETIC 118V. Soccer, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 119V. Soccer, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 121V. Softball, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 123. Squash, Beginning/Intermediate. 1 Unitss.**

Techniques, rules and practice matches. Racquets, balls, and eye guards provided. Limited enrollment. Fee.

**ATHLETIC 125C. Squash Club Team. 1 Unitss.**

(AU)

Same as: Men.

**ATHLETIC 126V. Squash, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 128. Swimming: Overcome Fear of Water. 1 Unitss.**

Overcome fear and discomfort in water. Learn to be comfortable and in control in both shallow and deep water. Feel balanced in water. Learn how water works and how your body works in water. If time permits, introduction to front crawl.

**ATHLETIC 129. Swimming: Beginning. 1 Unitss.**

Beginner Swim Swim: (\*If you can swim across a 25 yard pool using any stroke, you should instead take the Advanced Beginner course.) This class is for those who do not know how to swim yet. In this class we will be learning how to: -methodically relax in the water -breathe in an effective, relaxed way -float &amp; tread water -swim 3 different strokes (freestyle, backstroke, breaststroke) -jump in the water from deck -use pool equipment (kick boards, pull buoys, fins) -swim across a 25 yard pool Fee. (AU).

**ATHLETIC 130. Swimming: Advanced Beginning. 1 Unitss.**

Advanced Beginner Swim: This class is for those who can swim across a 25 yard pool using any swim stroke. In this class we will be learning how to: -breathe in an effective, relaxed way -tread water -jump in -dive from the edge -do the 4 competitive swimming strokes (Freestyle, Backstroke, Breaststroke &amp; Butterfly) -use pool equipment (kick boards, pull buoys, hand paddles, fins) -do flipturns -use intervals for conditioning -evolve to swimming 500-1,000 yards Final week of class: underwater videotaping and review of each individual Fee. (AU).

**ATHLETIC 131. Swimming: Intermediate. 1 Unitss.**

Intermediate Swim: This class is for those who can swim 2-4 times across a 25 yard pool using the freestyle stroke. In this class we will be learning how to: -breathe in an effective, relaxed way -tread water -dive from the edge -do the 4 competitive swimming strokes (Freestyle, Backstroke, Breaststroke &amp; Butterfly) -use pool equipment (kick boards, pull buoys, hand paddles, fins) -do flipturns -use intervals for conditioning -evolve to swimming 1,000-1,500 yards Final week of class: underwater videotaping and review of each individual Fee. (AU).

**ATHLETIC 132. Swimming: Advanced. 1 Unitss.**

Review and refine all basic strokes and safety skills. Introduction to or review of butterfly and flip turn. Stroke drills and information on conditioning and designing individual workouts. Prerequisite: average to good strokes; ability to swim approximately 400-500 yards continuously. Fee. (AU).

**ATHLETIC 133. Swim Conditioning. 1 Unitss.**

Improve cardio-respiratory endurance through directed swimming workouts. Technique corrections as needed. Prerequisite: advanced swimmer. Fee. (AU).

**ATHLETIC 135V. Swimming, Synchronized: Varsity. 1-2 Units.**

(AU).

**ATHLETIC 136V. Swimming, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 137V. Swimming, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 138. Table Tennis: Intermediate/Advanced. 1 Unitss.**

This class is intended for players who have experience playing table-tennis including those who have taken the beginning table-tennis class. Students should have prior experience in countering, looping, chopping, and serving.

**ATHLETIC 139. Table Tennis. 1 Unitss.**

Basic counters, topspins, and chops with both the forehand and backhand. Serve and return, emphasizing game situations and match play. All equipment provided. Fee.

**ATHLETIC 140. Taiji Quan. 1 Unitss.**

Taiji Quan (Tai Chi) is a Chinese martial arts system of slow meditative physical exercise designed for relaxation, balance and health. All levels are welcome.

Same as: Tai Chi.

**ATHLETIC 141C. Tae Kwon Do Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 143C. Tennis Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 144. Tennis: Beginning. 1 Unitss.**

Forehand, backhand, serve, and net play; rules and scoring. (AU).

**ATHLETIC 145. Tennis: Low Intermediate. 1 Unitss.**

Fundamental strokes and their use in a game situation. Prerequisites: 144, or knowledge of rules and scoring and average ability in fundamental strokes but limited playing experience. Fee. (AU).

**ATHLETIC 146. Tennis: Intermediate. 1 Unitss.**

Fundamental stroke review. Singles and doubles tactics. Prerequisites: 145 or average ability in fundamental strokes, and regular playing experience; NTRP rating of 3.0 or equivalent. (AU).

**ATHLETIC 147. Tennis: Advanced. 1 Unitss.**

Drills emphasize footwork, serve and return, approach shots, volleys, lobs, and overheads. Strategy for competition in singles and doubles. Prerequisites: above average stroking and game playing ability; NTRP rating above 4.0 or equivalent. (AU).

**ATHLETIC 148V. Tennis, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 149V. Tennis, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 151. Total Body Workout. 1 Unitss.**

For all fitness levels; tone and strengthen the entire body. Different equipment used to target all major muscle groups. (AU).

**ATHLETIC 153V. Track and Field, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 154V. Track and Field, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 156C. Triathlon Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 158C. Ultimate Frisbee Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU)

Same as: Men.

**ATHLETIC 159C. Ultimate Frisbee Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU) (Staff)

Same as: Women.

**ATHLETIC 162. Volleyball. 1 Unitss.**

Drills to improve skills and game playing strategy. As ability indicates, more emphasis on team play and strategy. Fee. (AU).

**ATHLETIC 164. Volleyball: Intermediate Sand. 1 Unitss.**

Further development of skills and rules. Strategy in two- and four-person sand volleyball. Fee. (AU).

**ATHLETIC 165. Volleyball: Advanced Sand. 1 Unitss.**

Refine and improve skills and game playing strategy in two- and four-person sand volleyball. Must have strong skills and general knowledge of team concepts. Prerequisite: 164 or consent of the instructor. Fee. (AU).

**ATHLETIC 166V. Volleyball, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 167V. Volleyball, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 168C. Volleyball Club Team. 1 Unitss.**

This credit is offered to returning members of the specified Club Sports team. All enrollees must complete 21 hours of participation with the team and meet any other team requirements during the quarter. This is NOT a PE class or credit for beginners. While many teams are open to beginners joining, the credit is offered to returning athletes committed to the team for the year. If you are new to the team, please look to register for the credit in future quarters once you are committed as a team member. (AU).

**ATHLETIC 169. Water Polo: Beginning. 1 Unitss.**

Introduction to basic skills and game play. For those who have never played or have had limited experience. Fee. (AU).

**ATHLETIC 170. Water Polo: Intermediate/Advanced. 1 Unitss.**

Further work on skills. Game strategies. Fee. (AU).

**ATHLETIC 171V. Water Polo, Varsity Men. 1-2 Units.**

(AU).

**ATHLETIC 172V. Water Polo, Varsity Women. 1-2 Units.**

(AU).

**ATHLETIC 174. Weight Training: Beginning. 1 Unitss.**

Improve fitness level through progressive resistance exercises using machines and free weights. Individualized weight training programs once basic exercises are learned. Stretching program. Basics of exercise physiology. Fee. (AU).

**ATHLETIC 176. Weight Training for Women. 1 Unitss.**

All levels welcome, but designed for the beginner. Techniques and equipment for weight training. Emphasis is on stretching, proper form and progressions, and injury prevention. The basics of the physiology of strength training and planning individual programs. Fee. (AU).

**ATHLETIC 177. Circuit Aerobic Weight Training. 1 Unitss.**

A full-body conditioning workout with weight lifting and aerobic components. Weight training equipment organized into a circuit to maximize workout intensity in a short amount of time. Fee. (AU).

**ATHLETIC 178M. Wing Chun Kung Fu. 1 Unitss.****ATHLETIC 179. Wrestling and Introduction to Mixed Martial Arts. 1 Unitss.**

While primarily focusing on the basic techniques of collegiate wrestling, some non-striking forms of MMA, such as Brazilian jiu-jitsu and submission grappling, will be covered throughout the quarter. Same as: MMA.

**ATHLETIC 180V. Wrestling, Varsity. 1-2 Units.**  
(AU).**ATHLETIC 181M. Wushu. 1 Unitss.****ATHLETIC 182. Yoga: Asana Practice. 1 Unitss.**

Yoga offers continual opportunities for growth and balance both physical and emotional. Challenging yourself with different approaches will help you stay focused and keep your practice creative. In Asana Yoga Practice students will learn solid yoga practices that they can enjoy on their own as well as yoga foundations that they can apply in all types of yoga classes around the world.

**ATHLETIC 183. Yoga: Advanced Asana. 1 Unitss.**

Advanced Asana Practice is for students who already possess a solid foundation in yoga and who want to learn and practice more challenging postures.

**ATHLETIC 184. Yoga/Pilates Fusion. 1 Unitss.**

Combination of power and restorative yoga with strength building Pilates exercises. Fee.

**ATHLETIC 186. Zumba. 1 Unitss.**

Zumba combines Latin rhythms with cardiovascular exercise to create an aerobic routine. Interval and resistance training to maximize caloric output, fat burning, and total body toning. (AU).

**ATHLETIC 187. Analysis of Human Movement. 2-4 Units.**

Overview of skeletal and muscular anatomy. The mechanical principles of movement as related to efficient performance in aquatics, dance, and sports.

**ATHLETIC 188. Athletics and Identity. 1 Unitss.**

This class provides an overview of identity development theory related to religious/spiritual identity development, gender and sexuality identity development, racial and cultural identity development, ethical and moral development, and the development of meaning and purpose. It will explore the ways in which athletic participation affects and contributes to each one of these developmental areas. This course will also examine each of these topics in a larger context by discussing relevant current issues and events in sport.

**ATHLETIC 189. Business Practices in Sport. 2 Units.**

Planning and management of intercollegiate sports and recreation. Elements of business contracts, finance, facility development, legal issues, risk management, human resources, security, and operations and event management. How an athletic and recreation department is organized. Career opportunities in sports and recreation administration.

**ATHLETIC 190. Introduction to Nutrition. 2 Units.**

How to optimize nutrition for health and performance. Topics include macronutrients, fad diets, sugar addiction, low-calorie sweeteners, caloric restriction, disease prevention, and nutrition. Additional credit is available through a lab section ATH 190L. (not required).

**ATHLETIC 190L. Introduction to Nutrition Lab. 1 Unitss.**

Introduction to Nutrition Lab offers an additional credit and builds on the principles taught in ATH 190. It allows students the opportunity to improve their nutrition in stages through various projects. A written term paper on a nutrition topic and group presentation, attendance at the first meeting, and concurrent registration in ATH 190 are required.

**ATHLETIC 193. Lifestyle Fitness Challenge. 2 Units.**

Lifestyle Fitness Challenge is a fun and engaging class. The students participate in a variety of exercises that include a focus on cardiovascular fitness, muscular strength and flexibility. They learn simple and easy ways to incorporate fun exercise into their weekly routines. Through presentations that cover everything from dealing with stress to back stretches, students learn more about their overall health, gaining a greater awareness about themselves and their bodies. The positive effects of this class definitely go beyond the experience that students have in the classroom and lead to lifelong changes for better health.

**ATHLETIC 195. Mind, Body, Spirit. 2 Units.**

Spiritual features of everyday life primarily from a psychological perspective with a focus on health. Topics include cultivating gratitude, forgiveness, life purpose, and kindness; mind/body/spirit solutions to everyday problems. Meditation and other stress management practices.

**ATHLETIC 196. Practice of Happiness. 1 Unitss.**

This class is for each student to explore personal happiness thru applying research-based principles to enhance everyday life. The goal of the class is to position happiness as the cornerstone of personal wellness, purpose and fulfillment. Sessions will combine lecture, guided practice, conversation and readings.

**ATHLETIC 197. Sport Psychology. 2 Units.**

Basic theories in psychology which have the greatest influence on sport performance. Motivation, anxiety reduction, personality and self esteem, motor learning theories and sociological aspects and their influence on performance and learning.

**ATHLETIC 199. Sports Nutrition with Clinical Applications. 1-2 Units.**

The central theme of this course is to see how the mechanisms by which nutrition positively impacts sports performance relates to the mechanisms of health and disease. Grading is based on class participation (1 unit) or term papers and presentations (2 units) There are no prerequisites for this class, but up to a dozen students are allowed to take the course for 2 units (discussed at the first class meeting) and they should have a background that enables them to engage in an upper division discussion of nutrition. This would include having taken Hum Bio 130 or 135 (Human Nutrition or Exercise Physiology), Athletics 75 (my lower division course), Bio Core or similarly helpful courses. At the very least a student should take Hum Bio 130 or Ath 75 concurrent to taking Ath 123. Limit of 12 students taking the class for 2 credits, students must talk with instructor on first day.

**ATHLETIC 200. Emotional Intelligence: Tools for Productivity and Flourishing. 2 Units.**

This class is designed to help high achieving, intellectually competent Stanford students develop their Emotional Intelligence. This class will use lecture, discussion, peer coaching and guided practice to help students assess, understand and utilize their EI strengths and weaknesses. Goals for class are improved stress management and resilience, greater self awareness and enhanced productivity.

**ATHLETIC 201. Foundations of Wellness-1. 2 Units.**

This class will explore the basic aspects of wellness related to the management of stress and the development of optimal performance with an emphasis on physical well being. Topics include, diet and nutrition, exercise, sleep, creating behavior change, goal setting and avoiding risky behaviors.

**ATHLETIC 202. Foundations of Wellness-2. 2 Units.**

This class will explore the basic aspects of wellness related to the management of stress and the creation of optimal performance with an emphasis on psychological well being. Topics include, stress management, enhancing emotional intelligence, creating positive emotion and the creation of happiness.

**ATHLETIC 320. Backpacking. 1 Unitss.**

Backpacking: Provides students with an overview of skills necessary for backpacking and camping responsibly in the wilderness. Topics covered: clothing and equipment selection, use and repair; Leave No Trace outdoor ethics; nutrition and cooking; hygiene and personal care; navigation; and common wilderness hazards. Recommended for students new to backpacking interested in personal and group outings, as well as those with previous experience looking to hone skills. No prerequisites.

**ATHLETIC 325. Winter Backcountry Travel. 1 Unitss.**

Introduction to traveling in the backcountry in adverse weather conditions. Topics include cross country touring, snow shoeing, winter camping techniques & shelters, and winter safety considerations including introduction to avalanche safety considerations.

**ATHLETIC 331. Rock Climbing 1. 1 Unitss.**

Learn the basics of rock climbing, safety and equipment in this introductory class. This is a great foundation for learning knots and having instruction on technique and practice time with instructors. Additional recreational classes (i.e., not-for-credit) are listed at [climbing.stanford.edu](http://climbing.stanford.edu).

**ATHLETIC 332. Rock Climbing 2. 1 Unitss.**

Rock Climbing 2 - Intermediate Climbing Technique is designed to instruct students in efficient climbing movement techniques for various terrain, introduce basic training principles for improving your climbing, and reinforce best safety practices for climbing and bouldering, This is a great course for individuals getting back into climbing and those continuing their climbing education. Prerequisite: Current Belay Certification at the Stanford Climbing Wall.

**ATHLETIC 333. Rock Climbing 3. 1 Unitss.**

Rock Climbing 3 - This is an advanced intermediate course and learn to lead class. It will focus on improving climbing technical skills including intermediate to advanced climbing technique, and an introduction to sport lead climbing. Students will be introduced to a variety of climbing skills and techniques for improving safety and efficiency while climbing including body positioning, efficient and controlled dynamic movement, proper lead clipping techniques, lead belaying techniques and catching lead falls, cleaning lead anchors and rappelling, and building basic sport climbing anchors from fixed protection. Students should have a minimum of one year prior climbing and top-rope belaying experience and be able to comfortably complete top-rope climbs of at least a 5.10a level of difficulty.

**ATHLETIC 340. Rock Climbing: Strength and Conditioning. 1 Unitss.**

For experienced climbers to improve climbing skills and overall fitness through rock climbing exercises that center on focus, endurance, power-endurance, and power. Prerequisite: intermediate climbing class or equivalent or consent of instructor. Fee. (AU).

**ATHLETIC 342. Rock Climbing Route Setting. 1 Unitss.**

This class will introduce the route setting for rock climbing.

**ATHLETIC 347. Aerial Fabrics 1- Static. 1 Unitss.**

If you've ever wanted to run away and join the circus, or at least be strong and flexible, this class is a great place to start! Aerial fabrics is a circus art that combines the acrobatics with the artistry of dance and the exhilaration of height. In this class, students will learn basic climbs, locking techniques and static poses. Emphasis will be placed on building confidence with being off the ground, endurance for short sequences of poses with transitions, and best practices. This class is appropriate for students with no experience. Students who are not completely comfortable with every pose, climb and static move are encouraged take this class repeatedly to gain more confidence and strength before moving on to the drops/dynamic class. The end-of-quarter showcase is optional for recreational students, and required for for-credit students.

**ATHLETIC 348. Aerial Fabrics 2: Drops + Dynamic Moves. 1 Unitss.**

Aerial Fabrics 2: Drops + Dynamic Moves -- Once you have mastered static poses and basic climbs, expand your aerial repertoire with more complex tricks, drops, and climbs. We will learn more difficult moves and dynamic routines. Emphasis will be placed on building strength and flexibility so that drops can be performed spectacularly and safely. The end-of-quarter showcase is optional for rec students and required for for-credit students. Pre-requisites: ability to climb to the top of the fabrics, invert comfortably from the air, and execute both a hip key (from the air) as well as a cross-back straddle. Participation is at instructor's discretion. Additional aerial fabric classes are offered not-for-credit through [climbing.stanford.edu](http://climbing.stanford.edu).

**ATHLETIC 350. Aerial Fabrics Conditioning. 1 Unitss.**

Strength, endurance, and flexibility are important for anyone interested in Aerial Fabrics. While this class does not focus on the aerial moves or skills, the strength and endurance you build here will make it easier to do everything in your other aerial classes, from a simple climb to the most complex of drops.

**ATHLETIC 370. Introduction to Downhill Skiing/Snowboarding. 1 Unitss.**

4 days of discounted ski/snowboard instruction and transportation for Stanford. Participants are bused from Stanford to one of four Tahoe Resorts on 4 different weekends. Enrolled students receive varied level of instruction (beginning to advanced), and have time to practice on the mountain before meeting bus to return home to Stanford. All attendance must be complete to all 4 weekends to receive passing credit.

**ATHLETIC 405. Outdoor Leadership. 1 Unitss.**

Outdoor Leadership 1 : Develop leadership skills necessary to lead multi-day backpacking trips for inexperienced participants. Course is taught through a combination of discussions and experiential activities and introduction to theory. Topics include: adventure learning, group dynamics, outdoor risk management, evacuations, facilitation. This course is required for those interested in leading Stanford Pre-Orientation Trips (SPOT), but is also open to interested students with other outdoor leadership goals. (FORMERLY ATH 84). Quarter class options and a spring break option.

**ATHLETIC 406. Outdoor Leadership Practicum 1. 1 Unitss.**

Outdoor Leadership Practicum: 4-day Outdoor Leadership Training Trip. Practice of leadership skills from Athletics 405. Additional technical outdoor skills taught include outdoor equipment selection and fitting, camp set up, minimum impact camping, stove use and repair, backcountry cooking, navigation, and risk management. PREREQ ATH 405 (Formerly ATH 84).

**ATHLETIC 415. Outdoor Leadership 2. 1 Unitss.**

Outdoor Leadership 2: This course will build the logistical and leadership skills needed for the effective design and delivery of multi-day outdoor trips. Students will learn the fundamentals of: route planning based on group size and skill; backcountry menu development and ration packaging; backcountry risk management and emergency action plans; theory behind evaluation and management of physical, emotional and perceived risk; execution of search, evacuation and emergency procedures; fundamentals of sound judgement and decision making. Prerequisites: completion of Ath. 405 and 406; Wilderness First Aid or Wilderness First Responder (510 or 515).

**ATHLETIC 416. Outdoor Leadership Practicum 2. 1 Unitss.**

Practice of topics covered in Athletics 415. Students will plan and co-lead field outings. Prerequisites: Ath 405, 406, 415. (415 and 416 may be taken simultaneously.).

**ATHLETIC 495. Outdoor Education: Assistant Instructor. 1 Unitss.**

Formerly ATH 83--Assist Instructing Outdoor Education Courses. Instructor Approval and Defined Student Goals/Benchmarks Required Prior to instructing.

**ATHLETIC 510. Wilderness First Aid. 1 Unitss.**

Wilderness First Aid (WFA) is a class that provides a basic introduction to backcountry and emergency medicine. Topics covered include patient assessment, addressing life threats, shock, spine safety, musculoskeletal injuries, medical emergencies, environmental emergencies, and more. Each weekly class short lectures and practical sessions. A 3-year certification card is provided by Stanford Wilderness Medicine (SWiM) upon successful completion of the course.

**ATHLETIC 515. Wilderness First Responder. 2 Units.**

Wilderness First Responder (WFR) is an intensive 80 hour class that focuses on basic life support techniques and tools for the outdoor professional working in the wilderness. It covers trauma, environmental and medical issues that arise in a wilderness setting using both lecture and hands-on activity of scenarios and labs for experiential education. Among other things, students will perform solid CPR and BLS skills, make improvised splints, understand basic anatomy and physiology, clean and manage wounds in the backcountry, recognize serious backcountry trauma injuries, environmental issues, medical issues, triage and know how to handle mass casualty incidents. Wilderness First Responder is a must for outdoor professionals looking to take their first aid skills to the next level, and to be prepared for medical emergencies in the wilderness. WFR certification lasts 3 years upon successful passing of written and practical exams. Course includes AEHS adult, child, and infant CPR certification which is OSHA approved. Contact Antja Thompson, antja@stanford.edu for more information.

**ATHLETIC 530. Climbing Wall Instructor. 1 Unitss.**

The Professional Climbing Instructor's Association (PCIA) Climbing Wall Instructor (CWI) Course provides instructors with an in depth and standardized understanding of the skills essential to teaching climbing in an indoor setting. Emphasis on the importance of teaching technically accurate information & sound fundamental skills. (Formerly ATH 21).

**ATHLETIC 560. AIARE Level 1 Avalanche Course. 1 Unitss.**

This 3-day course provides a Level 1 Avalanche Certificate through the American Institute for Avalanche Research and Education (AIARE). Through both classroom and field instruction, students will be provided with lessons and exercises that are practically oriented, useful, and applicable in the basic understanding of avalanches. The course describes a framework for decision making and risk management in avalanche terrain. It focuses on identifying the right questions rather than on providing "answers." ADVISORY: Students should be competent backcountry skiers/snowboarders, i.e., have the ability to travel in the winter environment using the appropriate gear. The course will take place in North Lake Tahoe. Transportation, accommodation, and ski/snowboard gear is not included in course fee.

## Biochemistry Courses

**BIOC 109A. The Human Genome and Disease. 3 Units.**

The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. Students with a major, minor or cotermin in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109A, BIO 209A, BIOC 209A, HUMBIO 158.

**BIOC 109B. The Human Genome and Disease: Genetic Diversity and Personalized Medicine. 3 Units.**

Continuation of 109A/209A. Genetic drift: the path of human predecessors out of Africa to Europe and then either through Asia to Australia or through northern Russia to Alaska down to the W. Coast of the Americas. Support for this idea through the histocompatibility genes and genetic sequences that predispose people to diseases. Guest lectures from academia and pharmaceutical companies. Prerequisite: Biology or Human Biology core. Students with a major, minor or cotermin in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109B, BIO 209B, BIOC 209B.

**BIOC 118Q. Genomics and Medicine. 3 Units.**

Preference to sophomores. Knowledge gained from sequencing human genomes and implications for medicine and biomedical research. Novel diagnoses and treatment of diseases, including stem cells, gene therapy and rational drug design. Personal genomics and how it is used to improve health and well being. Social and ethical implications of genetic information such as privacy, discrimination and insurability. Course Webpage: <http://biochem118.stanford.edu/>.

**BIOC 158. Genomics, Bioinformatics and Medicine. 3 Units.**

Molecular basis of inherited human disease. Diagnostics approaches: simple Mendelian diseases and complex, multifactorial diseases. Genomics: functional genomics, epigenetics, gene expression, SNPs, copy number and other structural genomic variations involved in disease. Novel therapeutic methods: stem cell therapy, gene therapy and drug developments that depend on the knowledge of genomics. Personal genomics, pharmacogenomics, clinical genomics and their role in the future of preventive medicine. Prerequisites: BIO 41 or HUMBIO 2A or consent of instructor. Those with credit in BIOC 118 not eligible to enroll. Course webpage: <http://biochem158.stanford.edu/>  
Same as: BIOC 258, BIOMEDIN 258, HUMBIO 158G.

**BIOC 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.



**BIOC 200. Applied Biochemistry. 1 Unitss.**

Enrollment limited to MD candidates. Fundamental concepts of biochemistry as applied to clinical medicine. Topics include thermodynamics, enzyme kinetics, vitamins and cofactors, metabolism of carbohydrates, lipids, amino acids and nucleotides, and the integration of metabolic pathways. Clinical case studies discussed in small-group, problem-based learning sessions.

**BIOC 202. Biochemistry Bootcamp. 1 Unitss.**

Open to first year Biochemistry students or consent of instructor. Hands-on, five-day immersion in biochemical methods and practice, theory and application of light microscopy, and computational approaches to modern biological problems.

**BIOC 205. Molecular Foundations of Medicine. 3 Units.**

For medical students. Topics include DNA structure, replication, repair, and recombination; gene expression, including mechanisms for regulating transcription and translation; chromosome structure and function; gene cloning, protein engineering, and genomics. Patient presentations and journal clubs illustrate how molecular biology affects the practice of medicine.

**BIOC 209A. The Human Genome and Disease. 3 Units.**

The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. Students with a major, minor or coterm in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109A, BIO 209A, BIOC 109A, HUMBIO 158.

**BIOC 209B. The Human Genome and Disease: Genetic Diversity and Personalized Medicine. 3 Units.**

Continuation of 109A/209A. Genetic drift: the path of human predecessors out of Africa to Europe and then either through Asia to Australia or through northern Russia to Alaska down to the W. Coast of the Americas. Support for this idea through the histocompatibility genes and genetic sequences that predispose people to diseases. Guest lectures from academia and pharmaceutical companies. Prerequisite: Biology or Human Biology core. Students with a major, minor or coterm in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109B, BIO 209B, BIOC 109B.

**BIOC 210. Advanced Topics in Membrane Trafficking. 3 Units.**

The structure, function, and biosynthesis of cellular membranes and organelles. Current literature. Prerequisite: consent of instructor.

**BIOC 215. Frontiers in Biological Research. 1 Unitss.**

Literature discussion in conjunction with the Frontiers in Biological Research seminar series in which investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker's primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research. Same as: DBIO 215, GENE 215.

**BIOC 218. Computational Molecular Biology. 3 Units.**

Practical, hands-on approach to field of computational molecular biology. Recommended for molecular biologists and computer scientists desiring to understand the major issues concerning analysis of genomes, sequences and structures. Various existing methods critically described and strengths and limitations of each. Practical assignments utilizing tools described. Prerequisite: BIO 41 or consent of instructor. All homework and coursework submitted electronically. Course webpage: <http://biochem218.stanford.edu/>. Same as: BIOMEDIN 231.

**BIOC 220. Chemistry of Biological Processes. 4 Units.**

The principles of organic and physical chemistry as applied to biomolecules. Goal is a working knowledge of chemical principles that underlie biological processes, and chemical tools used to study and manipulate biological systems. Prerequisites: organic chemistry and biochemistry, or consent of instructor. Same as: CSB 220.

**BIOC 221. The Teaching of Biochemistry. 3 Units.**

Required for teaching assistants in Biochemistry. Practical experience in teaching on a one-to-one basis, and problem set design and analysis. Familiarization with current lecture and text materials; evaluations of class papers and examinations. Prerequisite: enrollment in the Biochemistry Ph.D. program or consent of instructor.

**BIOC 224. Advanced Cell Biology. 4 Units.**

For Ph.D. students. Current research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for advanced undergraduates: BIO 129A,B, and consent of instructor. Same as: BIO 214, MCP 221.

**BIOC 226. Interdisciplinary Approaches to Biochemistry: Single Molecule Biophysics to Clinical Outcomes. 3 Units.**

Interdisciplinary analyses from basic biochemistry and biophysics to clinical outcomes of disease states and potential therapeutic interventions (translational research). Focus on cardiac system. Cardiomyopathies arise from missense mutations in cardiac muscle proteins, including the cardiac myosin motor. Single molecule biophysics and classical enzyme kinetics and use of induced pluripotent stem cells (iPS cells) and single cell studies lay foundation for discussions of effects of cardiomyopathy mutations on heart function. Potential therapeutic approaches discussed, including genetic analysis, DNA cloning, reconstitution of functional assemblies, x-ray diffraction and 3D reconstruction of electron microscope images, spectroscopic methods, computational approaches, single molecule biophysics, use of induced pluripotent stem cells in research, and other interdisciplinary approaches. Current papers examined. Prerequisites: basic biochemistry.

**BIOC 236. Biology by the Numbers: Evolution. 3 Units.**

Topics in biology from a quantitative perspective. Subjects vary. 2012-13 focus: evolution, from basic principles of evolutionary dynamics to fundamental quantitative questions that are far from being answered; from early life, metabolic processes, and molding of earth by microbes to spread of human epidemics; from analysis of genomes and molecular phylogenies to aspects of multi-cellular development. Prerequisite: familiarity with ordinary differential equations and probability. Biology background not required. Same as: APPPHYS 236.

**BIOC 241. Biological Macromolecules. 3-5 Units.**

The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 30. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only. Same as: BIOPHYS 241, SBIO 241.

**BIOC 257. Currents in Biochemistry. 1 Unitss.**

Seminars by Biochemistry faculty on their ongoing research. Background, current advances and retreats, general significance, and tactical and strategic research directions.

**BIOC 258. Genomics, Bioinformatics and Medicine. 3 Units.**

Molecular basis of inherited human disease. Diagnostics approaches: simple Mendelian diseases and complex, multifactorial diseases. Genomics: functional genomics, epigenetics, gene expression, SNPs, copy number and other structural genomic variations involved in disease. Novel therapeutic methods: stem cell therapy, gene therapy and drug developments that depend on the knowledge of genomics. Personal genomics, pharmacogenomics, clinical genomics and their role in the future of preventive medicine. Prerequisites: BIO 41 or HUMBIO 2A or consent of instructor. Those with credit in BIOC 118 not eligible to enroll. Course webpage: <http://biochem158.stanford.edu/> Same as: BIOC 158, BIOMEDIN 258, HUMBIO 158G.

**BIOC 299. Directed Reading in Biochemistry. 1-18 Units.**

Prerequisite: consent of instructor.

**BIOC 350. Development of Thesis Research. 2 Units.**

Biochemistry 2nd year PhD students with permission of instructor only. Students place their thesis research into a broader scientific perspective, identify important questions to ask, and learn to communicate these clearly. Series of roundtable discussions with students and faculty about the proposed research topics. Initial focus on developing the equivalent of specific aims for research grants.

**BIOC 360. Developing an Original Research Proposal. 1 Unitss.**

Biochemistry 3rd year PhD students with permission of instructor only. Students develop new research directions. Topics well outside of student's research topic must be chosen. Series of discussion groups with faculty and students. Students present possible outside research topics followed by presentation of important questions and approaches to answer these questions. Focus is on developing the equivalent of specific aims for research grants.

**BIOC 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**BIOC 399. Graduate Research and Special Advanced Work. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members.

**BIOC 459. Frontiers in Interdisciplinary Biosciences. 1 Unitss.**

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See <http://biox.stanford.edu/courses/459.html>. Recommended: basic mathematics, biology, chemistry, and physics. Same as: BIO 459, BIOE 459, CHEM 459, CHEMENG 459, PSYCH 459.

**BIOC 801. TGR Project. 0 Unit.****BIOC 802. TGR Dissertation. 0 Unit.**

## Bioengineering Courses

**BIOE 10N. Form and Function of Animal Skeletons. 3 Units.**

Preference to freshmen. The biomechanics and mechanobiology of the musculoskeletal system in human beings and other vertebrates on the level of the whole organism, organ systems, tissues, and cell biology. Field trips to labs.

Same as: ME 10N.

**BIOE 36Q. The Biophysics of Innate Immunity. 3 Units.**

The innate immune system provides our first line of defense against disease--both infections, and cancer. Innate immune effectors such as host defense peptides are deployed by numerous cell types (for instance neutrophils, macrophages, NK cells, epithelial cells and keratinocytes) and work by biophysical mechanisms of action. The course draws from the primary literature and covers the evolution, structures, mechanisms, and physiological functions of important "innate immune effectors" (components of the innate immune system that can attack pathogens, and infected or host cells, and kill or incapacitate them directly). The course is aimed at students who have an interest in biochemistry, molecular/cellular biology, biophysics, and/or bioengineering.

**BIOE 41. Physical Biology of Macromolecules. 4 Units.**

Principles of statistical physics, thermodynamics, and kinetics with applications to molecular biology. Topics include entropy, temperature, chemical forces, enzyme kinetics, free energy and its uses, self assembly, cooperative transitions in macromolecules, molecular machines, feedback, and accurate replication. Prerequisites: MATH 41, 42; CHEM 31A, B (or 31X); strongly recommended: PHYSICS 41, CME 100 or MATH 51, and CME 106; or instructor approval.

**BIOE 42. Physical Biology of Cells. 4 Units.**

Principles of transport, continuum mechanics, and fluids, with applications to cell biology. Topics include random walks, diffusion, Langevin dynamics, transport theory, low Reynolds number flow, and beam theory, with applications including quantitative models of protein trafficking in the cell, mechanics of the cell cytoskeleton, the effects of molecular noise in development, the electromagnetics of nerve impulses, and an introduction to cardiovascular fluid flow. Prerequisites: MATH 41, 42; CHEM 31A, B (or 31X); strongly recommended: CS 106A, PHYSICS 41, CME 100 or MATH 51, and CME 106; or instructor approval. 4 units, Spr (Huang, K).

**BIOE 44. Fundamentals for Engineering Biology Lab. 4 Units.**

Introduction to next-generation techniques in genetic, molecular, biochemical, and cellular engineering. Lab modules build upon current research including: gene and genome engineering via decoupled design and construction of genetic material; component engineering focusing on molecular design and quantitative analysis of experiments; device and system engineering using abstracted genetically encoded objects; and product development based on useful applications of biological technologies.

**BIOE 45. Computational Modeling of Microbial Communities. 4 Units.**

Innovative new sequencing technologies are permitting the generation of massive amounts of sequence data and changing the way we think about and pursue biological questions. Coupled to these opportunities are tremendous challenges for biologists to grapple with the manipulation and analysis of large datasets and to address quantitative questions on a systems scale. The goal of this course is to provide biologists with basic computational tools and knowledge to confront large datasets in a quantitative manner. Students will learn basic programming skills in Matlab and Perl. Covered material will include: image analysis, bioinformatics algorithms, reaction-diffusion modeling, Monte Carlo algorithms, and population dynamics. Students will apply computational skills to a miniature research project studying the human microbiome or biofuel-related photosynthetic microbial communities. Spr 2012, (Huang, K., Sonnenburg, J., and Vora, T.) Same as: MI 245.

**BIOE 51. Anatomy for Bioengineers. 4 Units.**

Fundamental human anatomy, spanning major body systems and tissues including nerve, muscle, bone, cardiovascular, respiratory, gastrointestinal, and renal systems. Explore intricacies of structure and function, and how various body parts come together to form a coherent and adaptable living being. Correlate clinical conditions and therapeutic interventions. Participate in lab sessions with predissected cadaveric material and hands-on learning to gain understanding of the bioengineering human application domain. Encourage anatomical thinking, defining challenges and opportunities for bioengineers.

**BIOE 70Q. Medical Device Innovation. 3 Units.**

Preference to sophomores. Introduces students to the design of medical technologies and the non-technical factors that impact their clinical adoption and market success. Guest speakers include engineers, doctors, and other professionals who have helped bring ideas from concept to clinical use. Hands-on design projects will challenge students to invent their own solutions to clinical needs. No previous engineering training is required.

**BIOE 80. Introduction to Bioengineering. 4 Units.**

Overview of bioengineering focused on engineering analysis and design of biological systems. Topics include chemical properties of biological components, rates and equilibrium properties of biological reactions, cellular structure and communication, genetic programming of biological systems, and engineering balances and systems analysis. Application of these concepts to engineering biological systems for diverse areas, including health and medicine, biomanufacturing, and sustainability, is emphasized. Includes an introduction to MATLAB as a problem-solving tool and a team-based project emphasizing the responsible development of technologies. 4 units, Spr (Barron)  
Same as: ENGR 80.

**BIOE 101. Systems Biology. 4 Units.**

Complex biological behaviors through the integration of computational modeling and molecular biology. Topics: reconstructing biological networks from high-throughput data and knowledge bases. Network properties. Computational modeling of network behaviors at the small and large scale. Using model predictions to guide an experimental program. Robustness, noise, and cellular variation. Prerequisites: CME 102; BIO 41, BIO 42; or consent of instructor.  
Same as: BIOE 210.

**BIOE 103. Systems Physiology and Design. 4 Units.**

Biological and electrical design principles. Engineering tools used to electrically probe and model physiological systems. Basic and clinical excitable cell physiology. Topics: single-cell physiology (treatment of cells as bioelectrical devices, cable properties, ion channels and gradients, nonlinear dynamics of action potentials), network physiology and system design (neural networks, orderly recruitment of axons, Hebbian and spike timing-dependent plasticity), and excitable cell disease and interventions (major neurological and neuromuscular disease syndromes, neuromuscular simulation and surgical planning, electromagnetic stimulation instrumentation, optogenetics, tissue engineering). Prerequisites: MATH 41, 42; CME 102; PHY 41, 43; BIO 41, 42; or instructor approval.

**BIOE 123. Optics and Devices Lab. 4 Units.**

This course provides a hands-on introduction to designing, building, and evaluating devices for controlling experiments in the field of bioengineering. This course primarily focuses on the tools and concepts related to optics and electronics, but also touches on other valuable techniques such as rapid prototyping, image analysis, and micro-fluidics. The first part of the course consists of guided modules such as building optical traps and electronic amplifiers, while the second half of the course is more open, project based and where students design and develop their own computer controlled microscope incl. closed loop object tracking. Prerequisites: BIOE 41 and Matlab recommended or instructor approval. Win (Riedel-Kruse, I.; Stephen Quake). Limited enrollment. Priority given to 3rd and 4th year BioE majors. Lab fee may apply.

**BIOE 131. Ethics in Bioengineering. 3 Units.**

Bioengineering focuses on the development and application of new technologies in the biology and medicine. These technologies often have powerful effects on living systems at the microscopic and macroscopic level. They can provide great benefit to society, but they also can be used in dangerous or damaging ways. These effects may be positive or negative, and so it is critical that bioengineers understand the basic principles of ethics when thinking about how the technologies they develop can and should be applied. On a personal level, every bioengineer should understand the basic principles of ethical behavior in the professional setting. This course will involve substantial writing, and will use case-study methodology to introduce both societal and personal ethical principles, with a focus on practical applications. WIM for Bioengineering. Enrollment limited to 20; priority given to Bioengineering majors.

**BIOE 141A. Biodesign Project I. 4 Units.**

First of a two quarter series. Team-based experience in biological and biomedical technology design including need validation, design, initial prototyping, analysis and quantitative testing. This course is open only to students in the undergraduate Bioengineering program.

**BIOE 141B. Biodesign Project II. 4 Units.**

Second of two quarter series. Team-based experience in biological and biomedical technology design including need validation, design, initial prototyping, analysis and quantitative testing. This course is open only to students in the undergraduate Bioengineering program.

**BIOE 191. Bioengineering Problems and Experimental Investigation. 1-5 Units.**

Directed study and research for undergraduates on a subject of mutual interest to student and instructor. Prerequisites: consent of instructor and adviser. (Staff).

**BIOE 191X. Out-of-Department Advanced Research Laboratory in Bioengineering. 1-15 Units.**

Individual research by arrangement with out-of-department instructors. Credit for 191X is restricted to declared Bioengineering majors pursuing honors and requires department approval. See <http://bioengineering.stanford.edu/education/undergraduate.html> for additional information. May be repeated for credit.

**BIOE 210. Systems Biology. 4 Units.**

Complex biological behaviors through the integration of computational modeling and molecular biology. Topics: reconstructing biological networks from high-throughput data and knowledge bases. Network properties. Computational modeling of network behaviors at the small and large scale. Using model predictions to guide an experimental program. Robustness, noise, and cellular variation. Prerequisites: CME 102; BIO 41, BIO 42; or consent of instructor.  
Same as: BIOE 101.

**BIOE 212. Introduction to Biomedical Informatics Research Methodology. 3 Units.**

Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor. Same as: BIOMEDIN 212, CS 272, GENE 212.

**BIOE 214. Representations and Algorithms for Computational Molecular Biology. 3-4 Units.**

Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units. Same as: BIOMEDIN 214, CS 274, GENE 214.

**BIOE 220. Introduction to Imaging and Image-based Human Anatomy. 3-4 Units.**

The physics of medical imaging and human anatomy through medical images. Emphasis is on normal anatomy, contrast mechanisms, and relative strengths of each imaging modality. Labs reinforce imaging techniques and anatomy. Same as: RAD 220.

**BIOE 222A. Multimodality Molecular Imaging in Living Subjects I. 4 Units.**

Focuses on instruments and chemistries for imaging of cellular and molecular processes in vivo. Basics of instrumentation physics, chemistry of molecular imaging probes, and an introduction to preclinical and clinical molecular imaging modalities. Same as: RAD 222A.

**BIOE 222B. Multimodality Molecular Imaging in Living Subjects II. 4 Units.**

Focuses on molecular probes that target specific disease mechanisms. The ideal characteristics of molecular probes; how to optimize their design for use as effective imaging reagents that target specific steps in biological pathways and reveal the nature of disease through noninvasive assays. Same as: RAD 222B.

**BIOE 222C. Multimodality Molecular Imaging in Living Subjects III. 4 Units.**

Focuses on emerging chemistries and instruments that address unmet needs for improved diagnosis and disease management in cancer, neurological disease, cardiovascular medicine and musculoskeletal disorders. Objective is to identify problems or controversies in the field, and to resolve them through understanding the relevant primary literature. Same as: RAD 222C.

**BIOE 223. Physics and Engineering of X-Ray Computed Tomography. 3 Units.**

CT scanning geometries, production of x-rays, interactions of x-rays with matter, 2D and 3D CT reconstruction, image presentation, image quality performance parameters, system components, image artifacts, radiation dose. Prerequisites: differential and integral calculus. Knowledge of Fourier transforms (EE261) recommended. Same as: RAD 223.

**BIOE 224. Ultrasound Imaging and Therapeutic Applications. 3 Units.**

Covers the basic concepts of ultrasound imaging including acoustic properties of biological tissues, transducer hardware, beam formation, and clinical imaging. Also includes the therapeutic applications of ultrasound including thermal and mechanical effects, visualization of the temperature and radiation force with MRI, tissue assessment with MRI and ultrasound, and ultrasound-enhanced drug delivery. Same as: RAD 225.

**BIOE 236. Biophysical Mechanisms of Innate Immunity. 3 Units.**

The innate immune system provides our first line of defense against infections of all kinds as well as cancer. Innate immune effectors, e.g. host defense peptides are deployed by numerous cell types (neutrophils, macrophages, NK cells, as well as epithelial cells, keratinocytes, and others) and attack by biophysical mechanisms of action. Disorders of innate immunity are increasingly being implicated in human autoimmune disease. Using primary literature, we will cover the evolution, structures, mechanisms, and functions of innate immune effectors.

**BIOE 244. Advanced Frameworks and Approaches for Engineering Integrated Genetic Systems. 4 Units.**

Concepts and techniques for the design and implementation of engineered genetic systems. Topics covered include the quantitative exploration of tools that support (a) molecular component engineering, (b) abstraction and composition of functional genetic devices, (c) use of control and dynamical systems theory in device and systems design, (d) treatment of molecular "noise", (e) integration of DNA-encoded programs within cellular chassis, (f) designing for evolution, and (g) the use of standards in measurement, genetic layout architecture, and data exchange. Prerequisites: CME104, CME106, CHEM 33, BIO41, BIO42, BIOE41, BIOE42, and BIOE44 (or equivalents), or permission of the instructors.

**BIOE 260. Tissue Engineering. 3 Units.**

Principles of tissue engineering and design strategies for practical applications for tissue repair. Topics include tissue components and dynamics, morphogenesis, stem cells, cellular fate processes, cell and tissue characterization, controlled drug and gene delivery, bioreactors, cell-materials interactions, and host integration. Present research proposal to solve a real life tissue engineering problem. Same as: ORTHO 260.

**BIOE 261. Principles and Practice of Stem Cell Engineering. 3 Units.**

Quantitative models used to characterize incorporation of new cells into existing tissues emphasizing pluripotent cells such as embryonic and neural stem cells. Molecular methods to control stem cell decisions to self-renew, differentiate, die, or become quiescent. Practical, industrial, and ethical aspects of stem cell technology application. Final projects: team-reviewed grants and business proposals. Same as: NSUR 261.

**BIOE 273. BIODESIGN FOR MOBILE HEALTH. 1 Unitss.**

Examines the emerging Mobile Health industry. Mobile health (mHealth, or, wireless health) is the provision of health services and information via mobile technologies such as mobile phones and wearable sensors. Innovations in this area promise solutions to the need for universal access to affordable and effective health care by enabling consumers to take charge of their health, creating affordable ways to manage aging and chronic conditions, moving care from the hospital into the home, improving treatment options by providing transparency of measurable clinical outcomes, and shifting the focus from sick care to health improvement and prevention. Topics include the driving needs, applications, challenges and incentives that characterize the emerging mobile health landscape, and include an overview of some of the devices and companies that are already transforming the way health care is accessed today. Faculty and guest speakers discuss the status of the industry and research in Mobile Health, as well as opportunities in and challenges to medical technology innovation unique to this area. Issues related to Key Markets/Applications, Consumer/Enterprise Innovation, Policy/Regulatory, Financing, Business Models, Global Initiatives and Entrepreneurship are covered. Same as: MED 273.

**BIOE 280. Skeletal Development and Evolution. 3 Units.**

The mechanobiology of skeletal growth, adaptation, regeneration, and aging is considered from developmental and evolutionary perspectives. Emphasis is on the interactions between mechanical and chemical factors in the regulation of connective tissue biology. Prerequisites: BIO 42, and ME 80 or BIOE 42. Same as: ME 280.

**BIOE 281. Biomechanics of Movement. 3 Units.**

Experimental techniques to study human and animal movement including motion capture systems, EMG, force plates, medical imaging, and animation. The mechanical properties of muscle and tendon, and quantitative analysis of musculoskeletal geometry. Projects and demonstrations emphasize applications of mechanics in sports, orthopedics, and rehabilitation. Same as: ME 281.

**BIOE 284B. Cardiovascular Bioengineering. 3 Units.**

Continuation of ME/BIOE 284A. Integrative cardiovascular physiology, blood fluid mechanics, and transport in the microcirculation. Sensing, feedback, and control of the circulation. Overview of congenital and adult cardiovascular disease, diagnostic methods, and treatment strategies. Engineering principles to evaluate the performance of cardiovascular devices and the efficacy of treatment strategies. Same as: ME 284B.

**BIOE 291. Principles and Practice of Optogenetics for Optical Control of Biological Tissues. 3 Units.**

Principles and practice of optical control of biological processes (optogenetics), emphasizing bioengineering approaches. Theoretical, historical, and current practice of the field. Requisite molecular-genetic, optoelectronic, behavioral, clinical, and ethical concepts, and mentored analysis and presentation of relevant papers. Final projects of research proposals and a laboratory component in BioX to provide hands-on training. Contact instructor before registering.

**BIOE 300A. Molecular and Cellular Bioengineering. 3 Units.**

The molecular and cellular bases of life from an engineering perspective. Analysis and engineering of biomolecular structure and dynamics, enzyme function, molecular interactions, metabolic pathways, signal transduction, and cellular mechanics. Quantitative primary literature. Prerequisites: CHEM 171 and BIO 41 or equivalents; MATLAB or an equivalent programming language.

**BIOE 300B. Physiology and Tissue Engineering. 3 Units.**

This course focuses on engineering approaches to quantifying, modeling and controlling the physiology and pathophysiology of complex systems, from the level of individual cells to tissue, organ and multi-organ systems. Winter (Covert).

**BIOE 301A. Molecular and Cellular Engineering Lab. 2 Units.**

Preference to Bioengineering graduate students. Practical applications of biotechnology and molecular bioengineering including recombinant DNA techniques, molecular cloning, microbial cell growth and manipulation, and library screening. Emphasis is on experimental design and data analysis. Limited enrollment. Corequisite: 300A. Fall (Cochran).

**BIOE 301B. Clinical Needs and Technology. 1 Unitss.**

Diagnostic and therapeutic methods in medicine. Labs include a pathology/histology session, pulmonary function testing, and the Goodman Simulation Center. Each student paired with a physician for observation of an operation or procedure. Final presentation. Limited enrollment. Corequisite: 300B.

**BIOE 301C. Diagnostic Devices Lab. 3 Units.**

Biomedical instruments and diagnostic devices. Emphasis is on comparing measurements with theoretical predictions. Labs include ECG, MRI, microfluidics, CT, and EEG. Prerequisites: 300B and 301B. Spring (Boahen).

**BIOE 311. Biophysics of Multi-cellular Systems and Amorphous Computers. 2-3 Units.**

This course provides an interdisciplinary perspective on the design, emergent behavior, and functionality of multi-cellular biological systems such as embryos, biofilms, and artificial tissues and their conceptual relationship to amorphous computers. Students will discuss relevant literature and will be introduced to and apply pertinent mathematical and biophysical modeling approaches to various aspect of multi-cellular systems. Specific topics include: (Morphogen) gradients; reaction-diffusion systems (Turing patterns); visco-elastic aspects and forces in tissues; morphogenesis; coordinated gene expression, genetic oscillators and synchrony; genetic networks; self-organization, noise, robustness, and evolvability; emergent behavior; criticality; symmetries; scaling; fractals; agent based modeling. The course is geared towards a broadly interested graduate and advanced undergraduates audience such as from bio- / applied physics, computer science, developmental biology, and bio- / tissue / mechanical / electrical engineering. Prerequisites: Previous knowledge in one programming language - ideally Matlab - is strongly recommended; undergraduate students benefit from BIOE 41, BIOE 42, or equivalent. Win (Riedel-Kruse, I.H.).

**BIOE 331. Protein Engineering. 3 Units.**

The design and engineering of biomolecules emphasizing proteins, antibodies, and enzymes. Combinatorial and rational methodologies, protein structure and function, and biophysical analyses of modified biomolecules. Clinically relevant examples from the literature and biotech industry. Prerequisite: basic biochemistry. Winter, Cochran.

**BIOE 332. Large-Scale Neural Modeling. 3 Units.**

Large-scale models link cellular properties, columnar microcircuits, recurrent connectivity, and feedback projections to experimentally studied behaviors such as selective attention and working memory. Emphasis is on making experimentally testable predictions by exploring spike-based communication and biophysics-based computation. Work in teams of two to implement models from the literature and develop models of your own. Run models with up to a million neurons in real-time on a special-purpose simulation platform developed at Stanford (Neurogrid). Spring, (Boahen, K.).

**BIOE 333. Interfacial Phenomena and Bionanotechnology. 3 Units.**

Control over and understanding of interfacial phenomena and colloidal science are the essential foundation of bionanotechnology. Key mathematical relationships derived by Laplace, Gibbs, Kelvin and Young are derived and explained, along with the thermodynamics of systems of large interfacial area. Forces controlling surface and interfacial phenomena and surfactant and biomacromolecule self-assembly are discussed. Protein folding/unfolding and aggregation, and nano- and microfluidics are elucidated in these terms. Students will gain insight into the interplay between physical and chemical properties of biomolecules. Spring, (Barron, A.).

**BIOE 334. Engineering Principles in Molecular Biology. 3 Units.**

The achievements and difficulties that exemplify the interface of theory and quantitative experiment. Topics include: bistability, cooperativity, robust adaptation, kinetic proofreading, analysis of fluctuations, sequence analysis, clustering, phylogenetics, maximum likelihood methods, and information theory. Sources include classic papers.

**BIOE 335. Molecular Motors I. 3 Units.**

Physical mechanisms of mechanochemical coupling in biological molecular motors, using F1 ATPase as the major model system. Applications of biochemistry, structure determination, single molecule tracking and manipulation, protein engineering, and computational techniques to the study of molecular motors.

**BIOE 355. Advanced Biochemical Engineering. 3 Units.**

Combines biological knowledge and methods with quantitative engineering principles. Quantitative review of biochemistry and metabolism; recombinant DNA technology and synthetic biology (metabolic engineering). The production of protein pharmaceuticals as a paradigm for the application of chemical engineering principles to advanced process development within the framework of current business and regulatory requirements. Prerequisite: CHEMENG 181 (formerly 188) or BIOSCI 41, or equivalent.

Same as: CHEMENG 355.

**BIOE 361. Biomaterials in Regenerative Medicine. 3 Units.**

Materials design and engineering for regenerative medicine. How materials interact with cells through their micro- and nanostructure, mechanical properties, degradation characteristics, surface chemistry, and biochemistry. Examples include novel materials for drug and gene delivery, materials for stem cell proliferation and differentiation, and tissue engineering scaffolds. Prerequisites: undergraduate chemistry, and cell/molecular biology or biochemistry.

Same as: MATSCI 381.

**BIOE 370. Microfluidic Device Laboratory. 2 Units.**

Fabrication of microfluidic devices for biological applications. Photolithography, soft lithography, and micromechanical valves and pumps. Emphasis is on device design, fabrication, and testing.

**BIOE 371. Global Biodesign: Medical Technology in an International Context. 1-2 Units.**

(Same as OIT 587) Seminar examines the development and commercialization of medical technologies in the global setting focusing primarily on Europe, India and China. Faculty and guest speakers from industry and government discuss the status of the industry, as well as opportunities in and challenges to medical technology innovation unique to each geography. Topics related to development of technologies for bottom of the pyramid markets are also addressed. Students enrolling for 2 units are required to write and deliver a final paper.

Same as: MED 271.

**BIOE 372. Design for Service Innovation. 4 Units.**

(Same as OIT 343/01) Open to graduate students from all schools and departments. An experiential project course in which students work in multidisciplinary teams to design new services to address the needs of medically patients. Project teams partner with "safety net" hospitals and clinics to find better ways to deliver care to the low income and uninsured patients these institutions serve. Students learn proven innovation processes from experienced GSB, d. school, and SoM faculty, interface with students from across the university, and have the opportunity to see their ideas translated into improvements in the quality and efficiency of healthcare in the real world. Prerequisite: admission to the course is by application only. Applications available at <http://DesignForService.stanford.edu>. Applications must be submitted by November 16, 2011. Same as: HRP 274, MED 274.

**BIOE 374A. Biodesign Innovation: Needs Finding and Concept Creation. 4 Units.**

(Same as OIT 384) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations. Same as: ME 368A, MED 272A.

**BIOE 374B. Biodesign Innovation: Concept Development and Implementation. 4 Units.**

(Same as OIT 385) Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. Prerequisite: MED 272A, ME368A, OIT 384 or BIOE 374A. Same as: ME 368B, MED 272B.

**BIOE 375A. Biodesign Innovation: Needs Finding and Concept Creation. 2 Units.**

Enrollment limited to SCPD students. Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations.

**BIOE 375B. Biodesign Innovation: Concept Development and Implementation. 2 Units.**

Enrollment limited to SCPD students. Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. Prerequisite: BIOE 375A.

**BIOE 381. Orthopaedic Bioengineering. 3 Units.**

Engineering approaches applied to the musculoskeletal system in the context of surgical and medical care. Fundamental anatomy and physiology. Material and structural characteristics of hard and soft connective tissues and organ systems, and the role of mechanics in normal development and pathogenesis. Engineering methods used in the evaluation and planning of orthopaedic procedures, surgery, and devices.

Same as: ME 381.

**BIOE 386. Neuromuscular Biomechanics. 3 Units.**

The interplay between mechanics and neural control of movement. State of the art assessment through a review of classic and recent journal articles. Emphasis is on the application of dynamics and control to the design of assistive technology for persons with movement disorders. Same as: ME 386.

**BIOE 390. Introduction to Bioengineering Research. 2 Units.**

Preference to medical and bioengineering graduate students with first preference given to Bioengineering Scholarly Concentration medical students. Bioengineering is an interdisciplinary field that leverages the disciplines of biology, medicine, and engineering to understand living systems, and engineer biological systems and improve engineering designs and human and environmental health. Students and faculty will make presentations during the course. Students will be expected to make presentations, complete a short paper, read selected articles, and take quizzes on the material.

Same as: MED 289.

**BIOE 391. Directed Study. 1-6 Units.**

May be used to prepare for research during a later quarter in 392. Faculty sponsor required. May be repeated for credit.

**BIOE 392. Directed Investigation. 1-10 Units.**

For Bioengineering graduate students. Previous work in 391 may be required for background; faculty sponsor required. May be repeated for credit.

**BIOE 393. Bioengineering Departmental Research Colloquium. 1 Unitss.**

Bioengineering department labs at Stanford present recent research projects and results. Guest lecturers. Topics include applications of engineering to biology, medicine, biotechnology, and medical technology, including biodesign and devices, molecular and cellular engineering, regenerative medicine and tissue engineering, biomedical imaging, and biomedical computation. Aut, Win, Spr (Lin, Riedel-Kruse, Barron).

**BIOE 450. Advances in Biotechnology. 3 Units.**

Guest academic and industrial speakers. Latest developments in fields such as bioenergy, green process technology, production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.

Same as: CHEMENG 450.

**BIOE 454. Synthetic Biology and Metabolic Engineering. 3 Units.**

Principles for the design and optimization of new biological systems. Development of new enzymes, metabolic pathways, other metabolic systems, and communication systems among organisms. Example applications include the production of central metabolites, amino acids, pharmaceutical proteins, and isoprenoids. Economic challenges and quantitative assessment of metabolic performance. Pre- or corequisite: CHEMENG 355 or equivalent.

Same as: CHEMENG 454.

**BIOE 459. Frontiers in Interdisciplinary Biosciences. 1 Unitss.**

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See <http://biox.stanford.edu/courses/459.html>. Recommended: basic mathematics, biology, chemistry, and physics.

Same as: BIO 459, BIOC 459, CHEM 459, CHEMENG 459, PSYCH 459.

**BIOE 484. Computational Methods in Cardiovascular Bioengineering. 3 Units.**

Lumped parameter, one-dimensional nonlinear and linear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system and evaluate the performance of cardiovascular devices. Construction of anatomic models and extraction of physiologic quantities from medical imaging data. Problems in blood flow within the context of disease research, device design, and surgical planning.

Same as: ME 484.

**BIOE 485. Modeling and Simulation of Human Movement. 3 Units.**

Direct experience with the computational tools used to create simulations of human movement. Lecture/labs on animation of movement; kinematic models of joints; forward dynamic simulation; computational models of muscles, tendons, and ligaments; creation of models from medical images; control of dynamic simulations; collision detection and contact models.

Prerequisite: 281, 331A,B, or equivalent.

Same as: ME 485.

**BIOE 500. Thesis. 1-15 Units.**

(Staff)

Same as: Ph.D.

**BIOE 802. TGR Dissertation. 0 Unit.**

(Staff).

## Biology Courses

**BIO 3. Frontiers in Marine Biology. 1 Unitss.**

An introduction to contemporary research in marine biology, including ecology, conservation biology, environmental toxicology, behavior, biomechanics, evolution, neurobiology, and molecular biology. Emphasis is on new discoveries and the technologies used to make them. Weekly lectures by faculty from the Hopkins Marine Station.

**BIO 3N. Views of a Changing Sea: Literature & Science. 3 Units.**

The state of a changing world ocean, particularly in the eastern Pacific, will be examined through historical and contemporary fiction, non-fiction and scientific publications. Issues will include harvest and mariculture fisheries, land-sea interactions and oceanic climate change in both surface and deep waters.

**BIO 4N. Personalized Genomic Medicine. 3 Units.**

Exploration of the exciting new field of personalized genomic medicine. Personalized medicine is based on the idea that each person's unique genome sequence can be used to predict risk of acquiring specific diseases, and to make more informed medical choices. Learn about the fascinating science behind these approaches; where they are heading in the future; and the ethical implications such technology presents. Lectures will be augmented with hands-on experience in exploring and analyzing a real person's genome.

**BIO 5. Ecology for Everyone. 4 Units.**

Basics of ecology, from gut bacteria to global climate change. We will link processes at several scales to connect individual behavior, population growth, species interactions and ecosystem function. Combining classroom and field experience, we will see how basic hypothesis testing provides a way to learn about the world by considering the ecology of familiar organisms such as ants, squirrels, trees and some kinds of food. No prerequisites except arithmetic; open to everyone, including but not only those who may be headed for more advanced courses in ecology and environmental science.

Same as: EARTHSYS 5.

**BIO 7N. Introduction to Conservation Photography. 3 Units.**

Introduction to the field of conservation photography and the strategic use of visual communication in addressing issues concerning the environment and conservation. Students will be introduced to basic digital photography, digital image processing, and the theory and application of photographic techniques. Case studies of conservation issues will be examined through photographs and multimedia platforms including images, video, and audio. Lectures, tutorials, demonstrations, and mandatory field trips will culminate in the production of individual and group projects.

**BIO 7S. Introduction to Biology. 3 Units.**

The major fields of biology: biochemistry, the cell, evolution, and diversity. Foundation for higher-level biology courses.

**BIO 7SL. Introduction to Biology Lab. 2 Units.**

Optional lab to be taken concurrently with BIO 7S.

**BIO 8N. Human Evolution. 3 Units.**

A survey of the anatomical and behavioral evidence for human evolution and of the increasingly important information from molecular genetics. Emphasis on the split between the human and chimpanzee lines 6-7 million years ago, the appearance of the australopiths by 4.1 million years ago, the emergence of the genus *Homo* about 2.5 million years ago, the spread of *Homo* from Africa 1.7-1.6 million years ago, the subsequent divergence of *Homo* into different species on different continents, and the expansion of fully modern humans (*Homo sapiens*) from Africa about 50,000 years ago to replace the Neanderthals and other non-modern Eurasians.

**BIO 8S. Introduction to Human Physiology. 3 Units.**

The function and regulation of human organ systems. Various diseases are examined as failures of these regulatory processes. Systems include cardiovascular, respiratory, renal, endocrine, and gastrointestinal.

**BIO 9S. Introduction to Biological Research Methods. 3 Units.**

Theory and practice of experimental biology. Introduction to how to plan an experiment, conduct, and analyze data. Introduction to scientific writing and reading scientific journal articles. Prerequisite: high school biology.

**BIO 10AX. Conservation Photography. 2 Units.**

Account of the genre of conservation photography and strategic use of visual communication in the environmental arena. Introduction to use of digital SLR cameras and digital image processing. Case studies of conservation issues accompanied by multimedia platforms including images, video, and audio. Theory and application of photographic techniques. Lectures, tutorials, demonstrations, and field trips. Individual and group projects.

**BIO 10S. INTRODUCTION TO SPORTS SCIENCE. 3 Units.**

An overview of how modern science is now used in sports and exercise, including functional anatomy, biomechanics and physiology. Students will learn musculoskeletal anatomy; mechanism, management, and recovery from injuries in sport; clinical applications of biomechanics and physiology to performance and rehabilitation; and physiological adaptations that occur with intensity and nature of exercise. Students will use case studies of injuries in collegiate and professional sports.

**BIO 10SC. Natural History, Marine Biology, and Research. 2 Units.**

Marine biology, land use, conservation. Monterey Bay is home to the nation's largest marine sanctuary and also home to Stanford's Hopkins Marine Station. This course, which is based at Hopkins, explores the spectacular biology of Monterey Bay and the artistic and political history of the region. The course focuses on issues of conservation, sanctuary, and stewardship of the oceans and coastal lands. We will meet with conservationists, filmmakers, artists, authors, environmentalists, politicians, land-use planners, and lawyers, as well as scientists and educators, to learn what is being done to appreciate, protect, and study the coastline and near-shore waters at local and national levels. We will take a look at the discipline of marine biology to discover the range of topics and methods of research it embraces and to help define some of the larger issues in biology that loom in our future. The course emphasizes interactions and discussions between individuals, groups, and our guests; it is a total immersion experience. We will be together all of the time, either at our base at the Belden House in Pacific Grove or hiking and camping in Big Sur. Students are expected to have read the several books provided as introductory material before the course begins, and each is also expected to become our local expert in an area such as plant identification, bird identification, poetry, weather prediction, photography, history, ethnography, etc. The course requires an individual research project of your choice on a topic related to the general theme. Final reports will be presented at the last meeting of the group and may involve any medium, including written, oral, and performance media.

**BIO 11N. Biotechnology in Everyday Life. 3 Units.**

Preference to freshmen. The science that makes transgenic plants and animals possible. Current and future applications of biotechnology and the ethical issues raised.

**BIO 12N. Sensory Ecology of Marine Animals. 3 Units.**

Animals living in the oceans experience a highly varied range of environmental stimuli. An aquatic lifestyle requires an equally rich range of sensory adaptations, including some that are totally foreign to us. In this course we will examine sensory system in marine animals from both an environmental and behavioral perspective and from the point of view of neuroscience and information systems engineering.

**BIO 15N. Environmental Literacy. 3 Units.**

Preference to freshmen. Lack of public understanding of the details of most environmental problems is cited as a cause of environmental deterioration. Good citizenship requires literacy about the elements of the scientific and decision making processes that accompany most environmental issues: what can happen, what are the odds, how can the credibility of sources of expertise be assessed, which components of environmental debates deal with factual and theoretical issues, and which are political value judgments?.

**BIO 18Q. Plant evolutionary ecology. 3 Units.**

Plant EcoEvo analyzes the conceptual basis of ecology and evolution from the plants' perspective. After a broad overview of the biomes of the world, it explores population ecology, community ecology and biotic interactions. This is followed by an analysis of biodiversity from the botanical perspective and closes with a discussion of anthropogenic impact on plants. The course is based on lectures and practical activities (discussion of selected papers; analysis of data; laboratory activities, 2 field trips). Emphasis: Latin American ecosystems.

**BIO 20. Introduction to Brain and Behavior. 3 Units.**

Evolutionary principles to understand how the brain regulates behavior physiologically, and is also influenced by behavioral interactions. Topics include neuron structure and function, transmission of neural information, anatomy and physiology of sensory and motor systems, regulation of body states, the biological basis of learning and memory, and behavioral abnormalities.

Same as: HUMBIO 21.



**BIO 20N. Learning Creativity in Biology through Finding a Good Problem and Searching for Innovative Solutions. 3 Units.**

This course will explore how we can learn to be creative in biology. Examples of interesting problems include energy limitation, food security, species conservation and climate change. Once we agree on a problem to tackle, students will work in groups to find similar problems and solutions in other fields, construct a new solution together and debate positive and negative aspects of the solution to refine it. Students will gain experience in reading primary literature, innovative thinking, speaking and listening skills.

**BIO 22N. Infection, Immunity, and Global Health. 3 Units.**

Why do infectious diseases continue to challenge us despite advances in medicine? This course will explore the causes and prevention of infectious diseases, focusing on the interplay between pathogens, the immune system, the environment, and societal factors that affect disease occurrence and outcomes. Topics will include: basic elements of microbiology, immunology, and epidemiology; case studies of old diseases (e.g., smallpox, tuberculosis, malaria) and recently-emergent diseases (e.g., Ebola, AIDS, antibiotic-resistant bacteria, Lyme disease, and pandemic influenza) that illustrate the biological, environmental, cultural, political, and economic factors that affect disease emergence, spread, and control; the limitations of modern medical approaches such as antibiotics and vaccines; and strategies for reducing global infectious disease threats. The seminar will feature class discussion, student projects, and faculty and student presentations. Prerequisite: biology background, preferably introductory college courses (e.g., 41, 42, or HUMBIO 2A, 3A).

**BIO 23N. FACEBUG: The Social Life of Microbes. 3 Units.**

Exploration of three crucial aspects of microbial life. First, examine how the unseen microbial majority is responsible for critical but under-appreciated aspects of the biology of the planet. Second, investigate the array of current genomic and imaging tools available to probe microscopic organisms in the environment. Last, we will research the importance of microbial communities and social dynamics in ecological and human health settings.

**BIO 30N. Extinctions in Near Time: Biodiversity loss since the Pleistocene. 3 Units.**

The transition 11,700 years ago from the Pleistocene glacial period into the Holocene interglacial witnessed the expansion of humans around the world, climatic warming and the demise of many large vertebrate species. Since that time extinctions have continued on land and in the sea, culminating with the biodiversity crisis we are experiencing today. We will explore these prehistoric extinctions: "Who? When? Where? and Why?" in order to learn more about our planet's future.

**BIO 31Q. Ants: Behavior, Ecology, and Evolution. 3 Units.**

Preference to sophomores. Behavior: the organization of colonies, how they operate without central control, how they resemble other complex systems like brains. Ecology: how populations of colonies change, comparing the ecology of a species in SW American desert and invasive Argentine ants. Evolution: why are there so many species of ants; how are they alike, how do they differ, and why? Ants as the theme for exploring how to do research in animal behavior, ecology, and evolution. Research project will be on the invasive Argentine ant: its distribution on campus, foraging trails, and nest structure.

**BIO 33N. Conservation Science and Practice. 3 Units.**

Preference to freshmen. Interdisciplinary. The science and art of conservation today. The forces that are driving change in Earth's atmosphere, lands, waters, and variety of life forms. Which broad dimensions of the biosphere, and which elements of ecosystems, most merit protection? The prospects for, and challenges in, making conservation economically attractive and commonplace. Field trip; project.

**BIO 37N. Green Revolution and Plant Biotechnology. 3 Units.**

Feeding ever-growing populations is a constant challenge to mankind. In the second half of the 20th century, the breeding of improved varieties combined with the use of chemical fertilizers and pesticides led to crop yield increases labeled the Green Revolution. Modern technologies in genetic engineering are expected to bring the second green revolution. Meeting the current and future global food needs without further damaging the fragile environment requires innovative effort from scientists and the society.

**BIO 41. Genetics, Biochemistry, and Molecular Biology. 5 Units.**

Emphasis is on macromolecules (proteins, lipids, carbohydrates, and nucleic acids) and how their structure relates to function and higher order assembly; molecular biology, genome structure and dynamics, gene expression from transcription to translation. Prerequisites: CHEM 31X (or 31A,B), 33. Recommended: CHEM 35; MATH 19, 20, 21 or 41, 42.

**BIO 41S. Biochemistry, Genetics, and Molecular Biology. 5 Units.**

Emphasis is on macromolecules (proteins, lipids, carbohydrates, and nucleic acids) and how their structure relates to function and higher order assembly; molecular biology, genome structure and dynamics, gene expression from transcription to translation. Prerequisites: CHEM 31X (or 31A,B), 33; MATH 19, 20, 21 or 41, 42. Recommended: CHEM 35.

**BIO 42. Cell Biology and Animal Physiology. 5 Units.**

Cell structure and function; principles of animal physiology (immunology, renal, cardiovascular, sensory, motor physiology, and endocrinology); neurobiology from cellular basis to neural regulation of physiology. Prerequisites: CHEM 31X (or 31A,B), 33. Recommended: BIO 41; CHEM 35; MATH 19, 20, 21 or 41, 42.

**BIO 43. Plant Biology, Evolution, and Ecology. 5 Units.**

Principles of evolution: macro- and microevolution and population genetics. Ecology: the principles underlying the exchanges of mass and energy between organisms and their environments; population, community, and ecosystem ecology; populations, evolution, and global change. Equivalent to BIOHOPK 43. Prerequisites: CHEM 31X (or 31A,B), 33. Recommended: BIO 41, 42; CHEM 35; MATH 19, 20, 21 or 41, 42.

**BIO 44X. Core Molecular Biology Laboratory. 5 Units.**

Investigate yeast strains that are engineered to express the human protein, p53, and use modern molecular methods to identify the functional consequences of p53 mutations isolated from tumor cells. Learn about the protein's role as a tumor suppressor through lectures and by reading and discussing a journal article. Use molecular visualization programs to examine the structure of wild type and mutant p53 proteins. Formulate a testable hypothesis and assay the ability of mutant p53 to direct expression of several reporter genes. During guided reflection, formulate further analyses to determine whether mutant p53 is present in the cell, can bind to DNA, and/or can enter the nucleus. Lab experiments, team oral presentation, individual comprehensive written laboratory report. Prerequisites: CHEM 31X, or 31A,B, and 33; concurrent or past enrollment in Biology or Human Biology core. 44X,Y should be taken sequentially in the same year, preferably as sophomores, to prepare for internships. Preference given to juniors and seniors in autumn quarter, preference given to sophomores. Lab fee.

**BIO 44Y. Core Plant Biology & Eco Evo Laboratory. 5 Units.**

Students conduct hypothesis-driven field and laboratory research to assess abiotic and biotic contributions to the flowering phenology of hummingbird-pollinated flowering plants and the microbial communities assembled within the floral nectar. Observing flowers on marked plants at Jasper Ridge Biological Preserve, students record multiple data about the number and condition of the plants and flowers. Students access electronically monitored temperature data, fish-eye lens records of light exposure, published rainfall averages, and plant elevation information. Students participate in pollinator exclusion experiments, collect flowers and harvest floral nectar to sample for yeast. Microbial and molecular approaches to quantification and identification of the microorganisms may include colony counting, replica plating, fragment analysis by PCR and restriction enzyme digests, and sequencing. Student teams develop their own research hypotheses, mine appropriate databases, and apply evaluative statistical tests. Student teams deliver an oral defense of their hypotheses, submit a journal-style paper, and peer-review one another's research orally and in writing.

**BIO 101. Ecology. 4 Units.**

The principles of ecology. Topics: interactions of organisms with their environment, dynamics of populations, species interactions, structure and dynamics of ecological communities, biodiversity. Half-day field trip required. Satisfies Central Menu Area 4. Prerequisite: 43, or consent of instructor. Recommended: statistics.

**BIO 102. Demography: Health, Development, Environment. 3 Units.**

Demographic methods and their application to understanding and projecting changes in human infant, child, and adult mortality and health, fertility, population, sex ratios, and demographic transitions. Progress in human development, capabilities, and freedoms. Relationships between population and environment. Prerequisites: numeracy and basic statistics; Biology or Human Biology core; or consent of instructor.

Same as: HUMBIO 119.

**BIO 104. Advanced Molecular Biology. 5 Units.**

Molecular mechanisms that govern the replication, recombination, and expression of eukaryotic genomes. Topics: DNA replication, DNA recombination, gene transcription, RNA splicing, regulation of gene expression, protein synthesis, and protein folding. Satisfies Central Menu Area 1. Prerequisite: Biology core.

Same as: BIO 200.

**BIO 105A. Ecology and Natural History of Jasper Ridge Biological Preserve. 4 Units.**

Formerly 96A - Jasper Ridge Docent Training. First of two-quarter sequence training program to join the Jasper Ridge education/docent program. The scientific basis of ecological research in the context of a field station, hands-on field research, field ecology and the natural history of plants and animals, species interactions, archaeology, geology, hydrology, land management, multidisciplinary environmental education; and research projects, as well as management challenges of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes and research, and attend continuing education classes available to members of the JRBP community after the course.

Same as: EARTHSYS 105A.

**BIO 105B. Ecology and Natural History of Jasper Ridge Biological Preserve. 4 Units.**

Formerly 96B - Jasper Ridge Docent Training. First of two-quarter sequence training program to join the Jasper Ridge education/docent program. The scientific basis of ecological research in the context of a field station, hands-on field research, field ecology and the natural history of plants and animals, species interactions, archaeology, geology, hydrology, land management, multidisciplinary environmental education; and research projects, as well as management challenges of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes and research, and attend continuing education classes available to members of the JRBP community after the course.

Same as: EARTHSYS 105B.

**BIO 109A. The Human Genome and Disease. 3 Units.**

The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. Students with a major, minor or cotermin in Biology: 109A/209A or 109B/209B may count toward degree program but not both.

Same as: BIO 209A, BIOC 109A, BIOC 209A, HUMBIO 158.

**BIO 109B. The Human Genome and Disease: Genetic Diversity and Personalized Medicine. 3 Units.**

Continuation of 109A/209A. Genetic drift: the path of human predecessors out of Africa to Europe and then either through Asia to Australia or through northern Russia to Alaska down to the W. Coast of the Americas. Support for this idea through the histocompatibility genes and genetic sequences that predispose people to diseases. Guest lectures from academia and pharmaceutical companies. Prerequisite: Biology or Human Biology core. Students with a major, minor or cotermin in Biology: 109A/209A or 109B/209B may count toward degree program but not both.

Same as: BIO 209B, BIOC 109B, BIOC 209B.

**BIO 110. DNA Replication and Genomic Maintenance. 3 Units.**

Maintenance of the genome and its accurate replication are prerequisites for life. DNA replication is also intricately connected to pathways for responding to genotoxic stress, which include inevitable collisions with transcription. In eukaryotes, DNA repair and replication are tightly connected to chromatin modification. Emphasis for lecture topics include: DNA-templated chromatin transactions; Chromatin manipulation during replication and DNA damage responses; Structural biology and molecular mechanisms of replication and DNA repair enzymes; Inducible responses to genotoxic stress; Relationships of DNA damage processing to mutagenesis, carcinogenesis, aging and human genetic disease.

Same as: BIO 210.

**BIO 112. Human Physiology. 4 Units.**

The functioning of organ systems emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise, and gastrointestinal physiology. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology or Human Biology core.

Same as: BIO 212, HUMBIO 133.

**BIO 113. Fundamentals of Molecular Evolution. 4 Units.**

The inference of key molecular evolutionary processes from DNA and protein sequences. Topics include random genetic drift, coalescent models, effects and tests of natural selection, combined effects of linkage and natural selection, codon bias and genome evolution. Satisfies Central Menu Areas 1 or 4. Prerequisites: Biology core or graduate standing in any department, and consent of instructor.

Same as: BIO 244.

**BIO 116. Ecology of the Hawaiian Islands. 4 Units.**

Terrestrial and marine ecology and conservation biology of the Hawaiian Archipelago. Taught in the field in Hawaii as part of quarter-long sequence of courses including Earth Sciences and Anthropology. Topics include ecological succession, plant-soil interactions, conservation biology, biological invasions and ecosystem consequences, and coral reef ecology. Restricted to students accepted into the Earth Systems of Hawaii Program. Same as: EARTHSYS 116.

**BIO 117. Biology and Global Change. 4 Units.**

The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisite: Biology or Human Biology core or graduate standing. Same as: EARTHSYS 111, EESS 111.

**BIO 118. Genetic Analysis of Biological Processes. 5 Units.**

Genetic principles and their experimental applications. Emphasis is on the identification and use of mutations to study cellular function. Satisfies Central Menu Areas 1 or 2. Prerequisite: Biology core. Same as: BIO 218.

**BIO 119. Physiology of Global Change. 1 Unitss.**

Increased emissions of greenhouse gases into the atmosphere are inducing drastic shifts in many environmental factors. How will these environmental changes affect organisms and the ecosystems in which they occur? Are some species more vulnerable to global change than others? Examining how shifts in abiotic factors affect organismal physiology offers a powerful mechanistic tool to better understand species' responses to global change. This seminar will focus on the physiological stress resulting from and the adaptive responses made to changes in temperature, salinity, dissolved oxygen, and ocean acidity in a range of species with an emphasis on marine organisms. Interactions among these abiotic factors will show that an integrative physiological analysis is required to develop a mechanistic understanding of effects of global change. The course will be based on short lectures followed by discussions of relevant primary literature. Guest speakers will bring in special expertise on several key issues. The course will include a field trip to Hopkins Marine Station.

**BIO 120. Bacteria in Health and Disease. 3 Units.**

(Enrollment limited to junior and senior undergraduates) Throughout history humans have encountered novel microbes, which, in some cases, can cause disease and sometimes death. This course introduces undergraduate students (especially those thinking about a career in the biomedical sciences) to the bacteria that live in and on humans. Topics include the biology of the interaction of the simple microbe with complex human biology and the factors that determine whether or not we coexist relatively peacefully, suffer from overt disease, or succumb to the bacterial onslaught. Same as: MI 120.

**BIO 121. Biogeography. 3 Units.**

Global distributions of organisms through the Phanerozoic, with emphasis on historical causes. Topics: plate tectonics, island biogeography, climatic change, dispersal, vicariance, ecology of invasions, extinction, gradients, diversity. Satisfies Central Menu Area 4.

**BIO 126. Introduction to Biophysics. 3-4 Units.**

Core course appropriate for advanced undergraduate students and graduate students with prior knowledge of calculus and a college physics course. Introduction to how physical principles offer insights into modern biology, with regard to the structural, dynamical, and functional organization of biological systems. Topics include the roles of free energy, diffusion, electromotive forces, non-equilibrium dynamics, and information in fundamental biological processes. Same as: APPPHYS 205, BIO 226.

**BIO 127. From Generation to Generation: Scientific and Cultural Approaches to Jewish Genetics. 1 Unitss.**

This series of guest lectures aims to explore the connections between genetics and Jewish Studies. How do different Jewish populations relate to each other? To what extent are Jewish populations of the present descended from those of the past? What are the causes of diseases that occur disproportionately in Jewish populations? These and other questions will be addressed in a program that crosses the boundaries between science and Jewish Studies, culture and biology. Same as: JEWISHST 117.

**BIO 129A. Cellular Dynamics I: Cell Motility and Adhesion. 4 Units.**

Cell motility emphasizing role of actin assembly and dynamics coupling actin organization to cell movement. Interaction of cells with extracellular matrix, and remodelling of extracellular matrix in development and disease. Directed cell migration by chemotaxis (neuronal path-finding, immune cells). Cell-cell adhesion, formation of intercellular junctions and mechanisms regulating cell-cell interactions in development and diseases. Emphasis is on experimental logic, methods, problem solving, and interpretation of results. Students present research papers. Satisfies Central Menu Area 2. Prerequisite: Biology core.

**BIO 129B. Cellular Dynamics II: Building a Cell. 4 Units.**

Principles of cell organization; how common biochemical pathways are modified to generate diversity in cell structure and function. Roles of actin and microtubule cytoskeletons in cellular architecture. Mechanisms of protein sorting and trafficking, and protein modules and switches in regulating cell polarity. Yeast to polarized epithelial cells and neurons. Emphasis is on experimental logic, methods, problem solving, and interpretation of results. Students present research papers. Satisfies Central Menu Area 2. Prerequisite: Biology core. Recommended: 129A.

**BIO 131. Mathematics of Complexity. 1 Unitss.**

We've all heard the buzzwords - chaos, fractals, networks, power laws. What do these terms mean in a rigorous, mathematical sense? This 1-credit seminar will explore formalisms associated with the study of complex systems, including non-linear dynamics, graph theory, and fractals. Through readings, in-class problem sets, and hands-on simulations, we will pursue a concrete understanding. A basic course in calculus and differential equations and some coding experience would be helpful but is not required.

**BIO 132. Advanced Imaging Lab in Biophysics. 4 Units.**

Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor. Same as: APPPHYS 232, BIO 232, BIOPHYS 232, MCP 232.

**BIO 136. Evolutionary Paleobiology. 4 Units.**

A paleontological approach to evolutionary theory. Topics: history of life, speciation, heterochrony, evolutionary constraint, coevolution, macroevolution, the Cambrian Explosion, mass extinctions, taphonomy, life on land, life in the sea, life in the air. Satisfies Central Menu Area 4. Prerequisite: Biology Core.

**BIO 137. Plant Genetics. 3-4 Units.**

Gene analysis, mutagenesis, transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; scientific and societal lessons from transgenic plants. Satisfies Central Menu Area 2. Prerequisite: Biology core or consent of instructor. Satisfies WIM in Biology. Same as: BIO 237.

**BIO 139. Biology of Birds. 3 Units.**

How birds interact with their environments and each other, emphasizing studies that had impact in the fields of population biology, community ecology, and evolution. Local bird communities. Emphasis is on field research. Enrollment limited to 20. Prerequisites: 43 or equivalent, and consent of instructor. Recommended: birding experience.

**BIO 140. Population Biology of Butterflies. 2-5 Units.**

Field work on *Euphydryas* populations under study on campus and elsewhere in California. Course offered as participation in research when conditions permit; decisions not made until Winter Quarter. Prerequisites: 43 and consent of instructor.

**BIO 141. Biostatistics. 3-5 Units.**

Introductory statistical methods for biological data: describing data (numerical and graphical summaries); introduction to probability; and statistical inference (hypothesis tests and confidence intervals). Intermediate statistical methods: comparing groups (analysis of variance); analyzing associations (linear and logistic regression); and methods for categorical data (contingency tables and odds ratio). Course content integrated with statistical computing in R.

Same as: STATS 141.

**BIO 143. Evolution. 3 Units.**

The basic facts and principles of the evolution of all life. The logic of and evidence for the correctness of Darwin's argument for evolution by natural selection. How Mendelian genetics was integrated into evolutionary thinking. The integration of physiological and ecological perspectives into the study of evolutionary adaptation within species. Species formation and evolutionary divergence among species. Patterns of evolution over long time scales. Satisfies Central Menu Area 4.

Same as: BIO 243.

**BIO 144. Conservation Biology. 3-4 Units.**

Principles and application of the science of preserving biological diversity. Topics: sources of endangerment of diversity; the Endangered Species Act; conservation concepts and techniques at the population, community, and landscape levels; reserve design and management; conflict mediation. 4 units if taken with a field trip and discussion component. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: BIO 101, or BIO 43 or HUMBIO 2A with consent of instructor.

Same as: HUMBIO 112.

**BIO 145. Behavioral Ecology. 4 Units.**

Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/seminar format; seminars include discussion of journal articles. Independent research projects. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics. Satisfies WIM in Biology.

Same as: BIO 245.

**BIO 146. Population Studies. 1 Unit.**

Series of talks by distinguished speakers introducing approaches to population and resource studies.

**BIO 147. Controlling Climate Change in the 21st Century. 3 Units.**

Climate change is a global environmental, social, cultural and economic challenge. Responding to this challenge requires a paradigm shift which will alter energy production, transport, industry, politics, development strategies, north/south equity, and individual freedom and responsibilities around the world. Given the short term planning horizon of the majority of political, economic and social institutions, the slow burn of climate change presents major policy challenges. The course is designed to clarify the primary issues embedded in these challenges.

Same as: BIO 247, EARTHSYS 147, EARTHSYS 247, HUMBIO 116.

**BIO 149. The Neurobiology of Sleep. 4 Units.**

Preference to seniors and graduate students. The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Enrollment limited to 16.

Same as: BIO 249, HUMBIO 161.

**BIO 150. Human Behavioral Biology. 5 Units.**

Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness.

Same as: BIO 250, HUMBIO 160.

**BIO 151. Mechanisms of Neuron Death. 3 Units.**

For Biology majors with background in neuroscience. Cell and molecular biology of neuron death during neurological disease. Topics: the amyloid diseases (Alzheimer's), prion diseases (kuru and Creutzfeldt-Jakob), oxygen radical diseases (Parkinson's and ALS), triplet repeat diseases (Huntington's), and AIDS-related dementia. Student presentations. Enrollment limited to 15; application required.

**BIO 152. Imaging: Biological Light Microscopy. 3 Units.**

Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of lab instruments. Lab. Prerequisites: some college physics, Biology core.

Same as: MCP 222.

**BIO 153. Cellular Neuroscience: Cell Signaling and Behavior. 4 Units.**

Neural interactions underlying behavior. Prerequisites: PSYCH 1 or basic biology.

Same as: PSYCH 120.

**BIO 154. Molecular and Cellular Neurobiology. 4 Units.**

For advanced undergraduate students. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases. Satisfies Central Menu Areas 2 or 3 for Bio majors. Prerequisite for undergraduates: Biology core or equivalent, or consent of instructors.

**BIO 156. Epigenetics. 2 Units.**

For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in *Drosophila* in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42, or GENE 203, or consent of instructor.

Same as: BIO 256, GENE 206, PATH 206.

**BIO 157. Biochemistry and Molecular Biology of Plants. 3-4 Units.**

Biochemical and molecular basis of plant growth and adaptation. Topics include: hormone signal transduction; photoreceptor chemistry and signaling; metabolite sensing and transport; dynamics of photosynthesis; plant innate immunity and symbiosis. Lectures and readings will emphasize research methods. Prerequisite: Biology core or equivalent, or consent of instructor.

Same as: BIO 257.

**BIO 158. Developmental Neurobiology. 4 Units.**

For advanced undergraduates and coterminial students. The principles of nervous system development from the molecular control of patterning, cell-cell interactions, and trophic factors to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Satisfies Central Menu Areas 2 or 3. Prerequisite: BIO 42 or equivalent. Same as: BIO 258.

**BIO 160A. Developmental Biology I. 4 Units.**

Focus is on the molecular mechanisms underlying the generation of diverse cell types and tissues during embryonic and post-embryonic animal development. The role of cell-cell communication in controlling key developmental decisions. Topics covered in this quarter include embryonic axis formation, morphogen signaling, cell type specification and stem cells. Experimental logic and methods of research in developmental biology. Discussions of research papers. Satisfies Central Menu Areas 1 or 2. Prerequisite: Biology core or consent of instructor.

**BIO 160B. Developmental Biology II. 4 Units.**

Continuation of BIO 160A. Focus is on the molecular mechanisms underlying the generation of diverse cell types and tissues during embryonic and post-embryonic animal development. The role of cell-cell communication in controlling key developmental decisions. The topics include sexual control of development, tissue polarity and growth, cell migration, regeneration, and the evolution of developmental mechanisms. Experimental logic and methods of research in developmental biology. Discussions of research papers. Satisfies Central Menu Areas 1 or 2. Prerequisites: Biology Core and 160A, or consent of instructor.

**BIO 161. Molecular Basis of Biological Communication. 4 Units.**

Across molecular, cellular, organismal and communal biological scales, communication among elements of a system is required for its function. The molecules and logic at the heart of communication at levels from the interactions between cells in a developing body to how organisms perceive and respond to their physical environment and the organisms around them; how these systems normally work and how failures in communication result in and from disease. Current research literature. Prerequisites: BIO 41, 42. Recommended: BIO 160A, 129A.

**BIO 163. Neural Systems and Behavior. 4 Units.**

The field of neuroethology and its vertebrate and invertebrate model systems. Research-oriented. Readings include reviews and original papers. How animal brains compare; how neural circuits are adapted to species-typical behavior; and how the sensory worlds of different species represent the world. Lectures and required discussions. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: BIO 42, HUMBIO 4A. Same as: BIO 263, HUMBIO 163.

**BIO 164. Biosphere-Atmosphere Interactions. 4 Units.**

Physiological, ecological, and physical aspects of ecosystem function, emphasizing how ecosystems influence and are influenced by the atmosphere. Prerequisites: 42, 43; or consent of instructor. Same as: BIO 264.

**BIO 165. The Molecular Basis of Neurological Disorders. 1 Unit.**

Current topics in research and investigative therapies of neurological conditions including depression, personality disorders, schizophrenia, Parkinsons, epilepsy, aging and life-extension. Sources include primary literature with a focus on molecular mechanisms and therapeutic strategies. Emphasis placed on what the study of dysfunction in the nervous system tells us about the delicacy of proper function. Guest lecturers including Dr. Robert Sapolsky and Dr. Gary Steinberg.

**BIO 166. Faunal Analysis: Animal Remains for the Archaeologist. 5 Units.**

The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodological issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis. Same as: ANTHRO 113, ANTHRO 213, BIO 266.

**BIO 171. Principles of Cell Cycle Control. 3 Units.**

Genetic analysis of the key regulatory circuits governing the control of cell division. Illustration of key principles that can be generalized to other synthetic and natural biological circuits. Focus on tractable model organisms; growth control; irreversible biochemical switches; chromosome duplication; mitosis; DNA damage checkpoints; MAPK pathway-cell cycle interface; oncogenesis. Analysis of classic and current primary literature. Satisfies Central Menu Area 2. Same as: BIO 271, CSB 271.

**BIO 172. Molecular Basis of Body Plan Evolution. 4 Units.**

Developmental biology research, from arthropods and chordates, over the past 25 years has revealed astonishing levels of shared developmental similarities, despite large morphological differences between the two groups, and has led to speculation about the morphology of the earliest animals. This has led to a synthesis between developmental biology, zoology, and paleontology and sparked molecular developmental studies in diverse metazoan phyla. Focus is on the latest findings from comparative development and what they reveal about the early evolution of the animal phyla. Same as: BIO 272.

**BIO 174. Human Skeletal Anatomy. 5 Units.**

Study of the human skeleton (a. k. a. human osteology), as it bears on other disciplines, including medicine, forensics, archaeology, and paleoanthropology (human evolution). Basic bone biology, anatomy, and development, emphasizing hands-on examination and identification of human skeletal parts, their implications for determining an individual's age, sex, geographic origin, and health status, and for the evolutionary history of our species. Three hours of lecture and at least three hours of supervised and independent study in the lab each week. Same as: ANTHRO 175, ANTHRO 275, BIO 274, HUMBIO 180.

**BIO 175. Tropical Ecology and Conservation. 5 Units.**

Spring Break trip to a field station; lectures at Stanford. How to address scientific questions concerning ecology and conservation. Field trip includes natural history observations and group research projects. Symposium based on project results.

**BIO 177. Plant Microbe Interaction. 3 Units.**

Molecular basis of plant symbiosis and pathogenesis. Topics include mechanisms of recognition and signaling between microbes and plant hosts, with examples such as the role of small molecules, secreted peptides, and signal transduction pathways in symbiotic or pathogenic interactions. Readings include landmark papers together with readings in the contemporary literature. Prerequisites: Biology core and two or more upper division courses in genetics, molecular biology, or biochemistry. Recommended: plant genetics or plant biochemistry. Same as: BIO 277.

**BIO 178. Microbiology Literature. 3 Units.**

For advanced undergraduates and first-year graduate students. Critical reading of the research literature in prokaryotic genetics and molecular biology, with particular applications to the study of major human pathogens. Classic and foundational papers in pathogenesis, genetics, and molecular biology; recent literature on bacterial pathogens such as Salmonella, Vibrio, and/or Yersinia. Diverse experimental approaches: biochemistry, genomics, pathogenesis, and cell biology. Prerequisites: Biology Core and two upper-division courses in genetics, molecular biology, or biochemistry. Same as: BIO 278.

**BIO 182. Modeling Cultural Evolution. 3 Units.**

Seminar. Quantitative models for the evolution of socially transmitted traits. Rates of change of learned traits in populations and patterns of cultural diversity as a function of innovation and cultural transmission. Learning in constant and changing environments. Possible avenues for gene-culture coevolution.

Same as: BIO 282.

**BIO 183. Theoretical Population Genetics. 3 Units.**

Models in population genetics and evolution. Selection, random drift, gene linkage, migration, and inbreeding, and their influence on the evolution of gene frequencies and chromosome structure. Models are related to DNA sequence evolution. Prerequisites: calculus and linear algebra, or consent of instructor.

Same as: BIO 283.

**BIO 184. Principles and Practice of Biosystematics. 4 Units.**

The principles and major operating procedures of systematic biology; the classification of organisms and of the relationships among them. Concepts and issues common to the study of all organisms; examples from particular groups of creatures.

Same as: BIO 284.

**BIO 186. Natural History of the Vertebrates. 4 Units.**

Broad survey of the diversity of vertebrate life. Discussion of the major branches of the vertebrate evolutionary tree, with emphasis on evolutionary relationships and key adaptations as revealed by the fossil record and modern phylogenetics. Modern orders introduced through an emphasis on natural history, physiology, behavioral ecology, community ecology, and conservation. Lab sessions focused on comparative skeletal morphology through hands-on work with skeletal specimens. Discussion of field methods and experience with our local vertebrate communities through field trips to several of California's distinct biomes. Prerequisite: Biology core.

Same as: BIO 286.

**BIO 188. Biochemistry I. 3 Units.**

(CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 33, 35, 131, and 135 or 171.

Same as: BIO 288, CHEM 181, CHEMENG 181, CHEMENG 281.

**BIO 189. Biochemistry II. 3 Units.**

Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).

Same as: BIO 289, CHEM 183, CHEMENG 183, CHEMENG 283.

**BIO 196A. Biology Senior Reflection. 3 Units.**

Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C. Satisfies WIM in Biology.

**BIO 196B. Biology Senior Reflection. 3 Units.**

Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.

**BIO 196C. Biology Senior Reflection. 3 Units.**

Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.

**BIO 197WA. Senior Writing Project: The Personal Essay in Biology. 3 Units.**

Seminar focused on writing. Compose, workshop and revise scientifically relevant and personal essays in biology directed at a mainstream audience, interweaving research, interview, memoir, and other elements of nonfiction craft. Satisfies WIM in Biology.

**BIO 198. Directed Reading in Biology. 1-15 Units.**

Individually arranged under the supervision of members of the faculty.

**BIO 198X. Out-of-Department Directed Reading. 1-15 Units.**

Individually arranged under the supervision of members of the faculty. Credit for work arranged with out-of-department faculty is restricted to Biology majors and requires department approval. See <http://biohonors.stanford.edu> for information and petitions. May be repeated for credit.

**BIO 199. Advanced Research Laboratory in Experimental Biology. 1-15 Units.**

Individual research taken by arrangement with in-department instructors. See <http://biohonors.stanford.edu> for information on research sponsors, units, and credit for summer research. May be repeated for credit.

**BIO 199W. Senior Honors Thesis: How to Effectively Write About Scientific Research. 3 Units.**

Workshop. For seniors pursuing an honors thesis in a biology-focused major or program. Focus on improving scientific writing and synthesizing in the context of students' individual research projects. Complete literature review which will form the basis for the thesis introduction. Develop methods section of the thesis. Small seminar-style discussion sections with research-based discussions, student led PowerPoint presentations, and writing workshops. Co-requisite: Concurrent enrollment in 199 or 199X or equivalent. Satisfies WIM in Biology.

**BIO 199X. Out-of-Department Advanced Research Laboratory in Experimental Biology. 1-15 Units.**

Individual research by arrangement with out-of-department instructors. Credit for 199X is restricted to declared Biology majors and requires department approval. See <http://biohonors.stanford.edu> for information on research sponsors, units, petitions, deadlines, credit for summer research, and out-of-Stanford research. May be repeated for credit.

**BIO 200. Advanced Molecular Biology. 5 Units.**

Molecular mechanisms that govern the replication, recombination, and expression of eukaryotic genomes. Topics: DNA replication, DNA recombination, gene transcription, RNA splicing, regulation of gene expression, protein synthesis, and protein folding. Satisfies Central Menu Area I. Prerequisite: Biology core.

Same as: BIO 104.

**BIO 202. Ecological Statistics. 3 Units.**

Intended for graduate students (and advanced undergraduates in special circumstances with consent of instructors) in biology and related environmental sciences, this course is an introduction to statistical methods for ecological data analysis, using the programming language R. The course will have lectures, discussions, and independent research projects using the students' own data or simulated or publicly available data.

**BIO 207. Life and Death of Proteins. 3 Units.**

How proteins are made and degraded in the cell. Discussion of primary literature. Case studies follow the evolution of scientific ideas, and evaluate how different experimental approaches contribute to our understanding of a biological problem. Emphasis on multidisciplinary approaches. Topics: protein folding and assembly, mechanisms of chaperone action, sorting into organelles, misfolding and disease, and the ubiquitin-proteasome pathway. Enrollment limited to 30.

**BIO 209A. The Human Genome and Disease. 3 Units.**

The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. Students with a major, minor or coterm in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109A, BIOC 109A, BIOC 209A, HUMBIO 158.

**BIO 209B. The Human Genome and Disease: Genetic Diversity and Personalized Medicine. 3 Units.**

Continuation of 109A/209A. Genetic drift: the path of human predecessors out of Africa to Europe and then either through Asia to Australia or through northern Russia to Alaska down to the W. Coast of the Americas. Support for this idea through the histocompatibility genes and genetic sequences that predispose people to diseases. Guest lectures from academia and pharmaceutical companies. Prerequisite: Biology or Human Biology core. Students with a major, minor or coterm in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109B, BIOC 109B, BIOC 209B.

**BIO 210. DNA Replication and Genomic Maintenance. 3 Units.**

Maintenance of the genome and its accurate replication are prerequisites for life. DNA replication is also intricately connected to pathways for responding to genotoxic stress, which include inevitable collisions with transcription. In eukaryotes, DNA repair and replication are tightly connected to chromatin modification. Emphasis for lecture topics include: DNA-templated chromatin transactions; Chromatin manipulation during replication and DNA damage responses; Structural biology and molecular mechanisms of replication and DNA repair enzymes; Inducible responses to genotoxic stress; Relationships of DNA damage processing to mutagenesis, carcinogenesis, aging and human genetic disease. Same as: BIO 110.

**BIO 212. Human Physiology. 4 Units.**

The functioning of organ systems emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise, and gastrointestinal physiology. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology or Human Biology core. Same as: BIO 112, HUMBIO 133.

**BIO 214. Advanced Cell Biology. 4 Units.**

For Ph.D. students. Current research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for advanced undergraduates: BIO 129A,B, and consent of instructor. Same as: BIOC 224, MCP 221.

**BIO 215. Biochemical Evolution. 3 Units.**

Biochemical viewpoints on the evolutionary process. Topics: prebiotic biochemistry and the origins of life; adaptive organization of metabolism; enzyme polymorphisms and other biochemical aspects of population genetics; macromolecular phylogeny and protein clocks. Prerequisites: Biology core or substantial equivalent.

**BIO 216. Terrestrial Biogeochemistry. 3 Units.**

Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students. Same as: EESS 216.

**BIO 217. Neuronal Biophysics. 4 Units.**

Biophysical descriptions and mechanisms of passive and excitable membranes, ion channels and pumps, action potential propagation, and synaptic transmission. Introduction to dynamics of single neurons and neuronal networks. Emphasis is on the experimental basis for modern research applications. Interdisciplinary aspects of biology and physics. Literature, problem sets, and student presentations. Prerequisites: undergraduate physics, calculus, and biology.

**BIO 218. Genetic Analysis of Biological Processes. 5 Units.**

Genetic principles and their experimental applications. Emphasis is on the identification and use of mutations to study cellular function. Satisfies Central Menu Areas 1 or 2. Prerequisite: Biology core. Same as: BIO 118.

**BIO 220. Introduction to Theoretical Population Biology. 2 Units.**

Math functions, math sequences and series, complex math numbers and functions, differentiation, integration, linear algebra basics, probability and statistics. This course is a prerequisite for Bio 221.

**BIO 221. Methods of Theoretical Population Biology. 4 Units.**

Formulation and analysis of problems in population biology using theoretical and computational numerical methods. Topics include deterministic and stochastic models, structured populations, stability and bifurcations, and data-driven models with applications in ecology and genetics. Prerequisites: Bio 220 or consent of instructor.

**BIO 222. Exploring Neural Circuits. 3 Units.**

Seminar. The logic of how neural circuits control behavior; how neural circuits are assembled during development and modified by experience. Emphasis is on primary literature. Topics include: neurons as information processing units; simple and complex circuits underlying sensory information processing and motor control; and development and plasticity of neural circuits. Advanced undergraduates and graduate students with background in physical science, engineering, and biology may apply to enroll. Recommended: background in neuroscience.

**BIO 223. Stochastic and Nonlinear Dynamics. 3 Units.**

Theoretical analysis of dynamical processes: dynamical systems, stochastic processes, and spatiotemporal dynamics. Motivations and applications from biology and physics. Emphasis is on methods including qualitative approaches, asymptotics, and multiple scale analysis. Prerequisites: ordinary and partial differential equations, complex analysis, and probability or statistical physics. Same as: APPPHYS 223.

**BIO 226. Introduction to Biophysics. 3-4 Units.**

Core course appropriate for advanced undergraduate students and graduate students with prior knowledge of calculus and a college physics course. Introduction to how physical principles offer insights into modern biology, with regard to the structural, dynamical, and functional organization of biological systems. Topics include the roles of free energy, diffusion, electromotive forces, non-equilibrium dynamics, and information in fundamental biological processes.

Same as: APPPHYS 205, BIO 126.

**BIO 227. Foundations of Community Ecology. 2 Units.**

Discussion of classic papers in community ecology (Forbes, Clements, Gleason, Grinnell, Lindeman, Preston, Elton, Hutchinson, May, MacArthur, Odum, Connell, Paine, Tilman, etc.) and contemporary papers on related topics, to develop historical perspectives to understand current issues and identify future directions. Prerequisite for undergraduates: consent of instructor.

**BIO 230. Molecular and Cellular Immunology. 4 Units.**

Components of the immune system and their functions in immune responses in health and disease: development of the immune system; innate and adaptive immunity; structure and function of antibodies; molecular biology and biochemistry of antigen receptors and signaling pathways; cellular basis of immune responses and their regulation; genetic control of immune responses and disease susceptibility. Lectures and discussion in class and in sections. Satisfies Central Menu Areas 1 or 2. For upper class undergraduates and graduate students who have not previously taken an introductory immunology course. Prerequisite for undergraduates: Biology or Human Biology core, or consent of instructor.

**BIO 230A. Molecular and Cellular Immunology Literature Review. 1 Unitss.**

Special discussion section for graduate students. Supplement to 230. Corequisite: 230.

**BIO 232. Advanced Imaging Lab in Biophysics. 4 Units.**

Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.

Same as: APPPHYS 232, BIO 132, BIOPHYS 232, MCP 232.

**BIO 237. Plant Genetics. 3-4 Units.**

Gene analysis, mutagenesis, transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; scientific and societal lessons from transgenic plants. Satisfies Central Menu Area 2. Prerequisite: Biology core or consent of instructor. Satisfies WIM in Biology.

Same as: BIO 137.

**BIO 244. Fundamentals of Molecular Evolution. 4 Units.**

The inference of key molecular evolutionary processes from DNA and protein sequences. Topics include random genetic drift, coalescent models, effects and tests of natural selection, combined effects of linkage and natural selection, codon bias and genome evolution. Satisfies Central Menu Areas 1 or 4. Prerequisites: Biology core or graduate standing in any department, and consent of instructor.

Same as: BIO 113.

**BIO 245. Behavioral Ecology. 4 Units.**

Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/seminar format; seminars include discussion of journal articles. Independent research projects. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics. Satisfies WIM in Biology. Same as: BIO 145.

**BIO 247. Controlling Climate Change in the 21st Century. 3 Units.**

Climate change is a global environmental, social, cultural and economic challenge. Responding to this challenge requires a paradigm shift which will alter energy production, transport, industry, politics, development strategies, north/south equity, and individual freedom and responsibilities around the world. Given the short term planning horizon of the majority of political, economic and social institutions, the slow burn of climate change presents major policy challenges. The course is designed to clarify the primary issues embedded in these challenges.

Same as: BIO 147, EARTHSYS 147, EARTHSYS 247, HUMBIO 116.

**BIO 249. The Neurobiology of Sleep. 4 Units.**

Preference to seniors and graduate students. The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Enrollment limited to 16.

Same as: BIO 149, HUMBIO 161.

**BIO 250. Human Behavioral Biology. 5 Units.**

Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness.

Same as: BIO 150, HUMBIO 160.

**BIO 254. Molecular and Cellular Neurobiology. 5 Units.**

For graduate students. Includes lectures for BIO 154. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases.

Same as: NBIO 254.

**BIO 256. Epigenetics. 2 Units.**

For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in *Drosophila* in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42, or GENE 203, or consent of instructor.

Same as: BIO 156, GENE 206, PATH 206.

**BIO 257. Biochemistry and Molecular Biology of Plants. 3-4 Units.**

Biochemical and molecular basis of plant growth and adaptation. Topics include: hormone signal transduction; photoreceptor chemistry and signaling; metabolite sensing and transport; dynamics of photosynthesis; plant innate immunity and symbiosis. Lectures and readings will emphasize research methods. Prerequisite: Biology core or equivalent, or consent of instructor.

Same as: BIO 157.



**BIO 258. Developmental Neurobiology. 4 Units.**

For advanced undergraduates and coterminal students. The principles of nervous system development from the molecular control of patterning, cell-cell interactions, and trophic factors to the level of neural systems and the role of experience in influencing brain structure and function. Topics: neural induction and patterning cell lineage, neurogenesis, neuronal migration, axonal pathfinding, synapse elimination, the role of activity, critical periods, and the development of behavior. Satisfies Central Menu Areas 2 or 3. Prerequisite: BIO 42 or equivalent. Same as: BIO 158.

**BIO 263. Neural Systems and Behavior. 4 Units.**

The field of neuroethology and its vertebrate and invertebrate model systems. Research-oriented. Readings include reviews and original papers. How animal brains compare; how neural circuits are adapted to species-typical behavior; and how the sensory worlds of different species represent the world. Lectures and required discussions. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: BIO 42, HUMBIO 4A. Same as: BIO 163, HUMBIO 163.

**BIO 264. Biosphere-Atmosphere Interactions. 4 Units.**

Physiological, ecological, and physical aspects of ecosystem function, emphasizing how ecosystems influence and are influenced by the atmosphere. Prerequisites: 42, 43; or consent of instructor. Same as: BIO 164.

**BIO 266. Faunal Analysis: Animal Remains for the Archaeologist. 5 Units.**

The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodological issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis. Same as: ANTHRO 113, ANTHRO 213, BIO 166.

**BIO 272. Molecular Basis of Body Plan Evolution. 4 Units.**

Developmental biology research, from arthropods and chordates, over the past 25 years has revealed astonishing levels of shared developmental similarities, despite large morphological differences between the two groups, and has led to speculation about the morphology of the earliest animals. This has led to a synthesis between developmental biology, zoology, and paleontology and sparked molecular developmental studies in diverse metazoan phyla. Focus is on the latest findings from comparative development and what they reveal about the early evolution of the animal phyla. Same as: BIO 172.

**BIO 274. Human Skeletal Anatomy. 5 Units.**

Study of the human skeleton (a. k. a. human osteology), as it bears on other disciplines, including medicine, forensics, archaeology, and paleoanthropology (human evolution). Basic bone biology, anatomy, and development, emphasizing hands-on examination and identification of human skeletal parts, their implications for determining an individual's age, sex, geographic origin, and health status, and for the evolutionary history of our species. Three hours of lecture and at least three hours of supervised and independent study in the lab each week. Same as: ANTHRO 175, ANTHRO 275, BIO 174, HUMBIO 180.

**BIO 274S. Hopkins Microbiology Course. 3-12 Units.**

(Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents. Same as: BIOHOPK 274, CEE 274S, EESS 253S.

**BIO 277. Plant Microbe Interaction. 3 Units.**

Molecular basis of plant symbiosis and pathogenesis. Topics include mechanisms of recognition and signaling between microbes and plant hosts, with examples such as the role of small molecules, secreted peptides, and signal transduction pathways in symbiotic or pathogenic interactions. Readings include landmark papers together with readings in the contemporary literature. Prerequisites: Biology core and two or more upper division courses in genetics, molecular biology, or biochemistry. Recommended: plant genetics or plant biochemistry. Same as: BIO 177.

**BIO 278. Microbiology Literature. 3 Units.**

For advanced undergraduates and first-year graduate students. Critical reading of the research literature in prokaryotic genetics and molecular biology, with particular applications to the study of major human pathogens. Classic and foundational papers in pathogenesis, genetics, and molecular biology; recent literature on bacterial pathogens such as Salmonella, Vibrio, and/or Yersinia. Diverse experimental approaches: biochemistry, genomics, pathogenesis, and cell biology. Prerequisites: Biology Core and two upper-division courses in genetics, molecular biology, or biochemistry. Same as: BIO 178.

**BIO 282. Modeling Cultural Evolution. 3 Units.**

Seminar. Quantitative models for the evolution of socially transmitted traits. Rates of change of learned traits in populations and patterns of cultural diversity as a function of innovation and cultural transmission. Learning in constant and changing environments. Possible avenues for gene-culture coevolution. Same as: BIO 182.

**BIO 283. Theoretical Population Genetics. 3 Units.**

Models in population genetics and evolution. Selection, random drift, gene linkage, migration, and inbreeding, and their influence on the evolution of gene frequencies and chromosome structure. Models are related to DNA sequence evolution. Prerequisites: calculus and linear algebra, or consent of instructor. Same as: BIO 183.

**BIO 286. Natural History of the Vertebrates. 4 Units.**

Broad survey of the diversity of vertebrate life. Discussion of the major branches of the vertebrate evolutionary tree, with emphasis on evolutionary relationships and key adaptations as revealed by the fossil record and modern phylogenetics. Modern orders introduced through an emphasis on natural history, physiology, behavioral ecology, community ecology, and conservation. Lab sessions focused on comparative skeletal morphology through hands-on work with skeletal specimens. Discussion of field methods and experience with our local vertebrate communities through field trips to several of California's distinct biomes. Prerequisite: Biology core. Same as: BIO 186.

**BIO 288. Biochemistry I. 3 Units.**

(CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 33, 35, 131, and 135 or 171.

Same as: BIO 188, CHEM 181, CHEMENG 181, CHEMENG 281.

**BIO 289. Biochemistry II. 3 Units.**

Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life.

Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).

Same as: BIO 189, CHEM 183, CHEMENG 183, CHEMENG 283.

**BIO 290. Teaching of Biology. 1-5 Units.**

Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. May be repeated for credit. Prerequisite: consent of instructor.

**BIO 291. Development and Teaching of Core Experimental Laboratories. 1-2 Units.**

Preparation for teaching the core experimental courses (44X and 44Y). Emphasis is on lab, speaking, and writing skills. Focus is on updating the lab to meet the changing technical needs of the students. Taken prior to teaching either of the above courses. May be repeated for credit. Prerequisite: selection by instructor.

**BIO 292. Curricular Practical Training. 1-3 Units.**

CPT course required for international students completing degree requirements.

**BIO 294. Cellular Biophysics. 3 Units.**

Physical biology of dynamical and mechanical processes in cells. Emphasis is on qualitative understanding of biological functions through quantitative analysis and simple mathematical models. Sensory transduction, signaling, adaptation, switches, molecular motors, actin and microtubules, motility, and circadian clocks. Prerequisites: differential equations and introductory statistical mechanics.

Same as: APPPHYS 294.

**BIO 299. Biology PhD Lab Rotation. 1-10 Units.**

Limited to first year Biology PhD students. Lab rotations with Biosciences faculty.

**BIO 300. Graduate Research. 1-10 Units.**

For graduate students only. Individual research by arrangement with in-department instructors.

**BIO 300X. Out-of-Department Graduate Research. 1-10 Units.**

Individual research by arrangement with out-of-department instructors. Master's students: credit for work arranged with out-of-department instructors is restricted to Biology students and requires approved department petition. See <http://biohonors.stanford.edu> for more information. May be repeated for credit.

**BIO 301. Frontiers in Biology. 1-3 Units.**

Limited to and required of first-year Ph.D. students in molecular, cellular, and developmental biology. Current research in molecular, cellular, and developmental biology emphasizing primary research literature. Held in conjunction with the department's Monday seminar series. Students and faculty meet weekly before the seminar for a student presentation and discussion of upcoming papers.

**BIO 302. Current Topics and Concepts in Population Biology, Ecology, and Evolution. 1 Unitss.**

Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics. This course is open only to Biology PhD students and is not open to auditors."

**BIO 303. Current Topics and Concepts in Population Biology, Ecology, and Evolution. 1 Unitss.**

Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics. This course is open only to Biology PhD students and is not open to auditors."

**BIO 304. Current Topics and Concepts in Population Biology, Ecology, and Evolution. 1 Unitss.**

Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics. This course is open only to Biology PhD students and is not open to auditors.

**BIO 306. Current Topics in Integrative Organismal Biology. 1 Unitss.**

Limited to and required of graduate students doing research in this field. At Hopkins Marine Station.

**BIO 312. Ethical Issues in Ecology and Evolutionary Biology. 1 Unitss.**

Focus is on ethical issues addressed in Donald Kennedy's *Academic Duty* and others of importance to academics and scientists in the fields of ecology, behavior, and evolutionary biology. Discussions led by faculty and outside guests. Satisfies ethics course requirement for ecology and evolutionary biology. Prerequisite: PhD student in the ecology and evolutionary biology or marine program, or consent of instructor.

**BIO 315. Seminar in Biochemical Evolution. 1-3 Units.**

Literature review and discussion of current topics in biochemical evolution and molecular evolutionary genetics. Prerequisite: consent of instructor.

**BIO 321. Ecological Genetics. 1-3 Units.**

Systematic exploration of (1) the types of questions that can be addressed by ecological genetics techniques (i.e., community genomics, genetic variation between species in the same ecosystem, resource use, landscape genetics, etc.); (2) laboratory techniques available; and (3) analyses and modeling best suited for ecological genetics questions. Analysis of specific research problems and efforts (now underway or planned for the near future) among seminar participants, and discussion of these efforts with group review of the relative merits of alternative approaches.

**BIO 323. Detecting Climate-Driven Changes in California Plant Ranges. 1-2 Units.**

Seminar. For advanced undergraduates and graduate students. Future anthropogenic climate change will continue to alter plant communities, plant ranges, and ecosystems. Studies have already documented plant and animal range shifts across the globe, yet many questions remain as to how plants will respond to climate change. Which taxa and functional groups will be most sensitive to changes in climate? What will happen to ecological communities with differential response of plant species to climate? Focus is on analyzing trends in climate change and long-term plant distribution data in California. May be repeated for credit. Prerequisite: familiarity with statistical, spatial, or modeling analyses.

**BIO 324. Interpreting Ecological Data. 4 Units.**

Experimental design and the theory behind and appropriate use of parametric statistics including: student t-test; analysis of variance; linear regression and some variations including logistic regression and multiple regression; analysis of covariance; chi-squared similarity test; testing the independence of multiple tests; Monte Carlo and bootstrapping methods. Students encouraged to use data from their own research. Course does not fulfill undergraduate statistics requirement. Prerequisite: consent of instructor.

**BIO 325. The Evolution of Body Size. 2 Units.**

Preference to graduate students and upper-division undergraduates in GES and Biology. The influence of organism size on evolutionary and ecological patterns and processes. Focus is on integration of theoretical principles, observations of living organisms, and data from the fossil record. What are the physiological and ecological correlates of body size? Is there an optimum size? Do organisms tend to evolve to larger size? Does productivity control the size distribution of consumers? Does size affect the likelihood of extinction or speciation? How does size scale from the genome to the phenotype? How is metabolic rate involved in evolution of body size? What is the influence of geographic area on maximum body size?

Same as: GES 325.

**BIO 326. Foundations in Biogeography. 2 Units.**

Seminar. Focus on classic papers covering the global distribution and abundance of organisms through time. Topics include: phylogenetics, phylogeography, plate tectonics, island biogeography, climatic change, dispersal, vicariance, ecology of invasions, extinction, gradients, diversity, conservation and a history of the field.

**BIO 342. Plant Biology Seminar. 1-3 Units.**

Topics announced at the beginning of each quarter. Current literature. May be repeated for credit. See <http://carnegiedpb.stanford.edu/seminars/seminars.php>.

**BIO 346. Advanced Seminar on Prokaryotic Molecular Biology. 1 Unit.**

Enrollment limited to PhD students associated with departmental research groups in genetics or molecular biology.

**BIO 375. Field Ecology & Conservation. 4 Units.**

This course is based on question-driven research in the field, addressing both conceptual frameworks and methodological aspects of evolutionary ecology and conservation biology. It consists of faculty-led research projects and student independent projects. The field part takes place in a tropical rain forest research station in Mexico September 6-16, 2011. The field component is followed by sessions on campus, where the research data are analyzed, discussed and prepared as scientific papers. The training includes presentations of the papers in a mini-symposium organized as a professional meeting.

**BIO 383. Seminar in Population Genetics. 1-3 Units.**

Literature review, research, and current problems in the theory and practice of population genetics and molecular evolution. May be repeated for credit. Prerequisite: consent of instructor.

**BIO 384. Theoretical Ecology. 1-3 Units.**

Recent and classical research papers in ecology, and presentation of work in progress by participants. Prerequisite: consent of instructor.

**BIO 390. Topics in Biology. 1 Unit.**

Seminar. Topics in biology ranging from neurobiology to ecology.

**BIO 459. Frontiers in Interdisciplinary Biosciences. 1 Unit.**

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See <http://biox.stanford.edu/courses/459.html>. Recommended: basic mathematics, biology, chemistry, and physics.

Same as: BIOC 459, BIOE 459, CHEM 459, CHEMENG 459, PSYCH 459.

**BIO 802. TGR Dissertation. 0 Unit.**

## Biology/Hopkins Marine Courses

**BIOHOPK 43. Plant Biology, Evolution, and Ecology. 5 Units.**

Introduction to biology in a marine context. Principles of plant biology: physiology, structure, diversity. Principles of evolution: macro and microevolution, population genetics. Ecology: the principles governing the distribution and abundance of organisms; population, community, and ecosystem ecology. Equivalent to BIO 43. Corequisite: BIOHOPK 44Y.

**BIOHOPK 44Y. Core Laboratory in Plant Biology, Ecology and Evolution. 5 Units.**

Laboratory and field projects provide working familiarity with the concepts, organisms, and techniques of plant and evolutionary biology, and ecology. Emphasis is on hands-on experimentation in the marine environment, analysis of data, and written and oral presentation of the experiments. Equivalent to BIO 44Y. Corequisite: BIOHOPK 43. Satisfies WIM in Biology.

**BIOHOPK 160H. Developmental Biology in the Ocean: Diverse Embryonic & Larval Strategies of marine invertebrates. 5-8 Units.**

(Graduate students register for 261H.) Lab course is designed to introduce students to the diversity in the early developmental strategies of marine invertebrates and how an understanding of these microscopic life histories is key to understanding the evolutionary diversification of phyla and the distribution of their more familiar adults. Emphasis is on hands-on collection, spawning, observation and manipulation of embryos and their larvae.

Same as: BIOHOPK 260H.

**BIOHOPK 161H. Invertebrate Zoology. 5 Units.**

(Graduate students register for 261H.) Survey of invertebrate diversity emphasizing form and function in a phylogenetic framework. Morphological diversity, life histories, physiology, and ecology of the major invertebrate groups, concentrating on local marine forms as examples. Current views on the phylogenetic relationships and evolution of the invertebrates. Lectures, lab, plus field trips. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor. Same as: BIOHOPK 261H.

**BIOHOPK 162H. Comparative Animal Physiology. 5 Units.**

(Graduate students register for 262H.) How animals work. Topics: physiology of respiration, circulation, energy metabolism, thermal regulation, osmotic regulation, muscle physiology, and locomotion. Evolutionary and ecological physiology. Lectures, lab, and field research. An option to combine the course work with a more intensive research focus, with more units, is available. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor. Same as: BIOHOPK 262H.

**BIOHOPK 163H. Oceanic Biology. 4 Units.**

(Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affect marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Lectures, discussion, and field trips. Satisfies Central Menu Area 4 for Bio majors. Recommended: PHYSICS 21 or 51, CHEM 31, Biology core, or consent of instructor. Same as: BIOHOPK 263H.

**BIOHOPK 165H. The Extreme Life of the Sea. 3 Units.**

(Graduate students register for 265H.) Lecture course that explores the way marine species live in extreme ocean habitats. We will cover the deepest, hottest, coldest, and shallowest habitats and the biggest, fastest, most fecund, oldest and smallest species. We will focus on the molecular, physiological and ecological adaptations that allow species to thrive in these unusual environments.

Same as: BIOHOPK 265H.

**BIOHOPK 167H. Nerve, Muscle, and Synapse. 5 Units.**

(Graduate students register for 267H.) Fundamental aspects of membrane excitability, nerve conduction, synaptic transmission, and excitation-contraction coupling. Emphasis is on biophysical, molecular, and cellular level analyses of these processes in vertebrate and invertebrate systems. Labs on intra- and extracellular recording and patch clamp techniques. Lectures, discussions, and labs. Satisfies Central Menu Area 3 for Bio majors Prerequisites: PHYSICS 23, 28, 43, or equivalent; CHEM 31, 135; calculus; or consent of instructor.

Same as: BIOHOPK 267H.

**BIOHOPK 172H. Marine Ecology. 5 Units.**

(Graduate students register for 272H.) Course provides key concepts in ecology, familiarizes students with local marine ecosystems, the methods used in ecological studies of these ecosystems, and the analysis and interpretation of ecological data. Students will engage in presentation and debates of current topics in marine ecology and conservation. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: Biology core or consent of instructor.

Same as: BIOHOPK 272H.

**BIOHOPK 173H. Marine Conservation Biology. 1 Unit.**

(Graduate students register for 273H.) The science of preserving marine diversity. Goal is to introduce students to major conservation issues associated with marine ecosystems. Topics include decline of open ocean fisheries, salmon conservation, bycatch issues in fisheries, use of marine reserves, marine invasions, marine pollution, and global warming. Includes five lecturers from other universities who specialize in marine conservation. Same as: BIOHOPK 273H.

**BIOHOPK 174H. Experimental Design and Probability. 3 Units.**

(Graduate students register for 274H.) Variability is an integral part of biology. Introduction to probability and its use in designing experiments to address biological problems. Focus is on analysis of variance, when and how to use it, why it works, and how to interpret the results. Design of complex, but practical, asymmetrical experiments and environmental impact studies, and regression and analysis of covariance. Computer-based data analysis. Prerequisite: Biology core or consent of instructor.

Same as: BIOHOPK 274H.

**BIOHOPK 177H. Dynamics and Management of Marine Populations. 4 Units.**

(Graduate students register for 277H.) Course examines the ecological factors and processes that control natural and harvested marine populations. Course emphasizes mathematical models as tools to assess the dynamics of populations and to derive projections of their demographic fate under different management scenarios. Course objectives will be met by a combination of theoretical lectures, assigned readings and class discussions, case study analysis and interactive computer sessions.

Same as: BIOHOPK 277H.

**BIOHOPK 181H. Physiology of Global Change. 4 Units.**

(Graduate students register for 281H.) Global change is leading to significant alterations in several environmental factors, including temperature, ocean acidity and oxygen availability. This course focuses on: (i) how these environmental changes lead to physiological stress and (ii) how, and to what extent, are organisms able to adapt through short-term acclimatization and evolutionary adaptation to cope with these stresses. A major focus of the class is to link changes in species' distribution patterns with underlying physiological mechanics that establish environmental optima and tolerance limits.

Same as: BIOHOPK 281H.

**BIOHOPK 182H. Stanford at Sea. 16 Units.**

(Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

Same as: BIOHOPK 323H, EARTHSYS 323, EESS 323.

**BIOHOPK 184H. Holistic Biology: Waters of Monterey Bay and Monterey County. 8 Units.**

(Graduate students register for 284H.) For majors and non-majors. Complexity in natural systems is examined from complementary points of view, including scientific, historical, philosophical and literary. Lectures and discussions will focus on the writings of Ed Ricketts and John Steinbeck, poetry of Robinson Jeffers and on historical and contemporary works concerning marine and fresh-water systems, resource management and climate change. Locations of field work and weekend trips will include Monterey Bay, Elkhorn Slough and the Salinas and Carmel River systems. A group project with individual contributions will be carried out and presented at a symposium. This course will involve a significant amount of creative writing, and it satisfies the Writing in Major requirement for Biology. It is open to all majors and classes. Only 6 units may count towards the Biology major.

Same as: BIOHOPK 284H.

**BIOHOPK 185H. Ecology and Conservation of Kelp Forest Communities. 10-12 Units.**

(Graduate students register for 285H.) Eight week course. Daily lectures, labs, and scuba dives focused on kelp forest communities. Physical environment, identification, and natural history of resident organisms; ecological processes that maintain biodiversity and community organization; field methods, data analysis, and research diving techniques. Field research component contribute to ongoing studies associated with Hopkins Marine Life Observatory. It is recommended that students complete Stanford's Scientific Diver Training workshop, offered during spring break and the week before the course starts, although this is not a requirement. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: BIO 42 and 43, or BIO 42 and BIOHOPK 43, or consent of instructor; and advanced scuba certification and scuba equipment.

Same as: BIOHOPK 285H.

**BIOHOPK 187H. Sensory Ecology. 4 Units.**

(Graduate students register for 287H.) Topics: the ways animals receive, filter, and process information gleaned from the environment, sensory receptor mechanisms, neural processing, specialization to life underwater, communication within and between species, importance of behavior to ecosystem structure and dynamics, impact of acoustic and light pollution on marine animals. Emphasis is on the current scientific literature. The laboratory portion of the class explores sensory mechanisms using neurobiological methods and methods of experimental animal behavior. Same as: BIOHOPK 287H.

**BIOHOPK 189H. Sustainability and Marine Ecosystems. 3 Units.**

(Graduate students register for 289H.) The health of marine ecosystems is in decline due to overfishing, pollution, habitat damage, invasive species, and climate change. Because human communities are tightly coupled to coastal marine resources, understanding pathways to sustainability require understanding as much about humans as about the ocean. In this course, we explore factors that contribute to the sustainability and resilience of marine ecosystems and the human communities that depend upon them. This course is based on readings in the primary literature, discussions, and student projects. Same as: BIOHOPK 289H.

**BIOHOPK 198H. Directed Instruction or Reading. 1-15 Units.**

May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research. Credit for work arranged with out-of-department instructors restricted to Biology majors and requires department approval. May be repeated for credit. (Staff).

**BIOHOPK 199H. Undergraduate Research. 1-15 Units.**

Qualified undergraduates undertake individual work in the fields listed under 300H. Arrangements must be made by consultation or correspondence.

**BIOHOPK 260H. Developmental Biology in the Ocean: Diverse Embryonic & Larval Strategies of marine invertebrates. 5-8 Units.**

(Graduate students register for 261H.) Lab course is designed to introduce students to the diversity in the early developmental strategies of marine invertebrates and how an understanding of these microscopic life histories is key to understanding the evolutionary diversification of phyla and the distribution of their more familiar adults. Emphasis is on hands-on collection, spawning, observation and manipulation of embryos and their larvae.

Same as: BIOHOPK 160H.

**BIOHOPK 261H. Invertebrate Zoology. 5 Units.**

(Graduate students register for 261H.) Survey of invertebrate diversity emphasizing form and function in a phylogenetic framework. Morphological diversity, life histories, physiology, and ecology of the major invertebrate groups, concentrating on local marine forms as examples. Current views on the phylogenetic relationships and evolution of the invertebrates. Lectures, lab, plus field trips. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor. Same as: BIOHOPK 161H.

**BIOHOPK 262H. Comparative Animal Physiology. 5 Units.**

(Graduate students register for 262H.) How animals work. Topics: physiology of respiration, circulation, energy metabolism, thermal regulation, osmotic regulation, muscle physiology, and locomotion. Evolutionary and ecological physiology. Lectures, lab, and field research. An option to combine the course work with a more intensive research focus, with more units, is available. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor. Same as: BIOHOPK 162H.

**BIOHOPK 263H. Oceanic Biology. 4 Units.**

(Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affect marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Lectures, discussion, and field trips. Satisfies Central Menu Area 4 for Bio majors. Recommended: PHYSICS 21 or 51, CHEM 31, Biology core, or consent of instructor. Same as: BIOHOPK 163H.

**BIOHOPK 264H. POPULATION GENOMICS. 3 Units.**

The course will review genome-level data sets from next-generation sequencing and their use in cataloging genetic variation and gene expression. We will explore how these new data sets add to our growing understanding of the way genomes function and evolve in natural populations. The course will run in lecture/seminar format one day a week that will analyze recent papers in the field and will review emerging methods of data collection and evolutionary bioinformatics. We will spend one long weekend in the quarter preparing Illumina libraries, and finish by an analysis of these data for genetic variation and gene expression patterns. Prerequisites: graduate standing, or Molecular Ecology or Molecular Evolution.

**BIOHOPK 265H. The Extreme Life of the Sea. 3 Units.**

(Graduate students register for 265H.) Lecture course that explores the way marine species live in extreme ocean habitats. We will cover the deepest, hottest, coldest, and shallowest habitats and the biggest, fastest, most fecund, oldest and smallest species. We will focus on the molecular, physiological and ecological adaptations that allow species to thrive in these unusual environments. Same as: BIOHOPK 165H.

**BIOHOPK 267H. Nerve, Muscle, and Synapse. 5 Units.**

(Graduate students register for 267H.) Fundamental aspects of membrane excitability, nerve conduction, synaptic transmission, and excitation-contraction coupling. Emphasis is on biophysical, molecular, and cellular level analyses of these processes in vertebrate and invertebrate systems. Labs on intra- and extracellular recording and patch clamp techniques. Lectures, discussions, and labs. Satisfies Central Menu Area 3 for Bio majors Prerequisites: PHYSICS 23, 28, 43, or equivalent; CHEM 31, 135; calculus; or consent of instructor. Same as: BIOHOPK 167H.

**BIOHOPK 272H. Marine Ecology. 5 Units.**

(Graduate students register for 272H.) Course provides key concepts in ecology, familiarizes students with local marine ecosystems, the methods used in ecological studies of these ecosystems, and the analysis and interpretation of ecological data. Students will engage in presentation and debates of current topics in marine ecology and conservation. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: Biology core or consent of instructor. Same as: BIOHOPK 172H.

**BIOHOPK 273H. Marine Conservation Biology. 1 Units.**

(Graduate students register for 273H.) The science of preserving marine diversity. Goal is to introduce students to major conservation issues associated with marine ecosystems. Topics include decline of open ocean fisheries, salmon conservation, bycatch issues in fisheries, use of marine reserves, marine invasions, marine pollution, and global warming. Includes five lecturers from other universities who specialize in marine conservation. Same as: BIOHOPK 173H.

**BIOHOPK 274. Hopkins Microbiology Course. 3-12 Units.**

(Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.

Same as: BIO 274S, CEE 274S, EESS 253S.

**BIOHOPK 274H. Experimental Design and Probability. 3 Units.**

(Graduate students register for 274H.) Variability is an integral part of biology. Introduction to probability and its use in designing experiments to address biological problems. Focus is on analysis of variance, when and how to use it, why it works, and how to interpret the results. Design of complex, but practical, asymmetrical experiments and environmental impact studies, and regression and analysis of covariance. Computer-based data analysis. Prerequisite: Biology core or consent of instructor.

Same as: BIOHOPK 174H.

**BIOHOPK 275H. Synthesis in Ecology. 2 Units.**

Introduction to frameworks and approaches to synthesizing large data sets, including meta-analysis and permutational multivariate analysis of variance. Hands-on data analysis sessions. May be repeated for credit.

**BIOHOPK 277H. Dynamics and Management of Marine Populations. 4 Units.**

(Graduate students register for 277H.) Course examines the ecological factors and processes that control natural and harvested marine populations. Course emphasizes mathematical models as tools to assess the dynamics of populations and to derive projections of their demographic fate under different management scenarios. Course objectives will be met by a combination of theoretical lectures, assigned readings and class discussions, case study analysis and interactive computer sessions.

Same as: BIOHOPK 177H.

**BIOHOPK 280. Short Course on Ocean Policy. 3 Units.**

Course will introduce graduate students in the natural and social sciences to ocean policy and governance, and how science influences public policy decisions at the international, national and state levels. Students will learn about pressing challenges to ocean health, and together with leaders in ocean science and policy, examine how science and scientists can work with the policy-making process to address these challenges. Students will examine the roles of natural science, social science, and government institutions in ocean management. Students will have the opportunity to engage with experts in ocean science and policy, and participate in field trips, group projects, and other interactive activities. Students will also learn how to communicate with ocean policy makers and journalists through hands-on practical exercises. Prerequisite: consent of instructor.

**BIOHOPK 281H. Physiology of Global Change. 4 Units.**

(Graduate students register for 281H.) Global change is leading to significant alterations in several environmental factors, including temperature, ocean acidity and oxygen availability. This course focuses on: (i) how these environmental changes lead to physiological stress and (ii) how, and to what extent, are organisms able to adapt through short-term acclimatization and evolutionary adaptation to cope with these stresses. A major focus of the class is to link changes in species' distribution patterns with underlying physiological mechanics that establish environmental optima and tolerance limits.

Same as: BIOHOPK 181H.

**BIOHOPK 284H. Holistic Biology: Waters of Monterey Bay and Monterey County. 8 Units.**

(Graduate students register for 284H.) For majors and non-majors. Complexity in natural systems is examined from complementary points of view, including scientific, historical, philosophical and literary. Lectures and discussions will focus on the writings of Ed Ricketts and John Steinbeck, poetry of Robinson Jeffers and on historical and contemporary works concerning marine and fresh-water systems, resource management and climate change. Locations of field work and weekend trips will include Monterey Bay, Elkhorn Slough and the Salinas and Carmel River systems. A group project with individual contributions will be carried out and presented at a symposium. This course will involve a significant amount of creative writing, and it satisfies the Writing in Major requirement for Biology. It is open to all majors and classes. Only 6 units may count towards the Biology major.

Same as: BIOHOPK 184H.

**BIOHOPK 285H. Ecology and Conservation of Kelp Forest Communities. 10-12 Units.**

(Graduate students register for 285H.) Eight week course. Daily lectures, labs, and scuba dives focused on kelp forest communities. Physical environment, identification, and natural history of resident organisms; ecological processes that maintain biodiversity and community organization; field methods, data analysis, and research diving techniques. Field research component contribute to ongoing studies associated with Hopkins Marine Life Observatory. It is recommended that students complete Stanford's Scientific Diver Training workshop, offered during spring break and the week before the course starts, although this is not a requirement. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: BIO 42 and 43, or BIO 42 and BIOHOPK 43, or consent of instructor; and advanced scuba certification and scuba equipment.

Same as: BIOHOPK 185H.

**BIOHOPK 287H. Sensory Ecology. 4 Units.**

(Graduate students register for 287H.) Topics: the ways animals receive, filter, and process information gleaned from the environment, sensory receptor mechanisms, neural processing, specialization to life underwater, communication within and between species, importance of behavior to ecosystem structure and dynamics, impact of acoustic and light pollution on marine animals. Emphasis is on the current scientific literature. The laboratory portion of the class explores sensory mechanisms using neurobiological methods and methods of experimental animal behavior.

Same as: BIOHOPK 187H.

**BIOHOPK 289H. Sustainability and Marine Ecosystems. 3 Units.**

(Graduate students register for 289H.) The health of marine ecosystems is in decline due to overfishing, pollution, habitat damage, invasive species, and climate change. Because human communities are tightly coupled to coastal marine resources, understanding pathways to sustainability require understanding as much about humans as about the ocean. In this course, we explore factors that contribute to the sustainability and resilience of marine ecosystems and the human communities that depend upon them. This course is based on readings in the primary literature, discussions, and student projects.

Same as: BIOHOPK 189H.

**BIOHOPK 290H. Teaching of Biological Science. 1-15 Units.**

Open to upper-division undergraduates and graduate students. Practical experience in teaching lab biology or serving as an assistant in a lecture course. Prerequisite: consent of instructor. (Staff).

**BIOHOPK 300H. Research. 1-15 Units.**

Graduate study involving original work undertaken with staff in the fields indicated. B. Block: Comparative Vertebrate Physiology (biomechanics, metabolic physiology and phylogeny of pelagic fishes, evolution of endothermy); L. Crowder: Marine ecology, fisheries, bycatch, integrating science and policy, marine conservation; G. De Leo: Population dynamics and management, wildlife diseases, environmental policies and sustainable development; M. Denny: Biomechanics (the mechanical properties of biological materials and their consequences for animal size, shape, and performance); W. Gilly: Neurobiology (analysis of giant axon systems in marine invertebrates from molecular to behavioral levels); C. Lowe: Evolution of Development (origin of chordates, early evolution of body plans); F. Micheli: Marine Ecology (species interactions and community ecology, scale-dependent aspects of community organization, marine conservation and design of multi-species marine protected areas, behavioral ecology); S. Palumbi: Molecular Evolution (mechanisms of speciation, genetic differentiations of populations, use of molecular tools in conservation biology, design of marine protected areas); G. Somero: Ecological and Evolutionary Physiology (adaptations of marine organisms to the environment: temperature, pressure, desiccation, and oxygen availability); S. Thompson: Neurobiology (neuronal control of behavior and mechanisms of ion permeation, signal transduction, calcium homeostasis, and neurotransmission); J. Watanabe: Marine Ecology (kelp forest ecology and invertebrate zoology).

**BIOHOPK 323H. Stanford at Sea. 16 Units.**

(Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

Same as: BIOHOPK 182H, EARTHSYS 323, EESS 323.

**BIOHOPK 801H. TGR Project. 0 Unit.****BIOHOPK 802H. TGR Dissertation. 0 Unit.**

## Biomedical Informatics Courses

**BIOMEDIN 109Q. Genomics: A Technical and Cultural Revolution. 3 Units.**

Preference to sophomores. Concepts of genomics, high-throughput methods of data collection, and computational approaches to analysis of data. The social, ethical, and economic implications of genomic science. Students may focus on computational or social aspects of genomics.

Same as: GENE 109Q.

**BIOMEDIN 156. Economics of Health and Medical Care. 5 Units.**

Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: demand for medical care and medical insurance; institutions in the health sector; economics of information applied to the market for health insurance and for health care; measurement and valuation of health; competition in health care delivery. Graduate students with research interests should take ECON 248. Prerequisites: ECON 50 and ECON 102A or Stats 116 or the equivalent. Recommended: ECON 51. Same as: BIOMEDIN 256, ECON 126, HRP 256.

**BIOMEDIN 200. Biomedical Informatics Colloquium. 1 Unitss.**

Series of colloquia offered by program faculty, students, and occasional guest lecturers. May be repeated three times for credit.

**BIOMEDIN 201. Biomedical Informatics Student Seminar. 1 Unitss.**

Participants report on recent articles from the Biomedical Informatics literature or their research projects. Goals are to teach critical reading of scientific papers and presentation skills. May be repeated three times for credit.

**BIOMEDIN 205. Precision Practice with Big Data. 1 Unitss.**

Primarily for M.D. students; open to other graduate students. Provides an overview of how to leverage large amounts of clinical, molecular, and imaging data within hospitals and in cyberspace--big data--to practice medicine more effectively. Lectures by physicians, researchers, and industry leaders survey how the major methods of informatics can help physicians leverage big data to profile disease, to personalize treatment to patients, to predict treatment response, to discover new knowledge, and to challenge established medical dogma and the current paradigm of clinical decision-making based solely on published knowledge and individual physician experience. May be repeated for credit. Prerequisite: background in biomedicine. Background in computer science can be helpful but not required.

**BIOMEDIN 206. Informatics in Industry. 1 Unitss.**

Effective management, modeling, acquisition, and mining of biomedical information in healthcare and biotechnology companies and approaches to information management adopted by companies in this ecosystem. Guest speakers from pharmaceutical/biotechnology companies, clinics/hospitals, health communities/portals, instrumentation/software vendors. May be repeated for credit.

**BIOMEDIN 210. Modeling Biomedical Systems: Ontology,****Terminology, Problem Solving. 3 Units.**

Methods for modeling biomedical systems and for making those models explicit in the context of building software systems. Emphasis is on intelligent systems for decision support and Semantic Web applications. Topics: knowledge representation, controlled terminologies, ontologies, reusable problem solvers, and knowledge acquisition. Recommended: exposure to object-oriented systems, basic biology.

Same as: CS 270.

**BIOMEDIN 212. Introduction to Biomedical Informatics Research Methodology. 3 Units.**

Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor.

Same as: BIOE 212, CS 272, GENE 212.

**BIOMEDIN 214. Representations and Algorithms for Computational Molecular Biology. 3-4 Units.**

Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units. Same as: BIOE 214, CS 274, GENE 214.

**BIOMEDIN 215. Data Driven Medicine. 3 Units.**

With the spread of electronic health records and increasingly low cost assays for patient molecular data, powerful data repositories with tremendous potential for biomedical research, clinical care and personalized medicine are being built. But these databases are large and difficult for any one specialist to analyze. To find the hidden associations within the full set of data, we introduce methods for data-mining at the internet scale, the handling of large-scale electronic medical records data for machine learning, methods in natural language processing and text-mining applied to medical records, methods for using ontologies for the annotation and indexing of unstructured content as well as semantic web technologies. Prerequisites: CS 106A; familiarity with statistics (STATS 202) and biology. Recommended: one of CS 246 (previously CS 345A), STATS 305, CS 229.

**BIOMEDIN 216. Representations and Algorithms for Molecular Biology: Lectures. 1-2 Units.**

Lecture component of BIOMEDIN 214. One unit for medical and graduate students who attend lectures only; may be taken for 2 units with participation in limited assignments and final project. Lectures also available via internet. Prerequisite: familiarity with biology recommended.

**BIOMEDIN 217. Translational Bioinformatics. 4 Units.**

Analytic, storage, and interpretive methods to optimize the transformation of genetic, genomic, and biological data into diagnostics and therapeutics for medicine. Topics: access and utility of publicly available data sources; types of genome-scale measurements in molecular biology and genomic medicine; analysis of microarray data; analysis of polymorphisms, proteomics, and protein interactions; linking genome-scale data to clinical data and phenotypes; and new questions in biomedicine using bioinformatics. Case studies. Prerequisites: programming ability at the level of CS 106A and familiarity with statistics and biology. Same as: CS 275.

**BIOMEDIN 218. Translational Bioinformatics Lectures. 2 Units.**

Same content as BIOMEDIN 217; for medical and graduate students who attend lectures and participate in limited assignments and final project. Analytic, storage, and interpretive methods to optimize the transformation of genetic, genomic, and biological data into diagnostics and therapeutics for medicine. Topics: access and utility of publicly available data sources; types of genome-scale measurements in molecular biology and genomic medicine; analysis of microarray data; analysis of polymorphisms, proteomics, and protein interactions; linking genome-scale data to clinical data and phenotypes; and new questions in biomedicine using bioinformatics. Case studies. Prerequisites: programming at the level of CS 106A; familiarity with statistics and biology.

**BIOMEDIN 219. Mathematical Models and Medical Decisions. 1-2 Units.**

Analytic methods for determining the optimal diagnostic and therapeutic decisions for the care of individual patients and for the design of policies affecting the care of patient populations. Topics: utility theory and probability modeling, empirical methods for estimating disease prevalence, probability models for periodic processes, binary decision-making techniques, Markov models of dynamic disease state problems, utility assessment techniques, parametric utility models, utility models for multidimensional outcomes, analysis of time-varying clinical outcomes, and the design of cost-constrained clinical policies. 2 units requires completion of a case study project. Prerequisites: introduction to calculus and basic statistics.

**BIOMEDIN 224. Principles of Pharmacogenomics. 3 Units.**

Introduction to the relevant pharmacology, genomics, experimental methods for high-throughput measurements (sequencing, expression, genotyping), analysis methods for GWAS, chemoinformatics, and natural language processing. Review of key gene classes (cytochromes, transporters, GPCRs), key drugs for which genetics is critical (warfarin, clopidogrel, statins, NSAIDs, neuropsychiatric drugs and cancer drugs). Also reviews resources for pharmacogenomics (PharmGKB, Drugbank, CMAP, and others) as well as issues in doing clinical implementation of pharmacogenomics testing. Reading of key papers, including student presentations of this work.; problem sets; final project selected with approval of instructor. Prerequisites: two of BIO 41, 42, 43, 44X, 44Y or consent of instructor. Same as: GENE 224.

**BIOMEDIN 225. Data Driven Medicine: Lectures. 2 Units.**

With the spread of electronic health records and increasingly low cost assays for patient molecular data, powerful data repositories with tremendous potential for biomedical research, clinical care and personalized medicine are being built. But these databases are large and difficult for any one specialist to analyze. To find the hidden associations within the full set of data, we introduce methods for data-mining at the internet scale, the handling of large-scale electronic medical records data for machine learning, methods in natural language processing and text-mining applied to medical records, methods for using ontologies for the annotation and indexing of unstructured content as well as semantic web technologies. Prerequisites: Biomedin 210 highly recommended; CS 106A, CS 345A recommended.

**BIOMEDIN 231. Computational Molecular Biology. 3 Units.**

Practical, hands-on approach to field of computational molecular biology. Recommended for molecular biologists and computer scientists desiring to understand the major issues concerning analysis of genomes, sequences and structures. Various existing methods critically described and strengths and limitations of each. Practical assignments utilizing tools described. Prerequisite: BIO 41 or consent of instructor. All homework and coursework submitted electronically. Course webpage: <http://biochem218.stanford.edu/>. Same as: BIOC 218.

**BIOMEDIN 233. Intermediate Biostatistics: Analysis of Discrete Data. 3 Units.**

Methods for analyzing data from case-control and cross-sectional studies: the 2x2 table, chi-square test, Fisher's exact test, odds ratios, Mantel-Haenzel methods, stratification, tests for matched data, logistic regression, conditional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference. Same as: HRP 261, STATS 261.

**BIOMEDIN 251. Outcomes Analysis. 3 Units.**

Methods of conducting empirical studies which use large existing medical, survey, and other databases to ask both clinical and policy questions. Econometric and statistical models used to conduct medical outcomes research. How research is conducted on medical and health economics questions when a randomized trial is impossible. Problem sets emphasize hands-on data analysis and application of methods, including re-analyses of well-known studies. Prerequisites: one or more courses in probability, and statistics or biostatistics. Same as: HRP 252.



**BIOMEDIN 256. Economics of Health and Medical Care. 5 Units.**

Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: demand for medical care and medical insurance; institutions in the health sector; economics of information applied to the market for health insurance and for health care; measurement and valuation of health; competition in health care delivery. Graduate students with research interests should take ECON 248. Prerequisites: ECON 50 and ECON 102A or Stats 116 or the equivalent. Recommended: ECON 51. Same as: BIOMEDIN 156, ECON 126, HRP 256.

**BIOMEDIN 258. Genomics, Bioinformatics and Medicine. 3 Units.**

Molecular basis of inherited human disease. Diagnostics approaches: simple Mendelian diseases and complex, multifactorial diseases. Genomics: functional genomics, epigenetics, gene expression, SNPs, copy number and other structural genomic variations involved in disease. Novel therapeutic methods: stem cell therapy, gene therapy and drug developments that depend on the knowledge of genomics. Personal genomics, pharmacogenomics, clinical genomics and their role in the future of preventive medicine. Prerequisites: BIO 41 or HUMBIO 2A or consent of instructor. Those with credit in BIOC 118 not eligible to enroll. Course webpage: <http://biochem158.stanford.edu/> Same as: BIOC 158, BIOC 258, HUMBIO 158G.

**BIOMEDIN 260. Computational Methods for Biomedical Image Analysis and Interpretation. 3-4 Units.**

The latest biological and medical imaging modalities and their applications in research and medicine. Focus is on computational analytic and interpretive approaches to optimize extraction and use of biological and clinical imaging data for diagnostic and therapeutic translational medical applications. Topics include major image databases, fundamental methods in image processing and quantitative extraction of image features, structured recording of image information including semantic features and ontologies, indexing, search and content-based image retrieval. Case studies include linking image data to genomic, phenotypic and clinical data, developing representations of image phenotypes for use in medical decision support and research applications and the role that biomedical imaging informatics plays in new questions in biomedical science. Includes a project. Enrollment for 3 units with reduced project requirements requires instructor consent. Prerequisites: programming ability at the level of CS 106A, familiarity with statistics, basic biology. Knowledge of Matlab highly recommended. Same as: RAD 260.

**BIOMEDIN 261. Computational Methods for Biomedical Image Analysis and Interpretation: Lectures. 2 Units.**

Lecture component of RAD/BIOMEDIN 260. The latest biological and medical imaging modalities and their applications in research and medicine. Focus is on computational analytic and interpretive approaches to optimize extraction and use of biological and clinical imaging data for diagnostic and therapeutic translational medical applications. Topics include major image databases, fundamental methods in image processing and quantitative extraction of image features, structured recording of image information including semantic features and ontologies, indexing, search and content-based image retrieval. Case studies include linking image data to genomic, phenotypic and clinical data, developing representations of image phenotypes for use in medical decision support and research applications and the role that biomedical imaging informatics plays in new questions in biomedical science. Prerequisites: familiarity with statistics, basic biology. Knowledge of Matlab and programming recommended. Same as: RAD 261.

**BIOMEDIN 262. Computational Genomics. 3 Units.**

Applications of computer science to genomics, and concepts in genomics from a computer science point of view. Topics: dynamic programming, sequence alignments, hidden Markov models, Gibbs sampling, and probabilistic context-free grammars. Applications of these tools to sequence analysis: comparative genomics, DNA sequencing and assembly, genomic annotation of repeats, genes, and regulatory sequences, microarrays and gene expression, phylogeny and molecular evolution, and RNA structure. Prerequisites: 161 or familiarity with basic algorithmic concepts. Recommended: basic knowledge of genetics. Same as: CS 262.

**BIOMEDIN 290. Biomedical Informatics Teaching Methods. 1-3 Units.**

Hands-on training in biomedical informatics pedagogy. Practical experience in pedagogical approaches, variously including didactic, inquiry, project, team, case, field, and/or problem-based approaches. Students create course content, including lectures, exercises, and assessments, and evaluate learning activities and outcomes. Prerequisite: instructor consent.

**BIOMEDIN 299. Directed Reading and Research. 1-18 Units.**

For students wishing to receive credit for directed reading or research time. Prerequisite: consent of instructor. (Staff).

**BIOMEDIN 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**BIOMEDIN 374. Algorithms in Biology. 2-3 Units.**

Algorithms and computational models applied to molecular biology and genetics. Topics vary annually. Possible topics include biological sequence comparison, annotation of genes and other functional elements, molecular evolution, genome rearrangements, microarrays and gene regulation, protein folding and classification, molecular docking, RNA secondary structure, DNA computing, and self-assembly. May be repeated for credit. Prerequisites: 161, 262 or 274, or BIOCHEM 218, or equivalents. Same as: CS 374.

**BIOMEDIN 390A. Curricular Practical Training. 1 Unitss.**

Provides educational opportunities in biomedical informatics research. Qualified biomedical informatics students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-up on projects they expect to perform. BIOMEDIN 390A, B, and C may each be taken only once.

**BIOMEDIN 390B. Curricular Practical Training. 1 Unitss.**

Provides educational opportunities in biomedical informatics research. Qualified biomedical informatics students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-up on projects they expect to perform. BIOMEDIN 390A, B, and C may each be taken only once.

**BIOMEDIN 390C. Curricular Practical Training. 1 Unitss.**

Provides educational opportunities in biomedical informatics research. Qualified biomedical informatics students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and must complete a research report outlining their work activity, problems investigated, key results, and any follow-up on projects they expect to perform. BIOMEDIN 390A, B, and C may each be taken only once.

**BIOMEDIN 432. Analysis of Costs, Risks, and Benefits of Health Care. 4 Units.**

(Same as MGTECON 332) For graduate students. How to do cost/benefit analysis when the output is difficult or impossible to measure. How do M.B.A. analytic tools apply in health services? Literature on the principles of cost/benefit analysis applied to health care. Critical review of actual studies. Emphasis is on the art of practical application. Same as: HRP 392.

**BIOMEDIN 801. TGR Master's Project. 0 Unit.**

Project credit for masters students who have completed all course requirements and minimum of 45 Stanford units.

**BIOMEDIN 802. TGR PhD Dissertation. 0 Unit.**

## Biophysics Courses

**BIOPHYS 227. Functional MRI Methods. 3 Units.**

Basics of functional magnetic resonance neuroimaging, including data acquisition, analysis, and experimental design. Journal club sections. Cognitive neuroscience and clinical applications. Prerequisites: basic physics, mathematics; neuroscience recommended. Same as: RAD 227.

**BIOPHYS 228. Computational Structural Biology. 3 Units.**

Interatomic forces and interactions such as electrostatics and hydrophobicity, and protein structure in terms of amino acid properties, local chain conformation, secondary structure, domains, and families of folds. How protein motion can be simulated. Bioinformatics introduced in terms of methods that compare proteins via their amino acid sequences and their three-dimensional structures. Structure prediction via simple comparative modeling. How to detect and model remote homologues. Predicting the structure of a protein from knowledge of its amino acid sequence. Via Internet. Same as: SBIO 228.

**BIOPHYS 232. Advanced Imaging Lab in Biophysics. 4 Units.**

Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor. Same as: APPPHYS 232, BIO 132, BIO 232, MCP 232.

**BIOPHYS 241. Biological Macromolecules. 3-5 Units.**

The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 30. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only. Same as: BIOC 241, SBIO 241.

**BIOPHYS 242. Methods in Molecular Biophysics. 3 Units.**

Experimental methods in molecular biophysics from theoretical and practical standpoints. Emphasis is on X-ray diffraction, nuclear magnetic resonance, and fluorescence spectroscopy. Prerequisite: physical chemistry or consent of instructor. Same as: SBIO 242.

**BIOPHYS 250. Seminar in Biophysics. 1 Unitss.**

Required of Biophysics graduate students. Presentation of current research projects and results by faculty in the Biophysics program. May be repeated for credit.

**BIOPHYS 297. Bio-Inorganic Chemistry. 3 Units.**

Overview of metal sites in biology. Metalloproteins as elaborated inorganic complexes, their basic coordination chemistry and bonding, unique features of the protein ligand, and the physical methods used to study active sites. Active site structures are correlated with function. Prerequisites: 153 and 173, or equivalents. Same as: CHEM 297.

**BIOPHYS 300. Graduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**BIOPHYS 399. Directed Reading in Biophysics. 1-18 Units.**

Prerequisite: consent of instructor.

**BIOPHYS 801. TGR Project. 0 Unit.****BIOPHYS 802. TGR Dissertation. 0 Unit.**

## Biosciences Interdisciplinary Courses

**BIOS 200. The Nucleus. 8 Units.**

Open to first year graduate students in the Biosciences, or Stem Cell Biology, only. Multidisciplinary class that develops fundamental concepts in modern biosciences research and teaches how to solve cutting edge research questions in a variety of sub-disciplines. Concepts are introduced through didactic instruction, expanded in small group discussions of original papers, and used as the basis for identifying important research questions. Basic and higher order topics, including evolution, networks, and information in biology are covered. Course develops critical skills in research design, critical interpretation of the literature, hypothesis testing and quantitative analysis. Modes of scientific communication and teamwork taught. No prerequisites.

**BIOS 201. Next Generation Sequencing and Applications. 2 Units.**

Usher in the golden age of biological discovery with next generation sequencing (NGS) through its wide spectrum of applications. Modules include general introduction of Next Generation Sequencing (NGS) technologies, applications of these sequencing technologies, caveats and comparisons with previous approaches, analysis and interpretation of sequencing data, principles of tools and resources and practical ways to utilize them, and features and pitfalls.

**BIOS 202. Hippocampal Field Potentials, an Introduction to CNS in Vitro Electrophysiology. 1-3 Units.**

Introduces students to theory and practice of in vitro CNS electrophysiology. Lectures cover basic electrical and electrode theory, hippocampal anatomy, interpretation of these potentials, common pitfalls and misinterpretations, design of experiments using field potentials and other related topics. Practicum is hands on training in obtaining, recording and interpreting field potentials from in vitro hippocampal slices. Students develop skills in data collection, analysis and evaluation, art and design of electrophysiological studies of the brain.

**BIOS 203. Introduction to Atomistic Simulations for Biochemical Applications. 3 Units.**

Theory and application of atomistic simulations needed to model and understand systems of biological relevance (proteins, DNA, small molecule therapeutic drug properties) for beginners. Topics: molecular interactions and classical force fields, first principles energy approaches, molecular dynamics, rare event and transition-state finding techniques, protein folding, and solvation methods. Hands-on tutorials based on key topics in biochemical simulation that use variety of state-of-the-art software packages on both standard and new, advanced graphical processing unit hardware for simulation and analysis of biochemical properties. Prerequisites: Some knowledge of quantum mechanics, biochemistry, and shell scripting (BASH or python) preferred.

**BIOS 204. Practical Tutorial on the Modeling of Signal Transduction Motifs. 2 Units.**

Basics of ordinary differential equation modeling of signal transduction motifs, small circuits of regulatory proteins and genes that serve as building blocks of complex regulatory circuits. Morning session covers numerical modeling experiments. Afternoon session explores theory underpinning that day's modeling session. Modeling done using Mathematica, Standard Edition provided to enrolled students.

**BIOS 205. Introductory data analysis in R for biomedical students. 1 Unitss.**

Topics include: basics of R (widely used, open-source programming and data analysis environment) programming language and data structures, reading/writing files, graphics tools for figure generation, basic statistical and regression operations, survey of relevant R library packages. Interactive format combining lectures and computer lab. Open to graduate students in biomedical sciences with permission of instructor.

**BIOS 206. In the Trenches with Regenerative Medicine: Stem Cells to Understand Development and Cure Disease. 1-3 Units.**

Week 1 encompasses "Human Pluripotent Stem Cell Laboratory Course." Hands-on teaching of culture of human embryonic stem cells and generation of induced pluripotent stem cells (iPSC), supporting lecture material, lecture and lab daily. Weeks 2 and 3 comprise lectures presented by scientists leading these projects, including at least one biotechnology company. Associated lab sessions focus on muscular dystrophy project, illustrating genetic engineering, differentiation, engraftment, and imaging of stem cells. Several speaker dinners with student participation. Week 1 only, 1 unit; weeks 2 and 3 lecture only, 1 unit; weeks 2 and 3 lecture and lab, 2 units; whole course, 3 units.

**BIOS 207. Interdisciplinary Approaches to Biochemistry: Single Molecule Biophysics to Clinical Outcomes. 1 Unitss.**

Interdisciplinary analysis from basic biochemistry and biophysics to clinical outcomes of disease states and potential therapeutic interventions. Focus on cardiac system. Single molecule biophysics and classical enzyme kinetics and use of induced pluripotent stem (iPS) cells and single cell studies lay foundation for discussions of effects of cardiomyopathy mutations on heart function. Analytical approaches discussed include genetic analysis, reconstitution of functional assemblies, x-ray diffraction, 3D reconstruction of electron microscope images, spectroscopic methods, computational approaches, single molecule biophysics, use of induced pluripotent stem cells in research.

**BIOS 208. Computational Macromolecule Structure Modeling. 2 Units.**

Concepts, workflow, and methodology of macromolecular structure modeling presented through introductory lectures followed by hands-on computer exercises with Rosetta software package. Array of problem types demonstrate how to formulate well-defined hypotheses and interpret variety of experimental data in addition to designing and engineering structure, function, and interactions. Students present independent investigations on appropriate systems selected from current literature or own research. Familiarity with command-line interface scripting recommended; contact instructors if unsure about computational skills level. Prerequisite: introductory courses in biochemistry, biophysics, structural biology, and/or bioengineering.

**BIOS 209. Practical Protein NMR Structure Determination. 2 Units.**

Work toward solving a high-resolution 3D structure from unprocessed NMR data acquired on a small well-characterized protein. Short lectures followed by hands-on computer exercises demonstrate best practices for data processing, spectra interpretation, and structure calculation with attention to troubleshooting and validation methods. Students should be familiar with fundamental concepts of protein structure and NMR spectroscopy and comfortable with the command-line environment. Prerequisite: SBIO242/BIOPHYS 242 strongly recommended, but not required.

**BIOS 210. Axonal Transport and Neurodegenerative Diseases. 2 Units.**

Introduction to mechanisms underlying axonal transport, significance of proper regulation in maintaining neuronal activities, and its implication in disease pathology. Lab section: visualize axonal transport of various axonal organelles such as mitochondria, synaptic vesicles and dense core vesicles in live cells and tissues.

**BIOS 211. Histology for Biosciences. 1 Unitss.**

Fundamentals of tissue organization as seen by light microscopy. Includes: epithelium, connective tissue, muscle, bone, cartilage, blood cells, nerve, and quick overview of several major organs. Each session has interactive 30 minute presentation followed by 1.5 hours viewing glass histology slides using individual microscopes and a multi-headed microscope. Slide sessions interspersed with interactive exercises to stimulate discussions. Supporting materials include select readings from histology atlas, electron micrographs, and virtual (whole-slide) images provided online.

**BIOS 212. Plant Genetics: Large Scale Experiments and Clonal Analysis. 2 Units.**

Using sectored dahlia flowers student teams perform clonal analysis of petals. Brief lectures introduce key topics and dahlia biology ([http://www.stanford.edu/group/dahlia\\_genetics/](http://www.stanford.edu/group/dahlia_genetics/)). Discussion topics: papers on clonal analysis and specification of floral parts in advanced and primitive Angiosperms, theory and best practices for structuring maize crosses in transposon tagging, allelism with 20 loci, and bulk segregant and fine mapping. Genes likely contributing to petal form and pigmentation nominated from RNA-Seq data and qRT-PCR validated. Genetic screen of ~105 plants to find tagged male-sterile alleles and puton validation performed. Prerequisite: graduate Genetics course.

**BIOS 213. Scientific Illustration and Animation. 1 Unitss.**

Techniques of presenting big picture ideas and detailed experiments as simple cartoons. Mixed lecture/lab course culminates with students producing figures and animations for an introduction/conclusion of a research presentation. Covers basic design principles to help produce figures useful for broad and focused audiences. Includes static illustrations, Flash style, and stop motion animation.

**BIOS 214. Molecules & Math. 1 Unitss.**

Introduction to molecular systems and their behavior as well as fundamental mathematical and computational tools for modeling molecular systems. Application of tools to critical medical areas: modeling of cardiovascular physiology; simulation of protein interactions; modeling of cellular differentiation; extraction of useful information from anatomic, functional and molecular images. Weekly lectures, group discussions, and individual project work.

**BIOS 215. Transplantation Immunology and Tolerance. 2 Units.**

Extensive literature review of experimental strategies to promote tolerance, including limitations involved in translating tolerance-promoting strategies to the clinic and targets of Immunosuppression. State of art approaches and limitations of current approaches. Discussions with prominent scientists and clinicians in field of transplantation. Student presentations on novel concepts and approaches in basic science, translational and clinical transplant.

**BIOS 216. Structural Biology and Vaccine Design. 1 Unitss.**

Structural biology is playing an increasing role in the development and analysis of vaccines and deepening understanding of challenging vaccine targets. Structural studies of target antigens have allowed mapping of neutralizing antibody epitopes and antigenic variation. Studies of antibody:antigen complexes have clarified how rare antibodies can confer broad neutralization to highly variant viruses, such as influenza virus and HIV. Course explores current structure-based efforts to improve vaccines to highly potent neutralizing epitopes, utilizing protein fragments, carbohydrate engineering and epitope scaffolding. Research from current literature on viruses including HIV, influenza virus, RSV and others examined.

**BIOS 217. The Ultimate Face Book: Understanding Normal and Abnormal Craniofacial Development. 1 Unitss.**

How the face is assembled during embryonic development to gain insights into facial birth defects and new "regenerative medicine" approaches to reconstruct the face following disease or injury. Learn how "a man finds room in the few square inches of the face for the traits of all his ancestors; for the expression of all his history, and his wants."

**BIOS 218. Molecular basis of membrane traffic. 2 Units.**

Transport of proteins through the secretory and endocytic pathways is essential for life; dysregulation causes disease and pathogens hijack these pathways to their best advantage. 5 international experts present didactic lectures and engage with students. Topics include: history of genetic and biochemical experiments to identify key components; reconstitution approaches; coated vesicle formation and cargo selection; control of membrane traffic by Rab GTPases; siRNA screens; high throughput microscopy analysis and systems biology approaches. Students devise and present research proposals based on the research of the guest speakers.

**BIOS 219. Human Gene Regulation: Genomic Thinking and Genomic Tools for Experimentalists. 1 Unitss.**

Focused look at the promoter/enhancer and related landscape of the human genome. Genomics and epigenomics of human gene regulation - truth, myths and mysteries. Genomic tools for the interpretation of vertebrate gene regulation experiments and predictions, and the insights behind them. Genomic thinking: purity vs. comprehensiveness, genome-wide vs. single locus. Prerequisites: undergraduate Biology or equivalent. Programming skills not required or taught.

**BIOS 220. Adventures in the Human Virosphere. 3 Units.**

Structure and function of viruses focusing on viruses that infect humans. Explore the interaction of humans and viruses from diverse perspectives: historical, cultural, political, demographic, organismal, molecular biological, biochemical, immunological, taxonomic. Emphasis on general principles of biology and matters of decision-making and policy. Selected case studies illustrate course material. Full-time immersive format of lectures, discussions, videos and model building. Recommended for non-virology students.

**BIOS 221. Modern Statistics for Modern Biology. 3 Units.**

Application based course in nonparametric statistics. Modern toolbox of visualization and statistical methods for the analysis of data, examples drawn from immunology, microbiology, cancer research and ecology. Methods covered include multivariate methods (PCA and extensions), sparse representations (trees, networks, contingency tables) as well as nonparametric testing (Bootstrap, permutation and Monte Carlo methods). Hands on, use R and cover many Bioconductor packages. Prerequisite: Minimal familiarity with computers. Instructor consent. Same as: STATS 366.

## Cancer Biology Courses

**CBIO 101. Cancer Biology. 4 Units.**

Experimental approaches to understanding the origins, diagnosis, and treatment of cancer. Focus on key experiments and discoveries with emphasis on genetics, molecular biology, and cell biology. Topics include carcinogens, tumor virology, oncogenes, tumor suppressor genes, cell cycle regulation, angiogenesis, invasion and metastasis, cancer genomics, cancer epidemiology, and cancer therapies. Discussion sections based on primary research articles that describe key experiments in the field. Satisfies Central Menu Areas 1 or 2 for Bio majors. Prerequisite: Biology or Human Biology core or equivalent, or consent of instructor. Same as: PATH 101.

**CBIO 241. Molecular, Cellular, and Genetic Basis of Cancer. 5 Units.**

Core course required for first-year Cancer Biology graduate students. Focus is on key experiments and classic primary research papers in cancer biology. Letter grade required. Undergraduates require consent of course director.

**CBIO 242. Scientific Basis of Clinical Cancer Therapy. 3 Units.**

Required for first- and second-year medical students who wish to join the Cancer Biology Scholarly Concentration Program. Also open to advanced undergraduates; limited enrollment. The curriculum includes a sampling of recent biomedical research discoveries that led to the current cancer diagnosis and therapeutic treatments.

**CBIO 243. Principles of Cancer Systems Biology. 3 Units.**

Focus is on the study of cancer that integrates experimental and computational methods when synthesizing and testing biological hypothesis. Covers basic principles of cancer systems biology research with an emphasis on network biology and pathway analysis. Topics include reconstruction of regulatory networks from multi-omic data (gene expression, methylation, miRNA, CNV) from the Cancer Genome Atlas (TCGA), functional approaches to large scale sequencing, single cell systems analysis of the tumor microenvironment, oncogene-specific synthetic lethal interactions, signaling analysis of targeted drugs and cancer proteomics.

**CBIO 260. Teaching in Cancer Biology. 1-10 Units.**

Practical experience in teaching by serving as a teaching assistant in a cancer biology course. Unit values are allotted individually to reflect the level of teaching responsibility assigned to the student.

**CBIO 275. Tumor Immunology. 3 Units.**

Focuses on the ability of innate and adaptive immune responses to recognize and control tumor growth. Topics include: tumor antigens, tumor immunosurveillance and immunoeediting, tumor immunotherapy, cancer vaccines and dendritic cell therapy. Tracks the historical developments of our understanding of modulating tumor immune response and discusses their relative significance in the light of current research findings. Prerequisite: for undergraduates, human biology or biology core. Same as: IMMUNOL 275.

**CBIO 280. Cancer Biology Journal Club. 1 Unitss.**

Required of and limited to first- and second-year graduate students in Cancer Biology. Recent papers in the literature presented by graduate students. When possible, discussion relates to and precedes cancer-related seminars at Stanford. Attendance at the relevant seminar required.

**CBIO 299. Directed Reading in Cancer Biology. 1-18 Units.**

Prerequisite: consent of instructor.

**CBIO 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Cancer Biology Ph.D. students must register as soon as they begin dissertation-related research work.

**CBIO 801. TGR Project. 0 Unit.****CBIO 802. TGR Dissertation. 0 Unit.**

## Cardiothoracic Surgery Courses

**CTS 199. Undergraduate Research. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**CTS 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**CTS 399. Graduate Research. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Catalan Language Courses

**CATLANG 1A. Accelerated First-Year Catalan, Part 1. 5 Units.**

First quarter of the two-quarter sequence. For students with knowledge of another Romance language, preferably Spanish. Emphasis is on developing beginning proficiency in interpersonal, interpretive, and presentational spheres. Prerequisite: consent of instructor.

**CATLANG 2A. Accelerated First-Year Catalan, Part 2. 5 Units.**

Continuation of CATLANG 1A. For students with knowledge of another Romance language, preferably Spanish. Further development of socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Completion of CATLANG 2A fulfills the University language requirement. Prerequisite: CATLANG 1A or consent of instructor.

**CATLANG 199. Individual Work. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**CATLANG 395. Graduate Studies in Catalan. 2-5 Units.**

May be repeated for credit. Prerequisite consent of instructor.

## Center for Teaching Learning Courses

**CTL 53. Working Smarter. 2 Units.**

College-level strategies and skills in time management, reading, speaking, writing, and test preparation. Students explore learning preferences to develop strategies in different academic settings.

**CTL 100. The Next Three Years: Making the Most of Stanford. 1 Unitss.**

This course is designed for frosh approaching the end of year one at Stanford. The goal is to help you think more broadly and more deeply about the remainder of your Stanford undergraduate education, reflecting on what you have learned so far. Weekly meetings will consist of presentations and discussions, emphasizing an integrated approach to making the most of Stanford. The course will include guest lecturers and background readings. Aspects of a student's life that will be discussed include coursework, residential life, personal health and development, extracurricular groups, different types of relationships (friends and close others, teacher-student, advisor-advisee, peer mentoring), community and public service, and career development. The course should build your knowledge of and ability to use the many resources at Stanford designed to assist you in all these areas, as well as connecting you with the experiences of other students, helping you to peer into your own future.

**CTL 105. Voice and Articulation Intensive for Non-Native English Speakers. 1-2 Units.**

Workshop focusing on exercises designed to help foreign students improve their articulation and delivery in English. Work includes breath, sound, enunciation, melody, and colloquialism.

**CTL 115. Voice Workshop. 1-2 Units.**

Focus is on breath, voice production, expansion of vocal range and stamina, and clarity of articulation. Geared toward public speaking including presentations, lectures, and job talks. May be taken in conjunction with CTL 117.

Same as: CTL 215.

**CTL 117. The Art of Effective Speaking. 3 Units.**

The principles and practice of effective oral communication. Through formal and informal speaking activities, students develop skills framing and articulating ideas through speech. Strategies for speaking extemporaneously, preparing and delivering multimedia presentations, formulating persuasive arguments, refining critical clarity of thought, and enhancing general facility and confidence in oral self-expression.

Same as: CTL 217.

**CTL 118. Public Speaking: Romancing the Room. 3 Units.**

A practical approach to the art of public speaking. Emphasis is on developing skills in speech types including impromptu, personal experience, interviewing, demonstration, persuasive, and special occasion. Materials include videotape, texts of famous speeches, and a final dinner program of speeches. Students evaluate presentations by others. \$55 materials fee.

**CTL 119. Oral Communication Tutor Teaching Practicum. 1-3 Units.**

Seminar. For students with a strong background in public speaking who wish to train as public speaking tutors for CTL's Oral Communication Program. Readings, exercises, and supervised teaching refine speaking skills. Preparation to serve as a peer tutor in a variety of academic disciplines. Prerequisite: application and consent of instructor.

**CTL 120. Peer Tutor Training. 1 Unitss.**

Goal is to help students become effective peer tutors for course material already mastered by articulating aims; developing practical tutoring skills including strategies for drop-in sessions; observing experienced tutors; discussing reading assignments; role playing; and reflecting on experiences as a peer tutor intern. Prerequisite: consent of instructor.

**CTL 122. "The TED Commandments": The Art and Heart of Effective Public Speaking. 3 Units.**

Designed around the presentation principles of TED talks, this course approaches public speaking as an art of engagement and possibility. Students will learn a range of strategies -- both traditional and innovative -- for crafting a compelling message and delivering it with clarity, authenticity, and power. Limited enrollment.  
Same as: CTL 222.

**CTL 125. From the Page to the Stage: The Performance of Literature. 3 Units.**

The oral interpretation of literature as performance art and mode of literary analysis. Focus is on contemporary and local expression including topics such as the Spoken Word Collective at Stanford, the ensemble performance of short works of fiction by San Francisco's Word for Word Performing Arts Company, and the storytelling art of Awele Makeba which combines theater, oral history, and music. No performance experience necessary.

**CTL 130. Beyond Stereotype Threat: Claiming a Rightful Place in an Academic Community. 3 Units.**

Stereotype threat as mitigating the quality of a student's test performance; its impact on academic success at Stanford. How to reduce the impact of stereotype threat on Stanford students.  
Same as: PSYCH 125.

**CTL 175. Intertextuality, Interpretation, and Performance. 4 Units.**

Literary and performance theories from the late 20th century to the present. The performative link between writing and speech. Students apply theories in critical writings, performances, and intertextual assemblages. How to find and refine one's own voices in writing and vocality.

**CTL 177. Performance of Power: Oratory and Authority from the Ancient World to the Postmodern. 4 Units.**

Speech as action has long been seen as essential to leadership. Theories and examples of oratory, from Aristotle to Barack Obama, assessing each as model of voice-activated authority. The impact of mass media technologies as they transform the public space of oratory.

**CTL 180. Interpersonal and Small Group Communication. 3 Units.**

Communication effectiveness in the contexts of dyads, the workplace, family, and society. Listening, conflict resolution, leadership, power and its implementation, group dynamics, emotions, and cultural influences on interactions. Sources include readings videos/DVDs, role playing, interviews, individual and group presentations, and group exercises.  
Same as: CTL 280.

**CTL 190. Persuasive Speaking. 3 Units.**

Persuasion is the act of influencing others to see, feel, think, believe, and/or act in a way that is consistent with what the speaker or sender advocates. Persuasion seeks to engender power, and how that power is used can vary widely. How to effectively persuade others in interpersonal, family, workplace, and public spheres. How to be astute consumers of persuasive messages, including those from other individuals and from public sources such as media, advertising, and politics. In-class exercises and speeches to assist participants in developing and executing persuasive skills.  
Same as: CTL 290.

**CTL 199. Independent Study. 1-3 Units.**

Special study under lecturer direction, usually leading to a written report or an oral presentation. Prerequisite: consent of instructor.

**CTL 212. Conquering Speech Fright. 2 Units.**

Techniques of effective oral presentation and strategies for reducing speech anxiety and enhancing self-confidence and enjoyment.  
Same as: CTL 112.

**CTL 215. Voice Workshop. 1-2 Units.**

Focus is on breath, voice production, expansion of vocal range and stamina, and clarity of articulation. Geared toward public speaking including presentations, lectures, and job talks. May be taken in conjunction with CTL 117.  
Same as: CTL 115.

**CTL 217. The Art of Effective Speaking. 3 Units.**

The principles and practice of effective oral communication. Through formal and informal speaking activities, students develop skills framing and articulating ideas through speech. Strategies for speaking extemporaneously, preparing and delivering multimedia presentations, formulating persuasive arguments, refining critical clarity of thought, and enhancing general facility and confidence in oral self-expression.  
Same as: CTL 117.

**CTL 219. Oral Communication for Graduate Students. 1-3 Units.**

Graduate student speaking activities such as teaching (delivering lectures, guiding discussion, and facilitating small groups), professional presentations and conference papers, and preparing for oral exams and defenses. In-class projects, discussion, and individual evaluation assist students in developing effective techniques for improving oral communication skills.

**CTL 221. Practicum for fellows in the Stanford-SJSU Preparing Future Professors Program. 1 Unitss.**

Nine weekly one-hour sessions consisting of discussions of: (1) the previous week's SJSU shadowing experiences and (2) readings related to session themes.

**CTL 222. "The TED Commandments": The Art and Heart of Effective Public Speaking. 3 Units.**

Designed around the presentation principles of TED talks, this course approaches public speaking as an art of engagement and possibility. Students will learn a range of strategies -- both traditional and innovative -- for crafting a compelling message and delivering it with clarity, authenticity, and power. Limited enrollment.  
Same as: CTL 122.

**CTL 224. Fundamentals of College Teaching in the Humanities and Humanistic Social Sciences. 1-3 Units.**

For teaching assistants in the humanities and humanistic social sciences. Topics include current research on learning and teaching, practice teaching sessions, leading discussions, designing assignments and group activities, grading and feedback practices, and teaching with technology.

**CTL 225. Teaching Development Series. 1 Unitss.**

Teaching and academic career topics from CTL's workshops series. Documented participation in a minimum of 10 hours required for credit. Offerings vary quarterly. See <http://ctl.stanford.edu> for current information. May be repeated for credit. Prerequisite: consent of instructor.

**CTL 230. Mentoring in Research. 1 Unitss.**

Knowledge, skills, and hands-on training to mentor undergraduate research assistants and to impact relationships with your own mentors and advisers. Topics include communication and project management skills, different learning styles, and cultural, ethnic and socioeconomic diversity. Case studies, scenarios, and small group activities. Five weeks.

**CTL 231. Future Faculty Seminar. 1 Unitss.**

For graduate students from all disciplines who are considering faculty careers. Postdoctoral fellows, TGR students, and research/clinical trainees may audit by consent of instructor. Explores the broad spectrum of duties and opportunities presented through faculty positions beyond the research-related aspects. Develops awareness of resources and skills that lead to faculty success; answers field-specific and related faculty job questions through discussions with representatives of a variety of academic institutions and fellow course participants. Topics include: finding and obtaining faculty positions, negotiating and navigating the first year, and working toward tenure. May be repeated for credit. Same as: INDE 231.

**CTL 280. Interpersonal and Small Group Communication. 3 Units.**

Communication effectiveness in the contexts of dyads, the workplace, family, and society. Listening, conflict resolution, leadership, power and its implementation, group dynamics, emotions, and cultural influences on interactions. Sources include readings videos/DVDs, role playing, interviews, individual and group presentations, and group exercises. Same as: CTL 180.

**CTL 290. Persuasive Speaking. 3 Units.**

Persuasion is the act of influencing others to see, feel, think, believe, and/or act in a way that is consistent with what the speaker or sender advocates. Persuasion seeks to engender power, and how that power is used can vary widely. How to effectively persuade others in interpersonal, family, workplace, and public spheres. How to be astute consumers of persuasive messages, including those from other individuals and from public sources such as media, advertising, and politics. In-class exercises and speeches to assist participants in developing and executing persuasive skills. Same as: CTL 190.

**CTL 297X. Teaching and Learning in Higher Education. 3-4 Units.**

Open to master's and doctoral students in all disciplines. How teachers can promote lasting learning and ask which pedagogies are most effective in today's college classrooms. Readings analyze teaching and learning in diverse disciplines and institutional types. Students observe the instruction of a Stanford master teacher. Students write a paper about the instruction of the teacher they observe or prepare a syllabus and commentary for a course of their design. Same as: EDUC 297X.

**CTL 299. Independent Study. 1-3 Units.**

Special study under lecturer direction, usually leading to a written report or an oral presentation. Prerequisite: consent of instructor.

**CTL 312. Science and Engineering Course Design. 2-3 Units.**

For students interested in an academic career and who anticipate designing science courses at the undergraduate or graduate level. Goal is to apply research on science learning to the design of effective course materials. Topics include syllabus design, course content and format decisions, assessment planning and grading, and strategies for teaching improvement. Same as: ENGR 312.

## Chemical Systems Biology Courses

**CSB 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**CSB 210. Cell Signalling. 4 Units.**

The molecular mechanisms through which cells receive and respond to external signals. Emphasis is on principles of cell signaling, the systems-level properties of signal transduction modules, and experimental strategies through which cell signaling pathways are being studied. Prerequisite: working knowledge of biochemistry and genetics.

**CSB 220. Chemistry of Biological Processes. 4 Units.**

The principles of organic and physical chemistry as applied to biomolecules. Goal is a working knowledge of chemical principles that underlie biological processes, and chemical tools used to study and manipulate biological systems. Prerequisites: organic chemistry and biochemistry, or consent of instructor. Same as: BIOC 220.

**CSB 230. Current Methods in Proteomics. 3 Units.**

Introduces students to the instrumentation, experimental strategies, and computational methods used for identification and quantification of protein concentrations and posttranslational modifications on a systems-wide level. Topics include mass spectrometry (instrumentation configurations; polypeptide ionization; sample preparation and fractionation techniques; mass spectra interpretation; relative and absolute protein quantitation; and proteome-scale dataset analysis), protein and antibody arrays, multiparameter flow cytometry with Bayesian analysis, ribosomal protein translation profiling, and GFP and fluorescence imaging based quantification of protein abundance and post-translational modifications.

**CSB 240A. A Practical Approach to Drug Discovery and Development. 3-4 Units.**

Advancing a drug from discovery of a therapeutic target to human trials and commercialization. Topics include: high throughput assay development, compound screening, lead optimization, protecting intellectual property, toxicology testing, regulatory issues, assessment of clinical need, defining the market, conducting clinical trials, project management, and commercialization issues, including approach to licensing and raising capital. Maximum units are available by taking an additional contact hour.

**CSB 240B. A Practical Approach to Drug Discover and Development. 3-4 Units.**

(Continuation of 240A) Advancing a drug from discovery of a therapeutic target to human trials and commercialization. Topics include: high throughput assay development, compound screening, lead optimization, protecting intellectual property, toxicology testing, regulatory issues, assessment of clinical need, defining the market, conducting clinical trials, project management, and commercialization issues, including approach to licensing and raising capital. Maximum units are available by taking an additional contact hour. Prerequisite: 240A.

**CSB 242. Drug Discovery and Development Seminar Series. 1 Unitss.**

The scientific principles and technologies involved in making the transition from a basic biological observation to the creation of a new drug emphasizing molecular and genetic issues. Prerequisite: biochemistry, chemistry, or bioengineering.

**CSB 244. Drug Discovery and Development: A Case-based Approach. 3 Units.**

Introductory course covering the basics of drug discovery and development. Topics include target identification and validation; identification of small molecule compounds that modulate the target of interest; properties of a drug development candidate; drug formulation, absorption, and pharmacokinetics; preclinical safety studies; drug manufacturing and quality assurance; human testing for safety and efficacy; and regulatory issues. Chemical and Systems Biology students may not take this class for credit in addition to CSB 240A.

**CSB 250. The Biology of Chromatin Templated Processes. 3 Units.**

Topics include mechanisms of DNA replication; gene expressions regulation; DNA damage sensing and DNA repair; chromatin structure and function; and epigenetics and nuclear reprogramming. Prerequisite: working knowledge of molecular biology, biochemistry and genetics, or instructor consent.

**CSB 260. Concepts and Applications in Chemical Biology. 4 Units.**

Current topics include chemical genetics, activity-based probes, inducible protein degradation, DNA/RNA chemistry and molecular evolution, protein labeling, carbohydrate engineering, fluorescent proteins and sensors, optochemical/optogenetic methods, mass spectrometry, and genome-editing technologies.

**CSB 270. Research Seminar. 1 Unitss.**

Guest speakers and discussion on current research in pharmacology.

**CSB 299. Directed Reading in Chemical and Systems Biology. 1-18 Units.**

Prerequisite: consent of instructor.

**CSB 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**CSB 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**CSB 801. TGR Project. 0 Unit.****CSB 802. TGR Dissertation. 0 Unit.**

## Chemical Engineering Courses

**CHEMENG 10. The Chemical Engineering Profession. 1 Unitss.**

Open to all undergraduates. Overview of and careers in chemical engineering; opportunities to develop networks with working professionals. Panel discussions on career paths and post-graduation opportunities available. Areas include biotechnology, electronics, energy, environment, management consulting, nanotechnology, and graduate school in business, law, medicine, and engineering.

**CHEMENG 20. Introduction to Chemical Engineering. 3 Units.**

Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, material and energy balances, concepts of rate processes, energy and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: biotechnology, energy, production of chemicals, materials processing, and purification. Prerequisite: CHEM 31. Same as: ENGR 20.

**CHEMENG 25B. Biotechnology. 3 Units.**

Biology and chemistry fundamentals, genetic engineering, cell culture, protein production, pharmaceuticals, genomics, viruses, gene therapy, evolution, immunology, antibodies, vaccines, transgenic animals, cloning, stem cells, intellectual property, governmental regulations, and ethics. Prerequisites: CHEM 31 and MATH 41 or equivalent courage. Same as: ENGR 25B.

**CHEMENG 25E. Energy: Chemical Transformations for Production, Storage, and Use. 3 Units.**

An introduction and overview to the challenges and opportunities of energy supply and consumption. Emphasis on energy technologies where chemistry and engineering play key roles. Review of energy fundamentals along with historical energy perspectives and current energy production technologies. In depth analyses of solar thermal systems, biofuels, photovoltaics and electrochemical devices (batteries and fuel cells). Prerequisites: high school chemistry or equivalent. Same as: ENGR 25E.

**CHEMENG 35N. Renewable Energy for a Sustainable World. 3 Units.**

Preference to freshmen. Organized to prepare a renewable energy plan for California. Energy concepts and quantitation approaches are learned, energy needs and natural resources are assessed, and renewable energy technologies are evaluated for economic performance and environmental impact. An investment plan is developed along with implementation and research recommendations. The same concepts are then applied to Mexico as a second model system.

**CHEMENG 60Q. Environmental Regulation and Policy. 3 Units.**

Preference to sophomores. How environmental policy is formulated in the U.S. How and what type of scientific research is incorporated into decisions. How to determine acceptable risk, the public's right to know of chemical hazards, waste disposal and clean manufacturing, brownfield redevelopment, and new source review regulations. The proper use of science and engineering including media presentation and misrepresentation, public scientific and technical literacy, and emotional reactions. Alternative models to formulation of environmental policy. Political and economic forces, and stakeholder discussions.

**CHEMENG 70Q. Masters of Disaster. 3 Units.**

Preference to sophomores. For students interested in science, engineering, politics, and the law. Learn from past disasters to avoid future ones. How disasters can be tracked to failures in the design process. The roles of engineers, artisans, politicians, lawyers, and scientists in the design of products. Failure as rooted in oversight in adhering to the design process. Student teams analyze real disasters and design new products presumably free from the potential for disastrous outcomes.

**CHEMENG 80Q. Art, Chemistry, and Madness: The Science of Art Materials. 3 Units.**

Preference to sophomores. Chemistry of natural and synthetic pigments in five historical palettes: earth (paleolithic), classical (Egyptian, Greco-Roman), medieval European (Middle Ages), Renaissance (old masters), and synthetic (contemporary). Composite nature of paints using scanning electron microscopy images; analytical techniques used in art conservation, restoration, and determination of provenance; and inherent health hazards. Paintings as mechanical structures. Hands-on laboratory includes stretching canvas, applying gesso grounds, grinding pigments, preparing egg tempera paint, bamboo and quill pens, gilding and illumination, and papermaking.

**CHEMENG 100. Chemical Process Modeling, Dynamics, and Control. 3 Units.**

Mathematical methods applied to engineering problems using chemical engineering examples. The development of mathematical models to describe chemical process dynamic behavior. Analytical and computer simulation techniques for the solution of ordinary differential equations. Dynamic behavior of linear first- and second-order systems. Introduction to process control. Dynamics and stability of controlled systems. Prerequisites: CHEMENG 20 or ENGR 20; CME 102 or MATH 53.

**CHEMENG 110. Equilibrium Thermodynamics. 3 Units.**

Thermodynamic properties, equations of state, properties of non-ideal systems including mixtures, and phase and chemical equilibria. Prerequisite: CHEM 171 or equivalent.



**CHEMENG 120A. Fluid Mechanics. 4 Units.**

The flow of isothermal fluids from a momentum transport viewpoint. Continuum hypothesis, scalar and vector fields, fluid statics, non-Newtonian fluids, shell momentum balances, equations of motion and the Navier-Stokes equations, creeping and potential flow, parallel and nearly parallel flows, time-dependent parallel flows, boundary layer theory and separation, introduction to drag correlations. Prerequisites: junior in Chemical Engineering or consent of instructor; 100 and CME 102 or equivalent.

**CHEMENG 120B. Energy and Mass Transport. 4 Units.**

General diffusive transport, heat transport by conduction, Fourier's law, conduction in composites with analogies to electrical circuits, advection-diffusion equations, forced convection, boundary layer heat transport via forced convection in laminar flow, forced convection correlations, free convection, free convection boundary layers, free convection correlations and application to geophysical flows, melting and heat transfer at interfaces, radiation, diffusive transport of mass for dilute and non-dilute transfer, mass and heat transport analogies, mass transport with bulk chemical reaction, mass transport with interfacial chemical reaction, evaporation. Prerequisite 120A or consent of instructor.

**CHEMENG 130. Separation Processes. 3 Units.**

Analysis and design of equilibrium and non-equilibrium separation processes. Possible examples: distillation, liquid-liquid extraction, flash distillation, electrophoresis, centrifugation, membrane separations, chromatography, and reaction-assisted separation processes.

**CHEMENG 140. Micro and Nanoscale Fabrication Engineering. 3 Units.**

(Same as CHEMENG 140) Survey of fabrication and processing technologies in industrial sectors, such as semiconductor, biotechnology, and energy. Chemistry and transport of electronic and energy device fabrication. Solid state materials, electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, thin film deposition, plasma processing. Micro and nanopatterning involving photolithography, unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55 Same as: CHEMENG 240.

**CHEMENG 142. Basic Principles of Heterogeneous Catalysis with Applications in Energy Transformations. 3 Units.**

(Formerly 124/224) Introduction to heterogeneous catalysis, including models of surface reactivity, surface equilibria, kinetics of surface reactions, electronic and geometrical effects in heterogeneous catalysis, trends in reactivity, catalyst structure and composition, electro-catalysis and photo-catalysis. Selected applications and challenges in energy transformations will be discussed. Prerequisites: CHEM 31AB or 31X, CHEM 171, CHEM 175 or CHEMENG 170 or equivalents. Recommended: CHEM 173. Same as: CHEMENG 242.

**CHEMENG 150. Biochemical Engineering. 3 Units.**

Systems-level combination of chemical engineering concepts with biological principles. The production of protein pharmaceuticals as a paradigm to explore quantitative biochemistry and cellular physiology, the elemental stoichiometry of metabolism, recombinant DNA technology, synthetic biology and metabolic engineering, fermentation development and control, product isolation and purification, protein folding and formulation, and biobusiness and regulatory issues. Prerequisite: CHEMENG 181 (formerly 188) or BIOSCI 41 or equivalent.

**CHEMENG 160. Polymer Science and Engineering. 3 Units.**

Interrelationships among molecular structure, morphology, and mechanical behavior of polymers. Topics include amorphous and semicrystalline polymers, glass transitions, rubber elasticity, linear viscoelasticity, and rheology. Applications of polymers in biomedical devices and microelectronics. Prerequisites: CHEM 31 A,B or CHEM 31X, CHEM 33 and 171, or equivalent. Same as: CHEMENG 260.

**CHEMENG 162. Fundamentals of Polymers for Energy and Environmental Sustainability. 3 Units.**

The first five weeks of this course will be devoted to the fundamental aspects of polymers necessary to understand the applications in energy and the environment. These include: polymer chain configuration, morphology of semi-crystalline and amorphous solids, thermal transition behavior, thermodynamics of polymer blends and block copolymers, and the time/temperature dependence of linear viscoelasticity. The remaining five weeks of class will be devoted to applications, with special emphasis on membrane transport, including ion transport in fuel cell exchange membranes, gas transport in hydrogen enrichment membranes, and water transport in desalination membranes. In addition, completely degradable biocomposites will be discussed. Prerequisites: CHEM 31 A,B or CHEM 31X, CHEM 33, CHEM 171 Same as: CHEMENG 262.

**CHEMENG 170. Kinetics and Reactor Design. 3 Units.**

Chemical kinetics, elementary reactions, mechanisms, rate-limiting steps, and quasi-steady state approximations. Ideal isothermal and non-isothermal reactors; design principles. Steady state and unsteady state operation of reactors; conversion and limitations of thermodynamic equilibrium. Enzymes and heterogeneous catalysis and catalytic reaction mechanisms. Prerequisites: 110, 120A, 120B.

**CHEMENG 174. Environmental Microbiology I. 3 Units.**

Basics of microbiology and biochemistry. The biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents. Same as: CEE 274A, CHEMENG 274.

**CHEMENG 180. Chemical Engineering Plant Design. 3 Units.**

Open to seniors in chemical engineering or by consent of instructor. Application of chemical engineering principles to the design of practical plants for the manufacture of chemicals and related materials. Topics: flow-sheet development from a conceptual design, equipment design for distillation, chemical reactions, heat transfer, pumping, and compression; estimation of capital expenditures and production costs; plant construction.

**CHEMENG 181. Biochemistry I. 3 Units.**

(CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 33, 35, 131, and 135 or 171. Same as: BIO 188, BIO 288, CHEM 181, CHEMENG 281.

**CHEMENG 183. Biochemistry II. 3 Units.**

Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288). Same as: BIO 189, BIO 289, CHEM 183, CHEMENG 283.

**CHEMENG 185A. Chemical Engineering Laboratory A. 4 Units.**

Experimental aspects of chemical engineering science. Emphasizes laboratory work and development of communication skills. Lab work in student groups. Student presentations. Prerequisites: 120A,B. Corequisite: 170.

**CHEMENG 185B. Chemical Engineering Laboratory B. 4 Units.**

Methods and techniques in molecular biology and biochemical engineering. Emphasis is on team organization, communication skills, experimental design, and project execution. Creation of presentations, experiments, and demonstrations for high school students. Additional laboratory times to be arranged. Prerequisite: BIO 41, CHEMENG 181, or equivalent.

**CHEMENG 190. Undergraduate Research in Chemical Engineering. 1-6 Units.**

Laboratory or theoretical work for undergraduates under the supervision of a faculty member. Research in one of the graduate research groups or other special projects in the undergraduate chemical engineering lab. Students should consult advisers for information on available projects. Course may be repeated.

**CHEMENG 190H. Undergraduate Honors Research in Chemical Engineering. 1-5 Units.**

For Chemical Engineering majors pursuing a B.S. with Honors degree who have submitted an approved research proposal to the department. Unofficial transcript must document BSH status and at least 9 units of 190H research for a minimum of 3 quarters. May be repeated for credit.

**CHEMENG 191H. Undergraduate Honors Seminar. 1 Unit.**

For Chemical Engineering majors approved for B.S. with Honors research program. Honors research proposal must be submitted and unofficial transcript document BSH status prior to required concurrent registration in 190H and 191H. May be repeated for credit. Corequisite: 190H.

**CHEMENG 196. Entrepreneurship in Engineering and Science-based Industries. 3 Units.**

Open to seniors and graduate students interested in entrepreneurship in engineering and science intensive industries such as chemical, energy, materials, bioengineering, environmental, clean-tech, pharmaceuticals, medical, and biotechnology. Exploration of the dynamics, complexity, and challenges that define entrepreneurship, particularly for companies that require long development times, large investments, integration across a wide range of technical and non-technical disciplines, and the creation and protection of intellectual property. Covers business basics, opportunity viability, creating start-ups, entrepreneurial leadership, and entrepreneurship as a career. Teaching methods include lectures, case studies, guest speakers, and individual and team projects. Same as: CHEMENG 296.

**CHEMENG 240. Micro and Nanoscale Fabrication Engineering. 3 Units.**

(Same as CHEMENG 140) Survey of fabrication and processing technologies in industrial sectors, such as semiconductor, biotechnology, and energy. Chemistry and transport of electronic and energy device fabrication. Solid state materials, electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, thin film deposition, plasma processing. Micro and nanopatterning involving photolithography, unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55 Same as: CHEMENG 140.

**CHEMENG 242. Basic Principles of Heterogeneous Catalysis with Applications in Energy Transformations. 3 Units.**

(Formerly 124/224) Introduction to heterogeneous catalysis, including models of surface reactivity, surface equilibria, kinetics of surface reactions, electronic and geometrical effects in heterogeneous catalysis, trends in reactivity, catalyst structure and composition, electro-catalysis and photocatalysis. Selected applications and challenges in energy transformations will be discussed. Prerequisites: CHEM 31AB or 31X, CHEM 171, CHEM 175 or CHEMENG 170 or equivalents. Recommended: CHEM 173. Same as: CHEMENG 142.

**CHEMENG 260. Polymer Science and Engineering. 3 Units.**

Interrelationships among molecular structure, morphology, and mechanical behavior of polymers. Topics include amorphous and semicrystalline polymers, glass transitions, rubber elasticity, linear viscoelasticity, and rheology. Applications of polymers in biomedical devices and microelectronics. Prerequisites: CHEM 31 A,B or CHEM 31X, CHEM 33 and 171, or equivalent. Same as: CHEMENG 160.

**CHEMENG 262. Fundamentals of Polymers for Energy and Environmental Sustainability. 3 Units.**

The first five weeks of this course will be devoted to the fundamental aspects of polymers necessary to understand the applications in energy and the environment. These include: polymer chain configuration, morphology of semi-crystalline and amorphous solids, thermal transition behavior, thermodynamics of polymer blends and block copolymers, and the time/temperature dependence of linear viscoelasticity. The remaining five weeks of class will be devoted to applications, with special emphasis on membrane transport, including ion transport in fuel cell exchange membranes, gas transport in hydrogen enrichment membranes, and water transport in desalination membranes. In addition, completely degradable biocomposites will be discussed. Prerequisites: CHEM 31 A,B or CHEM 31X, CHEM 33, CHEM 171 Same as: CHEMENG 162.

**CHEMENG 274. Environmental Microbiology I. 3 Units.**

Basics of microbiology and biochemistry. The biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents. Same as: CEE 274A, CHEMENG 174.

**CHEMENG 281. Biochemistry I. 3 Units.**

(CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 33, 35, 131, and 135 or 171. Same as: BIO 188, BIO 288, CHEM 181, CHEMENG 181.

**CHEMENG 283. Biochemistry II. 3 Units.**

Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).  
Same as: BIO 189, BIO 289, CHEM 183, CHEMENG 183.

**CHEMENG 296. Entrepreneurship in Engineering and Science-based Industries. 3 Units.**

Open to seniors and graduate students interested in entrepreneurship in engineering and science intensive industries such as chemical, energy, materials, bioengineering, environmental, clean-tech, pharmaceuticals, medical, and biotechnology. Exploration of the dynamics, complexity, and challenges that define entrepreneurship, particularly for companies that require long development times, large investments, integration across a wide range of technical and non-technical disciplines, and the creation and protection of intellectual property. Covers business basics, opportunity viability, creating start-ups, entrepreneurial leadership, and entrepreneurship as a career. Teaching methods include lectures, case studies, guest speakers, and individual and team projects.  
Same as: CHEMENG 196.

**CHEMENG 300. Applied Mathematics in the Chemical and Biological Sciences. 3 Units.**

Mathematical solution methods via applied problems including chemical reaction sequences, mass and heat transfer in chemical reactors, quantum mechanics, fluid mechanics of reacting systems, and chromatography. Topics include generalized vector space theory, linear operator theory with eigenvalue methods, phase plane methods, perturbation theory (regular and singular), solution of parabolic and elliptic partial differential equations, and transform methods (Laplace and Fourier). Prerequisites: CME 102/ENGR 155A and CME 104/ENGR 155B, or equivalents.  
Same as: CME 330.

**CHEMENG 310. Microhydrodynamics. 3 Units.**

Transport phenomena on small-length scales appropriate to applications in microfluidics, complex fluids, and biology. The basic equations of mass, momentum, and energy, derived for incompressible fluids and simplified to the slow-flow limit. Topics: solution techniques utilizing expansions of harmonic and Green's functions; singularity solutions; flows involving rigid particles and fluid droplets; applications to suspensions; lubrication theory for flows in confined geometries; slender body theory; and capillarity and wetting. Prerequisites: 120A,B, 300, or equivalents.  
Same as: ME 451D.

**CHEMENG 320. Chemical Kinetics and Reaction Engineering. 3 Units.**

Theoretical and experimental tools useful in understanding and manipulating reactions mediated by small-molecules and biological catalysts. Theoretical: first classical chemical kinetics and transition state theory; then RRKM theory and Monte Carlo simulations. Experimental approaches include practical application of modern spectroscopic techniques, stopped-flow measurements, temperature-jump experiments, and single-molecule approaches to chemical and biological systems. Both theory and application are framed with regard to systems of particular interest, including industrially relevant enzymes, organometallic catalysts, heterogeneous catalysis, electron transfer reactions, and chemical kinetics within living cells.

**CHEMENG 340. Molecular Thermodynamics. 3 Units.**

Classical thermodynamics and quantum mechanics. Development of statistical thermodynamics to address the collective behavior of molecules. Establishment of theories for gas, liquid, and solid phases, including phase transitions and critical behavior. Applications include electrolytes, ion channels, surface adsorption, ligand binding to proteins, hydrogen bonding in water, hydrophobicity, polymers, and proteins.

**CHEMENG 345. Fundamentals and Applications of Spectroscopy. 3 Units.**

Development of theoretical approaches to spectroscopy, including spectroscopic transitions, transition probabilities, and selection rules. Application to photon and electron spectroscopies of the gas and solid phases. Topics: rotational spectroscopy; infrared and Raman vibrational spectroscopies; fluorescence spectroscopy; Auger, x-ray and ultraviolet photoelectron spectroscopies. Prerequisite: CHEM 271 or course in quantum mechanics.

**CHEMENG 355. Advanced Biochemical Engineering. 3 Units.**

Combines biological knowledge and methods with quantitative engineering principles. Quantitative review of biochemistry and metabolism; recombinant DNA technology and synthetic biology (metabolic engineering). The production of protein pharmaceuticals as a paradigm for the application of chemical engineering principles to advanced process development within the framework of current business and regulatory requirements. Prerequisite: CHEMENG 181 (formerly 188) or BIOSCI 41, or equivalent.  
Same as: BIOE 355.

**CHEMENG 420. Growth and Form. 3 Units.**

Advanced topics course examining the role of physical forces in shaping living cells, tissues, and organs, making use of D'Arcy Thompson's classic text *On Growth and Form*. The course begins with a review of relevant physical principles drawn from statistical physics, polymer theory, rheology and materials science. We then examine current knowledge of cellular mechanotransduction pathways, the roles of physical forces in guiding embryonic development, and the contribution of aberrant cellular response to mechanical cues in heart disease and cancer. The course concludes by examining current frontiers in stem cell biology and tissue engineering.

**CHEMENG 432. Electrochemical Energy Conversion. 3 Units.**

Electrochemistry is playing an increasingly important role in renewable energy. This course aims to cover the fundamentals of electrochemistry, and then build on that knowledge to cover applications of electrochemistry in energy conversion. Topics to be covered include fuel cells, solar water-splitting, CO<sub>2</sub> conversion to fuels and chemicals, batteries, redox flow cells, and supercapacitors. Prerequisites: CHEM 31AB or 31 X, CHEM 33, CHEM 171, CHEM 175 or CHEMENG 170, or equivalents. Recommended: CHEM 173.

**CHEMENG 442. Structure and Reactivity of Solid Surfaces. 3 Units.**

The structure of solid surfaces including experimental methods for determining the structure of single crystal surfaces. The adsorption of molecules on these surfaces including the thermodynamics of adsorption processes, surface diffusion, and surface reactions. Molecular structure of adsorbates. Current topics in surface structure and reactivity, including systems for heterogeneous catalysis and electronic materials.

**CHEMENG 444. Electronic Structure Theory and Applications to Chemical Kinetics. 3 Units.**

Fundamentals of electronic structure theory as it applies to chemical reaction kinetics in homogeneous and heterogeneous reaction systems. Development and application of the theory of chemical kinetics, including traditional and harmonic transition state theories. Relationships between thermodynamics and kinetics to overall mechanism predictions. Lab involves chemical modeling including *ab initio* electronic structure calculations (Hartree-Fock, configuration interaction, coupled cluster, and many-body perturbation theory) and thermodynamic predictions. DFT calculations for catalysis applications are also covered. Prerequisite: quantum mechanics.  
Same as: ENERGY 256.

**CHEMENG 450. Advances in Biotechnology. 3 Units.**

Guest academic and industrial speakers. Latest developments in fields such as bioenergy, green process technology, production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.  
Same as: BIOE 450.

**CHEMENG 454. Synthetic Biology and Metabolic Engineering. 3 Units.**

Principles for the design and optimization of new biological systems. Development of new enzymes, metabolic pathways, other metabolic systems, and communication systems among organisms. Example applications include the production of central metabolites, amino acids, pharmaceutical proteins, and isoprenoids. Economic challenges and quantitative assessment of metabolic performance. Pre- or corequisite: CHEMENG 355 or equivalent.  
Same as: BIOE 454.

**CHEMENG 456. Microbial Bioenergy Systems. 3 Units.**

Introduction to microbial metabolic pathways and to the pathway logic with a special focus on microbial bioenergy systems. The first part of the course emphasizes the metabolic and biochemical principles of pathways, whereas the second part is more specifically directed toward using this knowledge to understand existing systems and to design innovative microbial bioenergy systems for biofuel, biorefinery, and environmental applications. There also is an emphasis on the implications of rerouting of energy and reducing equivalents for the fitness and ecology of the organism. Prerequisites: CHEMENG 174 or 181 and organic chemistry, or equivalents.  
Same as: CEE 274B.

**CHEMENG 459. Frontiers in Interdisciplinary Biosciences. 1 Unitss.**

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See <http://biox.stanford.edu/courses/459.html>. Recommended: basic mathematics, biology, chemistry, and physics.  
Same as: BIO 459, BIOC 459, BIOE 459, CHEM 459, PSYCH 459.

**CHEMENG 462. Complex Fluids and Non-Newtonian Flows. 3 Units.**

Definition of a complex liquid and microrheology. Division of complex fluids into suspensions, solutions, and melts. Suspensions as colloidal and non-colloidal. Extra stress and relation to the stresslet. Suspension rheology including Brownian and non-Brownian fibers. Microhydrodynamics and the Fokker-Planck equation. Linear viscoelasticity and the weak flow limit. Polymer solutions including single mode (dumbbell) and multimode models. Nonlinear viscoelasticity. Intermolecular effects in nondilute solutions and melts and the concept of reptation. Prerequisites: low Reynolds number hydrodynamics or consent of instructor.  
Same as: ME 455.

**CHEMENG 464. Polymer Chemistry. 3 Units.**

Polymer material design, synthesis, characterization, and application. Topics include organic and kinetic aspects of polymerization, polymer characterization techniques, and structure and properties of bulk polymers for commercial applications and emerging technologies.

**CHEMENG 466. Polymer Physics. 3 Units.**

Concepts and applications in the equilibrium and dynamic behavior of complex fluids. Topics include solution thermodynamics, scaling concepts, semiflexibility, characterization of polymer size (light scattering, osmotic pressure, size-exclusion chromatography, intrinsic viscosity), viscoelasticity, rheological measurements, polyelectrolytes, liquid crystals, biopolymers, and gels.

**CHEMENG 470. Complex Fluid Interfaces: Capillarity and Interfacial Dynamics. 3 Units.**

Complex fluid interfaces arise whenever amphiphiles (surfactants, phospholipids, polymers, colloidal particles) collect at liquid-fluid surfaces, imbuing them with nonlinear mechanical responses. Examples in nature include the cell membrane, lung surfactants, and the tear film. Industrial applications include emulsions and foams that require stabilization. The course discusses concepts in capillarity and wetting, interfacial fluid dynamics, thin film stability, the microstructure of self-organized monolayers and bilayers. Experimental microstructural methods (Brewster angle microscopy, fluorescence microscopy, grazing incidence x-ray diffraction) will be described. Prerequisite: 310 or equivalent.

**CHEMENG 482. The Startup Garage: Design. 2 Units.**

(Same as STRAMGT 356) The Startup Garage is an experiential lab course that focuses on the design, testing and launch of a new venture. Multidisciplinary student teams work through an iterative process of understanding user needs, creating a point of view statement, ideating and prototyping new product and services and their business models, and communicating the user need, product, service and business models to end-users, partners, and investors. In the autumn quarter, teams will: identify and validate a compelling user need and develop very preliminary prototypes for a new product or service and business models. Students form teams, conduct field work and iterate on the combination of business model -- product -- market. Teams will present their first prototypes (business model - product - market) at the end of the quarter to a panel of entrepreneurs, venture capitalists, angel investors and faculty.  
Same as: SOMGEN 282.

**CHEMENG 484. The Startup Garage: Testing and Launch. 4 Units.**  
(Same as STRAMGT 366) This is the second quarter of the two-quarter series. In this quarter, student teams expand the field work they started in the fall quarter. They get out of the building to talk to potential customers, partners, distributors, and investors to test and refine their business model, product/service and market. This quarter the teams will be expected to develop and test a minimally viable product, iterate, and focus on validated lessons on: the market opportunity, user need and behavior, user interactions with the product or service, business unit economics, sale and distribution models, partnerships, value proposition, and funding strategies. Teams will interact with customers, partners, distributors, investors and mentors with the end goal of developing and delivering a funding pitch to a panel of entrepreneurs, venture capitalists, angel investors and faculty. Same as: SOMGEN 284.

**CHEMENG 500. Special Topics in Protein Biotechnology. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 501. Special Topics in Semiconductor Processing. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 503. Special Topics in Biocatalysis. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 505. Special Topics in Microrheology. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 507. Special Topics in Polymer Physics and Molecular Assemblies. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 510. Special Topics in Transport Mechanics. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 513. Special Topics in Functional Organic Materials for Electronic and Optical Devices. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 514. Special Topics in Biopolymer Physics. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 515. Special Topics in Molecular and Systems Biology. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 516. Special Topics in Energy and Catalysis. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 517. Special Topics in Microbial Physiology and Metabolism. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 518. Special Topics in Advanced Biophysics and Protein Design. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 519. Special Topics in Interface Science and Catalysis. 1 Unitss.**

Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 520. Special Topics in Biological Chemistry. 1 Unitss.**  
Recent developments and current research. May be repeated for credit.  
Prerequisite: graduate standing and consent of instructor.

**CHEMENG 600. Graduate Research in Chemical Engineering. 1-12 Units.**

Laboratory and theoretical work leading to partial fulfillment of requirements for an advanced degree. Course may be repeated for credit.

**CHEMENG 699. Colloquium. 1 Unitss.**  
Weekly lectures by experts from academia and industry in the field of chemical engineering. Course may be repeated for credit.

## Chemistry Courses

**CHEM 1. Structure and Reactivity. 4 Units.**  
First lecture class in summer organic series. Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, kinetics and chemical equilibria. Recitation. Prerequisite: 31 A, B or 31 X or an AP Chemistry score of 5. Course equivalent: Chem 33.

**CHEM 1L. Introduction to Organic Chemistry Lab. 2 Units.**  
Techniques for separation of compounds: distillation, crystallization, extraction and chromatographic procedures in the context of reactions learned in Chem 1. Use of GC instrumentation for the analysis of reactions. Lecture treats theory; lab provides practice. Prerequisite: Chem 33 or Chem 1 co-requisite. Course equivalent in conjunction with Chem 2L: Chem 36.

**CHEM 2. Organic Monofunctional Compounds. 4 Units.**  
Second lecture class in summer organic series. Organic chemistry of oxygen and nitrogen aliphatic compounds. Recitation. Prerequisite: Chem 33 or Chem 1. Course equivalent: Chem 35.

**CHEM 2L. Organic Chemistry Lab I. 2 Units.**  
Application of separation techniques in the context of reactions learned in Chem 2. Use of IR instrumentation for the analysis of reactions. Lecture treats theory; lab provides practice. Prerequisite: Chem 1L. Co-requisite: Chem 35 or Chem 2. Course equivalent in conjunction with Chem 1L: Chem 36. . Course equivalent in conjunction with Chem 3L: Chem 130.

**CHEM 3. Organic Polyfunctional Compounds. 4 Units.**  
Last lecture class in summer organic series. Aromatic compounds, polysaccharides, amino acids, proteins, natural products, dyes, purines, pyrimidines, nucleic acids and polymers. Recitation. Prerequisite: Chem 35 or Chem 2. Course equivalent: Chem 131.

**CHEM 3L. Organic Chemistry Lab II. 2 Units.**  
Qualitative and analytical techniques applied to reactions learned in Chem 3. Use of NMR instrumentation for the analysis of reactions. Lecture treats theory; lab provides practice. Prerequisite: Chem 2L. Co-requisite: Chem 131 or Chem 3. Course equivalent in conjunction with Chem 2L: Chem 130.

**CHEM 10. Exploring Research and Problem Solving Across the Sciences. 2 Units.**  
Development and practice of critical problem solving and study skills using wide variety of scientific examples that illustrate the broad yet integrated nature of current research. Student teams will have the opportunity to explore and present on topics revolving around five central issues: energy, climate change, water resources, medicine, and food & nutrition from a chemical perspective.

**CHEM 24N. Nutrition and History. 3 Units.**

Preference to freshmen. Intended to broaden the introductory chemistry experience. The biochemical basis of historically important nutritional deficiencies (vitamins, minerals, starvation, metabolic variants that predispose to disease) and environmental toxins is related to physiological action and the sociological, political, and economic consequences of its effect on human populations. Prerequisite: high school chemistry. Recommended: 31A,B, or 31X, or 33.

**CHEM 25N. Science in the News. 3 Units.**

Preference to freshmen. Possible topics include: diseases such as avian flu, HIV, and malaria; environmental issues such as climate change, atmospheric pollution, and human population; energy sources in the future; evolution; stem cell research; nanotechnology; and drug development. Focus is on the scientific basis for these topics as a basis for intelligent discussion of societal and political implications. Sources include the popular media and scientific media for the nonspecialist, especially those available on the web.

**CHEM 25Q. Science-in-Theatre: A New Genre?. 3 Units.**

Preference to sophomores. How scientists acquire their rules, mores, and idiosyncrasies through a form of intellectual osmosis in a mentor-disciple relationship. Scientists represented as Franksteins or nerds, rather than normal. Why more intellectually challenging plays have appeared on the Anglo-American theatre scene where scientific behavior and even science are presented accurately. Students engage in a playwriting experiment. Same as: TAPS 25N.

**CHEM 26N. The What, Why, How and wow's of Nanotechnology. 3 Units.**

Preference to freshmen. Introduction to nanotechnology with discussion of basic science at the nanoscale, its difference from molecular and macroscopic scales, and implications and applications. Developments in nanotechnology in the past two decades, from imaging and moving single atoms on surfaces to killing cancer cells with nanoscale tools and gadgets.

**CHEM 31A. Chemical Principles I. 5 Units.**

For students with moderate or no background in chemistry. Stoichiometry; periodicity; electronic structure and bonding; gases; enthalpy; phase behavior. Emphasis is on skills to address structural and quantitative chemical questions; lab provides practice. Recitation.

**CHEM 31AC. Problem Solving in Science. 1 Unitss.**

Development and practice of critical problem solving skills using chemical examples. Limited enrollment. Prerequisite: consent of instructor. Corequisite: CHEM 31A.

**CHEM 31B. Chemical Principles II. 5 Units.**

Chemical equilibrium; acids and bases; oxidation and reduction reactions; chemical thermodynamics; kinetics. Lab. Prerequisite: 31A.

**CHEM 31BC. Problem Solving in Science. 1 Unitss.**

Development and practice of critical problem solving skills using chemical examples. Students should also be concurrently enrolled in the parent course 31B. Limited enrollment and with permission of the instructor.

**CHEM 31X. Chemical Principles. 4 Units.**

Accelerated; for students with substantial chemistry background. Chemical equilibria concepts, equilibrium constants, acids and bases, chemical thermodynamics, quantum concepts, models of ionic and covalent bonding, atomic and molecular orbital theory, periodicity, and bonding properties of matter. Recitation. Prerequisites for Autumn Quarter only: AP chemistry score of 5 or passing score on chemistry placement test. No Summer Quarter prerequisites. Recommended: high school physics.

**CHEM 33. Structure and Reactivity. 4 Units.**

Organic chemistry, functional groups, hydrocarbons, stereochemistry, thermochemistry, kinetics, chemical equilibria. Recitation. Prerequisite: 31A,B, or 31X, or an AP Chemistry score of 5.

**CHEM 33C. Problem Solving in Science. 1 Unitss.**

Development and practice of critical problem solving skills using chemical examples. Limited enrollment. Prerequisite: consent of instructor. Corequisite: CHEM 33.

**CHEM 33L. Introduction to Organic Chemistry Lab. 1 Unitss.**

Weekly lab teaches techniques for separation of compounds: distillation, crystallization, extraction and chromatographic procedures in the context of reactions learned in Chem 33. Use of GC and GCMS instrumentation for the analysis of reactions. Chem 33 co-requisite required. Replaces recitation section for Chem 33.

**CHEM 34XN. General Chemistry Laboratory. 1 Unitss.**

Introduction to chemical laboratory practice. Topics include preparation of compounds and characterization of their properties by modern spectroscopic techniques. Corequisite: Chemistry 31X or the equivalent. Limited to 12 students; enrollment by consent of the instructor.

**CHEM 35. Organic Monofunctional Compounds. 4 Units.**

Organic chemistry of oxygen and nitrogen aliphatic compounds. Recitation. Prerequisite: 33.

**CHEM 36. Organic Chemistry Laboratory I. 3 Units.**

Techniques for separations of compounds: distillation, crystallization, extraction, and chromatographic procedures. Lecture treats theory; lab provides practice. Prerequisite: prerequisite or corequisite CHEM 35.

**CHEM 110. Directed Instruction/Reading. 1-2 Units.**

Undergraduates pursue a reading program under supervision of a faculty member in Chemistry; may also involve participation in lab. Prerequisites: superior work in 31A,B, 31X, or 33; and consent of instructor and the Chemistry undergraduate study committee.

**CHEM 111. Exploring Chemical Research at Stanford. 1 Unitss.**

Preference to freshmen and sophomores. Department faculty describe their cutting-edge research and its applications.

**CHEM 130. Organic Chemistry Laboratory II. 4 Units.**

Diels-Alder, reduction, and Wittig reactions; qualitative analysis. Lab. Limited enrollment Autumn Quarter. Prerequisite: 36. Corequisite: 35.

**CHEM 131. Organic Polyfunctional Compounds. 3 Units.**

Aromatic compounds, polysaccharides, amino acids, proteins, natural products, dyes, purines, pyrimidines, nucleic acids, and polymers. Prerequisite: 35.

**CHEM 132. Synthesis Laboratory. 3 Units.**

Advanced synthetic methods in organic and inorganic laboratory chemistry. Prerequisites: 35, 130.

**CHEM 134. Analytical Chemistry Laboratory. 5 Units.**

Methods include gravimetric, volumetric, spectrophotometric, and chromatographic. Writing instruction includes communications, full papers, research proposals, and referee papers. Lab. Prerequisite: 130.

**CHEM 135. Physical Chemical Principles. 3 Units.**

Introductory physical chemistry intended for students of the life sciences, geology and environmental engineering. Chemical kinetics: rate laws, integration of rate laws, reaction mechanisms, enzyme kinetics. Chemical thermodynamics: first, second and third laws, thermochemistry, entropy, free energy, chemical equilibrium, physical equilibrium, osmotic pressure, other colligative properties. Prerequisites: 31A,B, or 31X, calculus.

**CHEM 137. Special Topics in Organic Chemistry. 3 Units.**

Introduction to physical organic chemistry and its applications in organic synthesis. Topics including Huckel MO theory, enantioselectivity & diastereoselectivity, kinetics and thermodynamics, isotope labeling, organometallics, reactive intermediates. Prerequisite CHEM 35.

**CHEM 151. Inorganic Chemistry I. 3 Units.**

Theories of electronic structure, stereochemistry, and symmetry properties of inorganic molecules. Topics: ionic and covalent interactions, electron-deficient bonding, and molecular orbital theories. Emphasis is on the chemistry of the metallic elements. Prerequisites: 35. Recommended: 171.

**CHEM 153. Inorganic Chemistry II. 3 Units.**

The theoretical aspects of inorganic chemistry. Group theory; many-electron atomic theory; molecular orbital theory emphasizing general concepts and group theory; ligand field theory; application of physical methods to predict the geometry, magnetism, and electronic spectra of transition metal complexes. Prerequisites: 151, 173.

**CHEM 155. Advanced Inorganic Chemistry. 3 Units.**

Chemical reactions of organotransition metal complexes and their role in homogeneous catalysis. Analogous patterns among reactions of transition metal complexes in lower oxidation states. Physical methods of structure determination. Prerequisite: one year of physical chemistry. Same as: CHEM 255.

**CHEM 171. Physical Chemistry. 3 Units.**

Chemical thermodynamics; fundamental principles, Gibbsian equations, systematic deduction of equations, equilibrium conditions, phase rule, gases, solutions. Prerequisites: 31A,B, or 31X, 35; MATH 51.

**CHEM 173. Physical Chemistry. 3 Units.**

Introduction to quantum chemistry: the basic principles of wave mechanics, the harmonic oscillator, the rigid rotator, infrared and microwave spectroscopy, the hydrogen atom, atomic structure, molecular structure, valence theory. Prerequisites: MATH 51, 53; PHYSICS 41, 43. Recommended: PHYSICS 45.

**CHEM 174. Physical Chemistry Laboratory I. 4 Units.**

Experimental investigations in spectroscopy, thermodynamics, and electronics. Students take measurements on molecular systems, design and build scientific instruments, and computer-automate them with software that they write themselves. Prerequisites: 134, 171, MATH 51, PHYSICS 44.

**CHEM 175. Physical Chemistry. 3 Units.**

Introduction to kinetic theory and statistical mechanics: molecular theory of matter and heat, transport phenomena in gases, Boltzmann distribution law, partition functions for ideal gases. Introduction to chemical kinetics: measurement of rates of reactions, relationship between rate and reaction mechanism, consideration of specific reactions, transition-state theory of reaction rates. Prerequisites: 171, 173.

**CHEM 176. Physical Chemistry Laboratory II. 3 Units.**

Use of chemical instrumentation to study physical chemical time-dependent processes. Experiments include reaction kinetics, fluorimetry, and nuclear magnetic and electron spin resonance spectroscopy. Lab. Prerequisite: 173.

**CHEM 181. Biochemistry I. 3 Units.**

(CHEMENG offerings formerly listed as 188/288.) Chemistry of major families of biomolecules including proteins, nucleic acids, carbohydrates, lipids, and cofactors. Structural and mechanistic analysis of properties of proteins including molecular recognition, catalysis, signal transduction, membrane transport, and harvesting of energy from light. Molecular evolution. Satisfies Central Menu Area 1 for Bio majors. Prerequisites: CHEM 33, 35, 131, and 135 or 171. Same as: BIO 188, BIO 288, CHEMENG 181, CHEMENG 281.

**CHEM 183. Biochemistry II. 3 Units.**

Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288). Same as: BIO 189, BIO 289, CHEMENG 183, CHEMENG 283.

**CHEM 184. Biological Chemistry Laboratory. 4 Units.**

Modern techniques in biological chemistry including protein purification, characterization of enzyme kinetics, heterologous expression of His-tagged fluorescent proteins, site-directed mutagenesis, and single-molecule fluorescence microscopy. Prerequisite: 181.

**CHEM 185. Biochemistry III. 3 Units.**

Advanced biophysical chemistry. Topics include: protein and DNA structure, stability, and folding, membrane lateral organization and dynamics, and transmembrane transport. Prerequisites: 171, 173, 183.

**CHEM 190. Introduction to Methods of Investigation. 1-5 Units.**

Limited to undergraduates admitted under the honors program or by special arrangement with a member of the teaching staff. May be repeated 8 times for a max of 27 units For general character and scope, see 200. Prerequisite:130. Corequisite: 300.

**CHEM 200. Research and Special Advanced Work. 1-15 Units.**

Qualified graduate students undertake research or advanced lab work not covered by listed courses under the direction of a member of the teaching staff. For research and special work, students register for 200.

**CHEM 221. Advanced Organic Chemistry. 3 Units.**

Molecular orbital theory and orbital symmetry. Thermochemistry and thermochemical kinetics. Unimolecular reaction rate theory. Methods of determining organic reaction mechanisms from a theoretical and experimental point of view. Prerequisites: 137, 175.

**CHEM 223. Advanced Organic Chemistry. 3 Units.**

Continuation of 221 with emphasis on physical methods. Prerequisite: 221 or consent of instructor.

**CHEM 225. Advanced Organic Chemistry. 3 Units.**

Continuation of 223. Organic reactions, new synthetic methods, selectivity analysis, and exercises in the syntheses of complex molecules. Prerequisite: 223 or consent of instructor.

**CHEM 227. Synthesis and Analysis at the Chemistry-Biology Interface. 3 Units.**

Focus on organic chemistry of biomacromolecules. Synthetic methods and conjugation chemistry; labeling and chemical modification of nucleic acids and peptides; combinatorial library construction and selection methods. Prerequisite: One year of undergraduate organic chemistry.

**CHEM 229. Organic Chemistry Seminar. 1 Unitss.**

Required of graduate students majoring in organic chemistry. Students giving seminars register for 231.

**CHEM 231. Organic Chemistry Seminar Presentation. 1 Unitss.**

Required of graduate students majoring in organic chemistry for the year in which they present their organic seminar. Second-year students must enroll all quarters.

**CHEM 233A. Creativity in Organic Chemistry. 1 Unitss.**

Required of second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report (A) and two research proposals (B, C). Second-year students register for A and B; third-year students register for C. A: Aut, B: Spr, C: Spr.

**CHEM 233B. Creativity in Organic Chemistry. 1 Unitss.**

Required of second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report (A) and two research proposals (B, C). Second-year students register for A and B; third-year students register for C. A: Aut, B: Spr, C: Spr.

**CHEM 233C. Creativity in Organic Chemistry. 1 Unitss.**

Required of second- and third-year Ph.D. candidates in organic chemistry. The art of formulating, writing, and orally defending a research progress report (A) and two research proposals (B, C). Second-year students register for A and B; third-year students register for C. A: Aut, B: Spr, C: Spr.

**CHEM 235. Applications of NMR Spectroscopy. 3 Units.**

The uses of NMR spectroscopy in chemical and biochemical sciences, emphasizing data acquisition for liquid samples and including selection, setup, and processing of standard and advanced experiments.

**CHEM 251. Advanced Inorganic Chemistry. 3 Units.**

Chemical reactions of inorganic compounds with focus on mechanisms of reactions mediated by inorganic and organometallic complexes. The structural and electronic basis of reactivity including oxidation and reduction; kinetics and thermodynamics of inorganic reactions. Prerequisite: one year of physical chemistry.

**CHEM 255. Advanced Inorganic Chemistry. 3 Units.**

Chemical reactions of organotransition metal complexes and their role in homogeneous catalysis. Analogous patterns among reactions of transition metal complexes in lower oxidation states. Physical methods of structure determination. Prerequisite: one year of physical chemistry. Same as: CHEM 155.

**CHEM 258A. Research Progress in Inorganic Chemistry. 1 Unitss.**

Required of all second-, third-, and fourth-year Ph.D. candidates in inorganic chemistry. Students present their research progress in written and oral forms (A); present a seminar in the literature of the field of research (B); and formulate, write, and orally defend a research proposal (C). Second-year students register for A; third-year students register for B; fourth-year students register for C.

**CHEM 258B. Research Progress in Inorganic Chemistry. 1 Unitss.**

Required of all second-, third-, and fourth-year Ph.D. candidates in inorganic chemistry. Students present their research progress in written and oral forms (A); present a seminar in the literature of the field of research (B); and formulate, write, and orally defend a research proposal (C). Second-year students register for A; third-year students register for B; fourth-year students register for C.

**CHEM 258C. Research Progress in Inorganic Chemistry. 1 Unitss.**

Required of all second-, third-, and fourth-year Ph.D. candidates in inorganic chemistry. Students present their research progress in written and oral forms (A); present a seminar in the literature of the field of research (B); and formulate, write, and orally defend a research proposal (C). Second-year students register for A; third-year students register for B; fourth-year students register for C.

**CHEM 259. Inorganic Chemistry Seminar. 1 Unitss.**

Required of graduate students majoring in inorganic chemistry.

**CHEM 271. Advanced Physical Chemistry. 3 Units.**

The principles of quantum mechanics. General formulation, mathematical methods, and applications of quantum theory. Exactly solvable problems and approximate methods including time independent perturbation theory and the variational method. Time dependent methods including exactly solvable problems, time dependent perturbation theory, and density matrix formalism. Different representations of quantum theory including the Schrödinger, matrix, and density matrix methods. Absorption and emission of radiation Angular momentum. Atomic structure calculations and simple molecular structure methods. Prerequisite: 175.

**CHEM 273. Advanced Physical Chemistry. 3 Units.**

The principles and methods of statistical mechanics from the ensemble point of view, statistical thermodynamics, heat capacities of solids and polyatomic gases, chemical equilibria, equations of state of fluids, and phase transitions. Prerequisite: 271.

**CHEM 275. Advanced Physical Chemistry. 3 Units.**

Topics in advanced quantum mechanics: ab initio electronic structure theory (Hartree-Fock, configuration interaction, multi-configuration self-consistent-field, and many-body perturbation theory techniques) and density functional theory, time-dependent quantum mechanics (time evolution operator, Feynman path integrals, correlation functions), interaction of radiation and matter (semiclassical and quantum theories of radiation, transition probabilities, selection rules), and vibrations and rotations of polyatomic molecules (normal modes, anharmonicity, wave functions and energy levels of rigid rotations, vibration-rotation interaction). Prerequisite: Chem 271 or Physics 230.

**CHEM 277. Materials Chemistry and Physics. 3 Units.**

Topics: structures and symmetries and of solid state crystalline materials, chemical applications of group theory in solids, quantum mechanical electronic band structures of solids, phonons in solids, synthesis methods and characterization techniques for solids including nanostructured materials, selected applications of solid state materials and nanostructures. May be repeated for credit.

**CHEM 278A. Research Progress in Physical Chemistry. 1 Unitss.**

Required of all second- and third-year Ph.D. candidates in physical and biophysical chemistry and chemical physics. Second-year students present their research progress and plans in brief written and oral summaries (A); third-year students prepare a written progress report (B). A: Win, B: Win.

**CHEM 278B. Research Progress in Physical Chemistry. 1 Unitss.**

Required of all second- and third-year Ph.D. candidates in physical and biophysical chemistry and chemical physics. Second-year students present their research progress and plans in brief written and oral summaries (A); third-year students prepare a written progress report (B). A: Win, B: Win.

**CHEM 279. Physical Chemistry Seminar. 1 Unitss.**

Required of graduate students majoring in physical chemistry. May be repeated for credit.

**CHEM 280. Single-Molecule Spectroscopy and Imaging. 3 Units.**

Theoretical and experimental techniques necessary to achieve single-molecule sensitivity in laser spectroscopy: interaction of radiation with spectroscopic transitions; systematics of signals, noise, and signal-to-noise; modulation and imaging methods; and analysis of fluctuations; applications to modern problems in biophysics, cellular imaging, physical chemistry, single-photon sources, and materials science. Prerequisites: 271, previous or concurrent enrollment in 273.

**CHEM 297. Bio-Inorganic Chemistry. 3 Units.**

Overview of metal sites in biology. Metalloproteins as elaborated inorganic complexes, their basic coordination chemistry and bonding, unique features of the protein ligand, and the physical methods used to study active sites. Active site structures are correlated with function. Prerequisites: 153 and 173, or equivalents. Same as: BIOPHYS 297.

**CHEM 299. Teaching of Chemistry. 1-3 Units.**

Required of all teaching assistants in Chemistry. Techniques of teaching chemistry by means of lectures and labs.

**CHEM 300. Department Colloquium. 1 Unitss.**

Required of graduate students. May be repeated for credit.



**CHEM 301. Research in Chemistry. 2 Units.**

Required of graduate students who have passed the qualifying examination. Open to qualified graduate students with the consent of the major professor. Research seminars and directed reading deal with newly developing areas in chemistry and experimental techniques. May be repeated for credit. Search for adviser name on Axess.

**CHEM 459. Frontiers in Interdisciplinary Biosciences. 1 Unitss.**

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See <http://biox.stanford.edu/courses/459.html>. Recommended: basic mathematics, biology, chemistry, and physics.

Same as: BIO 459, BIOC 459, BIOE 459, CHEMENG 459, PSYCH 459.

**CHEM 802. TGR Dissertation. 0 Unit.**

## Chicana/o Studies Courses

### Chicana/o-Latina/o Studies Courses

**CHILATST 14N. Growing Up Bilingual. 3 Units.**

This course is a Freshman Introductory Seminar that has as its purpose introducing students to the sociolinguistic study of bilingualism by focusing on bilingual communities in this country and on bilingual individuals who use two languages in their everyday lives. Much attention is given to the history, significance, and consequences of language contact in the United States. The course focuses on the experiences of long-term US minority populations as well as that of recent immigrants.

Same as: CSRE 14N, EDUC 114N.

**CHILATST 117N. Film, Nation, Latinidad. 3-4 Units.**

Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava. Same as: CSRE 117N, ILAC 117N.

**CHILATST 125S. Chicano/Latino Politics. 5 Units.**

The political position of Latinos and Latinas in the U.S.. Focus is on Mexican Americans, with attention to Cuban Americans, Puerto Ricans, and other groups. The history of each group in the American polity; their political circumstances with respect to the electoral process, the policy process, and government; the extent to which the demographic category Latino is meaningful; and group identity and solidarity among Americans of Latin American ancestry. Topics include immigration, education, affirmative action, language policy, and environmental justice.

Same as: POLISCI 125S.

**CHILATST 140. Migration in 21st Century Latin American Film. 3-5 Units.**

Focus on how images and narratives of migration are depicted in recent Latin American film. It compares migration as it takes place within Latin America to migration from Latin America to Europe and to the U.S. We will analyze these films, and their making, in the global context of an evergrowing tension between "inside" and "outside"; we consider how these films represent or explore precariousness and exclusion; visibility and invisibility; racial and gender dynamics; national and social boundaries; new subjectivities and cultural practices. Films include: El niño pez, Bolivia, Ulises, Faustino Mayta visita a su prima, Copacabana, Chico y Rita, Sin nombre, Los que se quedan, Amador, and En la puta calle. Films in Spanish, with English subtitles. Discussions and assignments in Spanish. Same as: ILAC 140.

**CHILATST 175B. Transnational Latin American Migration to the United States. 5 Units.**

Explores the major trends in Latin American migration to the United States. Examines the impact of transnational migration on identity formation, economic relations, and policy debates in Latin America and the United States. Topics include the role of remittances, citizenship debates, struggles over immigration reform, transnational identity formation, refugee migration and Cold War politics, Latino alliances in the United States, and the effects of gender and sexuality on migratory patterns.

Same as: HISTORY 175B.

**CHILATST 176S. Religion and the Politics of Culture in Chicana/o & Latina/o America. 5 Units.**

Explores depth and diversity of religious beliefs and practices in Chicana/o and Latina/o communities in order to pose fundamental questions about the nature of religion in relation to indigenous practices and contemporary identities. From Mayan creation stories to Pentecostalism, course will problematize the relationship of race/ethnicity, gender, and sexuality to religious experience, including institutional and informal religious practices; religion as a cultural identity; the paradox of religious conquest; religious syncretism; and the dynamic creativity of religious experience.

**CHILATST 179. Chicano & Chicana Theater: Politics In Performance. 3-5 Units.**

This is a practicum course, where the basic tenets and evolving politic and philosophies of Chicano and Latin American liberationist theater are examined through direct engagement with its theatrical forms, including, social protest & agit-prop, myth & ritual, scripting through improvisation, in-depth character and solo work, collective conceptualization and more. The course will culminate in an end-of-the quarter play performance in the Nitery Theater (Old Union) and at a Mission District theater in San Francisco.

Same as: TAPS 179, TAPS 379.

**CHILATST 180E. Introduction to Chicana/o Studies. 5 Units.**

Historical and contemporary experiences that have defined the status of Mexican-origin people living in the U.S. Topics include the U.S./Mexico border and the borderlands; immigration and anti-immigration sentiment; literary and cultural traditions; music; labor; historical perspectives on Mexicans in the U.S. and the Chicano movement; urban realities; gender relations; political and economic changes; and inter- and intra-group interactions. Sources include social science and humanities scholarship. Same as: CSRE 180E.

**CHILATST 189W. Language and Minority Rights. 3 Units.**

Language as it is implicated in migration and globalization. The effects of globalization processes on languages, the complexity of language use in migrant and indigenous minority contexts, the connectedness of today's societies brought about by the development of communication technologies. Individual and societal multilingualism; preservation and revival of endangered languages.

Same as: CSRE 189W, EDUC 189X.

**CHILATST 200. Latin@ Literature. 3-5 Units.**

Examines a diverse set of narratives by U.S. Latin@s of Mexican, Puerto Rican, Cuban, Guatemalan, and Dominican heritage through the lens of *latinidad*. All share the historical experience of Spanish colonization and U.S. imperialism, yet their im/migration patterns differ, affecting social, cultural, and political trajectories in the US and relationships to "home" and "homeland," nation, diaspora, history, and memory. Explores how racialization informs genders as well as sexualities. Emphasis on textual analysis. Taught in English.

Same as: CSRE 200, ILAC 280, ILAC 382.

**CHILATST 200R. Directed Research. 1-5 Units.****CHILATST 200W. Directed Reading. 1-5 Units.**

(Staff).

**CHILATST 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era. 5 Units.**

How creative projects build and strengthen communities of common concern. Projects focus on cultural reclamation, multiculturalism, cultural equity and contemporary cultural wars, media literacy, independent film, and community-based art. Guest artists and organizers, films, and case studies.

Same as: CSRE 201B.

**CHILATST 201C. Critical Concepts in Chican@ Literature. 3-5 Units.**

Combines primary texts of Chican@ literature with a metacritical interrogation of key concepts informing Chican@ literary criticism, the construction of Chican@ literary history, and a Chican@ literary canon. Interrogates the resistance paradigm and the "proper" subject of this literature, and critiques established genealogies and foundational authors and texts, as well as issues of periodization, including the notion of "emergence" (e.g. of feminist voices or dissident sexualities). Considers texts, authors and subjects that present alternatives to the resistance paradigm.

Same as: CSRE 201C, ILAC 380E.

**CHILATST 275B. Governance, Resistance, and Identity in Modern Mexico. 5 Units.**

Surveys the history of governance, resistance, and identity formation in Mexico from the nineteenth century to the present. Explores Mexico's historical struggles to achieve political stability, economic prosperity, and social justice and examines how regional, class, ethnic, and gender differences have figured prominently in the shaping of Mexican affairs. Topics include Mexico's wars and their legacies, the power of the state, violence and protest, debates over the meaning of "Mexicanness," youth culture, and the politics of indigenismo.

Same as: HISTORY 275B.

## Chinese General Courses

**CHINGEN 70N. Marvelous Creatures: Animals and Humans in Chinese Literature. 3-4 Units.**

Preference to freshmen. Read novels and short stories as well as view films that feature an array of marvelous creatures from late imperial times to the contemporary era. What animal imageries and metaphors can reveal about the Chinese and how they relate to the natural, supernatural, and human worlds across the centuries.

**CHINGEN 73. Chinese Language, Culture, and Society. 4 Units.**

Topics include the origin of Chinese, development of dialects, emergence of the standard, preferred formulaic expressions, the evolution of writing, and language policies in greater China. Prerequisite: CHINLANG 1 or 1B, or equivalent.

Same as: CHINGEN 173.

**CHINGEN 91. Traditional East Asian Culture: China. 5 Units.**

Required for Chinese and Japanese majors. Introduction to Chinese culture in a historical context. Topics include political and socioeconomic institutions, religion, ethics, education, and art and literature.

**CHINGEN 118. Constructing National History in East Asian Archaeology. 3-5 Units.**

Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.

Same as: ARCHLGY 135, ARCHLGY 235, CHINGEN 218.

**CHINGEN 119. Popular Culture and Casino Capitalism in China. 3-4 Units.**

Examination of different forms of Chinese popular culture used to gauge or control fate and uncertainty, from geomancy and qigong to ghost culture and mahjong. Ways in which Chinese are incorporating these cultural forms into the informal economy to get rich quick: rotating credit associations, stock market speculation, pyramid schemes, underground lotteries, counterfeiting. Impact of casino capitalism on Chinese culture and social life today.

Same as: CHINGEN 219.

**CHINGEN 120. Soldiers and Bandits in Chinese Culture. 3-5 Units.**

Social roles and literary images of two groups on the margins of traditional Chinese society; historical and comparative perspectives.

Same as: CHINGEN 220.

**CHINGEN 121. Classical Chinese Rituals. 3-5 Units.**

Meanings of rituals regarding death, wedding, war, and other activities; historical transformations of classical rituals throughout the premodern period; legacy of the Chinese ritual tradition. Sources include canonical texts.

Same as: CHINGEN 221.

**CHINGEN 131. Chinese Poetry in Translation. 4 Units.**

From the first millennium B.C. through the 12th century. Traditional verse forms representative of the classical tradition; highlights of the most distinguished poets. History, language, and culture. Chinese language not required.

Same as: CHINGEN 231.

**CHINGEN 132. Chinese Fiction and Drama in Translation. 4 Units.**

From early times to the 18th century, emphasizing literary and thematic discussions of major works in English translation.

Same as: CHINGEN 232.

**CHINGEN 133. Literature in 20th-Century China. 4-5 Units.**

(Graduate students register for 233.) How modern Chinese culture evolved from tradition to modernity; the century-long drive to build a modern nation state and to carry out social movements and political reforms. How the individual developed modern notions of love, affection, beauty, and moral relations with community and family. Sources include fiction and film clips. WIM course.

Same as: CHINGEN 233.

**CHINGEN 134. Early Chinese Mythology. 3-5 Units.**

The definition of a myth. Major myths of China prior to the rise of Buddhism and Daoism including: tales of the early sage kings such as Yu and the flood; depictions of deities in the underworld; historical myths; tales of immortals in relation to local cults; and tales of the patron deities of crafts.

Same as: CHINGEN 234.

**CHINGEN 135. Chinese Bodies, Chinese Selves. 3-5 Units.**

Interdisciplinary. The body as a contested site of representational practices, identity politics, cultural values, and social norms. Body images, inscriptions, and practices in relation to health, morality, gender, sexuality, nationalism, consumerism, and global capitalism in China and Taiwan. Sources include anthropological, literary, and historical studies, and fiction and film. No knowledge of Chinese required. Same as: CHINGEN 235.

**CHINGEN 136. The Chinese Family. 3-5 Units.**

History and literature. Institutional, ritual, affective, and symbolic aspects. Perspectives of gender, class, and social change. Same as: CHINGEN 236.

**CHINGEN 138. Love and Politics in Chinese Cinema. 4-5 Units.**

How films work as expressions of desire, impulse, emotional connection, and communal attachment during times of social upheaval and reconstruction. Film theory and aesthetics, and alternative paradigms about world and social relations. Chinese language not required. Same as: CHINGEN 238.

**CHINGEN 139. Cultural Revolution as Literature. 4 Units.**

Literary form, aesthetic sensibility, and themes of trauma, identity, and the limits of representation in major literary works concerning the Cultural Revolution in China. Recommended: background in Chinese history or literature. Same as: CHINGEN 239.

**CHINGEN 140. Chinese Justice: Law, Morality, and Literature. 3-5 Units.**

Explores the relationship between law and morality in Chinese literature, culture, and society. Readings include court case romances, crime plays, detective novels, and legal dramas from traditional era and modern and contemporary periods. Prior coursework in Chinese history, civilization, or literature is recommended. All readings are in English. Same as: CHINGEN 240.

**CHINGEN 141. Emergence of Chinese Civilization from Caves to Palaces. 3-4 Units.**

Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism. Same as: ARCHLGY 111, CHINGEN 241.

**CHINGEN 143. Images of Women in Ancient China and Greece. 4 Units.**

Representation of women in ancient Chinese and Greek texts. How men viewed women and what women had to say about themselves and their societies. Primary readings in poetry, drama, and didactic writings. Relevance for understanding modern concerns; use of comparison for discovering historical and cultural patterns. Same as: CHINGEN 243, CLASSGEN 153, CLASSGEN 253.

**CHINGEN 145. The Silk Road(s)-Myth and Reality. 3-5 Units.**

Consulting archaeological as well as written sources, this course evaluates all aspects of Silk Road history--trade, travel, war, religion, ideologies, and cultural exchange--from its earliest age through the Mongolian Era (13th century). Same as: CHINGEN 245.

**CHINGEN 150. Sex, Gender, and Power in Modern China. 3-5 Units.**

Investigates how sex, gender, and power are entwined in the Chinese experience of modernity. Topics include anti-footbinding campaigns, free love/free sex, women's mobilization in revolution and war, the new Marriage Law of 1950, Mao's iron girls, postsocialist celebrations of sensuality, and emergent queer politics. Readings range from feminist theory to China-focused historiography, ethnography, memoir, biography, fiction, essay, and film. All course materials are in English. Same as: CHINGEN 250.

**CHINGEN 160. New Directions in the Study of Poetry and Literary Culture. 4 Units.**

Inquiry into new approaches and interpretations of the poetic tradition in China in the context of cultural history. Readings in recent scholarship and criticism that situate poetry in print history, manuscript culture, gender studies, social history, etc. Readings in English. Reading knowledge of Chinese desirable but not required. Same as: CHINGEN 260.

**CHINGEN 169. A History of Chinese Drama. 3-4 Units.**

A survey of Chinese drama from its origins to late imperial China. In addition to tracing the historical development of Chinese drama, we will also examine both plays and traditional criticism of drama in an attempt to understand the aesthetic norms and moral values that went into its process of development, in other words, how Chinese performed, read, watched and evaluated plays. Same as: CHINGEN 269.

**CHINGEN 173. Chinese Language, Culture, and Society. 4 Units.**

Topics include the origin of Chinese, development of dialects, emergence of the standard, preferred formulaic expressions, the evolution of writing, and language policies in greater China. Prerequisite: CHINLANG 1 or 1B, or equivalent. Same as: CHINGEN 73.

**CHINGEN 193E. Female Divinities in China. 3-5 Units.**

The role of powerful goddesses, such as the Queen Mother of the West, Guanyin, and Chen Jinggu, in Chinese religion. Imperial history to the present day. What roles goddesses played in the spirit world, how this related to the roles of human women, and why a civilization that excluded women from the public sphere granted them such a major, even dominant place, in the religious sphere. Readings in English-language secondary literature. Same as: CHINGEN 393E.

**CHINGEN 194. The History and Culture of Peking Opera. 3-4 Units.**

Explores the history and culture of Peking opera from its regional origins to a major national form. It will focus on genre formation, the professional and social position of actors and the political role of Peking opera. In addition to academic texts, we will read memoirs, biographies and watch videos and movies. Same as: CHINGEN 294.

**CHINGEN 198. Senior Colloquium in Chinese Studies. 1 Unitss.**

Students research, write, and present a capstone essay or honors thesis.

**CHINGEN 200. Directed Readings in Asian Languages. 1-12 Units.**

For Chinese literature. Prerequisite: consent of instructor. (Staff).

**CHINGEN 201. Teaching Chinese Humanities. 1 Units.**

Prepares graduate students to teach humanities at the undergraduate level. Topics include syllabus development and course design, techniques for generating discussion, effective grading practices, and issues particular to the subject matter.

**CHINGEN 217. Worship of Buddhist Images in Medieval China. 3-5 Units.**

Explores Buddhist image-making practices from Han to Tang China from a trans-Asian perspective. Topics include characteristics of earliest Chinese images (vis-a-vis those of Indian subcontinent), their growth as a dominant artistic genre, inroads of foreign images and Chinese interactions, constructions of Buddhist ritual spaces such as monumental pagodas and cave temples, cross-cultural contexts of image worship.  
Same as: CHINGEN 117.

**CHINGEN 218. Constructing National History in East Asian Archaeology. 3-5 Units.**

Archaeological studies in contemporary East Asia share a common concern, to contribute to building a national narrative and cultural identity. This course focuses on case studies from China, Korea, and Japan, examining the influence of particular social-political contexts, such as nationalism, on the practice of archaeology in modern times.  
Same as: ARCHLGY 135, ARCHLGY 235, CHINGEN 118.

**CHINGEN 219. Popular Culture and Casino Capitalism in China. 3-4 Units.**

Examination of different forms of Chinese popular culture used to gauge or control fate and uncertainty, from geomancy and qigong to ghost culture and mahjong. Ways in which Chinese are incorporating these cultural forms into the informal economy to get rich quick: rotating credit associations, stock market speculation, pyramid schemes, underground lotteries, counterfeiting. Impact of casino capitalism on Chinese culture and social life today.  
Same as: CHINGEN 119.

**CHINGEN 220. Soldiers and Bandits in Chinese Culture. 3-5 Units.**

Social roles and literary images of two groups on the margins of traditional Chinese society; historical and comparative perspectives.  
Same as: CHINGEN 120.

**CHINGEN 221. Classical Chinese Rituals. 3-5 Units.**

Meanings of rituals regarding death, wedding, war, and other activities; historical transformations of classical rituals throughout the premodern period; legacy of the Chinese ritual tradition. Sources include canonical texts.  
Same as: CHINGEN 121.

**CHINGEN 231. Chinese Poetry in Translation. 4 Units.**

From the first millennium B.C. through the 12th century. Traditional verse forms representative of the classical tradition; highlights of the most distinguished poets. History, language, and culture. Chinese language not required.  
Same as: CHINGEN 131.

**CHINGEN 232. Chinese Fiction and Drama in Translation. 4 Units.**

From early times to the 18th century, emphasizing literary and thematic discussions of major works in English translation.  
Same as: CHINGEN 132.

**CHINGEN 233. Literature in 20th-Century China. 4-5 Units.**

(Graduate students register for 233.) How modern Chinese culture evolved from tradition to modernity; the century-long drive to build a modern nation state and to carry out social movements and political reforms. How the individual developed modern notions of love, affection, beauty, and moral relations with community and family. Sources include fiction and film clips. WIM course.  
Same as: CHINGEN 133.

**CHINGEN 234. Early Chinese Mythology. 3-5 Units.**

The definition of a myth. Major myths of China prior to the rise of Buddhism and Daoism including: tales of the early sage kings such as Yu and the flood; depictions of deities in the underworld; historical myths; tales of immortals in relation to local cults; and tales of the patron deities of crafts.  
Same as: CHINGEN 134.

**CHINGEN 235. Chinese Bodies, Chinese Selves. 3-5 Units.**

Interdisciplinary. The body as a contested site of representational practices, identity politics, cultural values, and social norms. Body images, inscriptions, and practices in relation to health, morality, gender, sexuality, nationalism, consumerism, and global capitalism in China and Taiwan. Sources include anthropological, literary, and historical studies, and fiction and film. No knowledge of Chinese required.  
Same as: CHINGEN 135.

**CHINGEN 236. The Chinese Family. 3-5 Units.**

History and literature. Institutional, ritual, affective, and symbolic aspects. Perspectives of gender, class, and social change.  
Same as: CHINGEN 136.

**CHINGEN 238. Love and Politics in Chinese Cinema. 4-5 Units.**

How films work as expressions of desire, impulse, emotional connection, and communal attachment during times of social upheaval and reconstruction. Film theory and aesthetics, and alternative paradigms about world and social relations. Chinese language not required.  
Same as: CHINGEN 138.

**CHINGEN 239. Cultural Revolution as Literature. 4 Units.**

Literary form, aesthetic sensibility, and themes of trauma, identity, and the limits of representation in major literary works concerning the Cultural Revolution in China. Recommended: background in Chinese history or literature.  
Same as: CHINGEN 139.

**CHINGEN 240. Chinese Justice: Law, Morality, and Literature. 3-5 Units.**

Explores the relationship between law and morality in Chinese literature, culture, and society. Readings include court case romances, crime plays, detective novels, and legal dramas from traditional era and modern and contemporary periods. Prior coursework in Chinese history, civilization, or literature is recommended. All readings are in English.  
Same as: CHINGEN 140.

**CHINGEN 241. Emergence of Chinese Civilization from Caves to Palaces. 3-4 Units.**

Introduces processes of cultural evolution from the Paleolithic to the Three Dynasties in China. By examining archaeological remains, ancient inscriptions, and traditional texts, four major topics will be discussed: origins of modern humans, beginnings of agriculture, development of social stratification, and emergence of states and urbanism.  
Same as: ARCHLGY 111, CHINGEN 141.

**CHINGEN 243. Images of Women in Ancient China and Greece. 4 Units.**

Representation of women in ancient Chinese and Greek texts. How men viewed women and what women had to say about themselves and their societies. Primary readings in poetry, drama, and didactic writings. Relevance for understanding modern concerns; use of comparison for discovering historical and cultural patterns.  
Same as: CHINGEN 143, CLASSGEN 153, CLASSGEN 253.

**CHINGEN 245. The Silk Road(s)-Myth and Reality. 3-5 Units.**

Consulting archaeological as well as written sources, this course evaluates all aspects of Silk Road history--trade, travel, war, religion, ideologies, and cultural exchange--from its earliest age through the Mongolian Era (13th century).  
Same as: CHINGEN 145.

**CHINGEN 250. Sex, Gender, and Power in Modern China. 3-5 Units.**

Investigates how sex, gender, and power are entwined in the Chinese experience of modernity. Topics include anti-footbinding campaigns, free love/free sex, women's mobilization in revolution and war, the new Marriage Law of 1950, Mao's iron girls, postsocialist celebrations of sensuality, and emergent queer politics. Readings range from feminist theory to China-focused historiography, ethnography, memoir, biography, fiction, essay, and film. All course materials are in English. Same as: CHINGEN 150.

**CHINGEN 260. New Directions in the Study of Poetry and Literary Culture. 4 Units.**

Inquiry into new approaches and interpretations of the poetic tradition in China in the context of cultural history. Readings in recent scholarship and criticism that situate poetry in print history, manuscript culture, gender studies, social history, etc. Readings in English. Reading knowledge of Chinese desirable but not required. Same as: CHINGEN 160.

**CHINGEN 269. A History of Chinese Drama. 3-4 Units.**

A survey of Chinese drama from its origins to late imperial China. In addition to tracing the historical development of Chinese drama, we will also examine both plays and traditional criticism of drama in an attempt to understand the aesthetic norms and moral values that went into its process of development, in other words, how Chinese performed, read, watched and evaluated plays. Same as: CHINGEN 169.

**CHINGEN 294. The History and Culture of Peking Opera. 3-4 Units.**

Explores the history and culture of Peking opera from its regional origins to a major national form. It will focus on genre formation, the professional and social position of actors and the political role of Peking opera. In addition to academic texts, we will read memoirs, biographies and watch videos and movies. Same as: CHINGEN 194.

**CHINGEN 393E. Female Divinities in China. 3-5 Units.**

The role of powerful goddesses, such as the Queen Mother of the West, Guanyin, and Chen Jinggu, in Chinese religion. Imperial history to the present day. What roles goddesses played in the spirit world, how this related to the roles of human women, and why a civilization that excluded women from the public sphere granted them such a major, even dominant place, in the religious sphere. Readings in English-language secondary literature. Same as: CHINGEN 193E.

## Chinese Language Courses

**CHINLANG 1. First-Year Modern Chinese, First Quarter. 5 Units.**

Conversation, grammar, reading, elementary composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements.

**CHINLANG 1B. First-Year Modern Chinese for Bilingual Students, First Quarter. 3 Units.**

For students with elementary comprehension and speaking skills who need work on conversation, grammar, reading, and composition.

**CHINLANG 2. First-Year Modern Chinese, Second Quarter. 5 Units.**

Continuation of CHINLANG 1. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: placement test, CHINLANG 1 or consent of instructor.

**CHINLANG 2B. First-Year Modern Chinese for Bilingual Students, Second Quarter. 3 Units.**

Continuation of CHINLANG 1B. For students with elementary comprehension and speaking skills who need work on conversation, grammar, reading, and composition. Prerequisite: Placement Test, CHINLANG 1B or consent of instructor.

**CHINLANG 3. First-Year Modern Chinese, Third Quarter. 5 Units.**

Continuation of CHINLANG 2. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Fulfills the University language requirement. Prerequisite: Placement Test, CHINLANG 2 or consent of instructor.

**CHINLANG 3B. First-Year Modern Chinese for Bilingual Students, Third Quarter. 3 Units.**

Continuation of CHINLANG 2B. For students with elementary comprehension and speaking skills who need work on conversation, grammar, reading, and composition. Prerequisite: Placement Test, CHINLANG 2B or consent of instructor.

**CHINLANG 5. Intensive First-Year Modern Chinese. 8 Units.**

Equivalent to 1,2,3 combined if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University.

**CHINLANG 6. Beginning Conversational Chinese, First Quarter. 2 Units.**

Three quarter sequence. Basic language skills in Mandarin to function abroad.

**CHINLANG 7. Beginning Conversational Chinese, Second Quarter. 2 Units.**

Continuation of CHINLANG 6. Basic language skills in Mandarin to function abroad. Prerequisite: CHINLANG 6 or consent of instructor.

**CHINLANG 8. Beginning Conversational Chinese, Third Quarter. 2 Units.**

Continuation of CHINLANG 7. Basic language skills in Mandarin to function abroad. Prerequisite: CHINLANG 7 or consent of instructor.

**CHINLANG 10. Beginning Southern Min (Taiwanese) Conversation, First Quarter. 2 Units.**

Three quarter sequence. Basic language skills for everyday life situations.

**CHINLANG 11. Beginning Southern Min (Taiwanese) Conversation, Second Quarter. 2 Units.**

Continuation of CHINLANG 10. Prerequisite: CHINLANG 10 or consent of instructor.

**CHINLANG 12. Beginning Southern Min (Taiwanese) Conversation, Third Quarter. 2 Units.**

Continuation of 11. Prerequisite: 11 or consent of instructor.

**CHINLANG 13A. Intermediate Southern Min (Taiwanese) Conversation, First Quarter. 2 Units.**

Continuation of CHINLANG 13. Vocabulary including business-related terms, grammatical structures, and spontaneous conversations. Prerequisite: CHINLANG 13 or consent of instructor.

**CHINLANG 13B. Intermediate Southern Min (Taiwanese) Conversation, Second Quarter. 2 Units.**

Continuation of CHINLANG 13A. Vocabulary including business-related terms, grammatical structures, and spontaneous conversations. Prerequisite: CHINLANG 13A or consent of instructor.

**CHINLANG 13C. Intermediate Southern Min (Taiwanese) Conversation, Third Quarter. 2 Units.**

Continuation of CHINLANG 13B. Vocabulary including business-related terms, grammatical structures, and spontaneous conversations. Prerequisite: CHINLANG 13B or consent of instructor.

**CHINLANG 15. Beginning Conversational Cantonese, First Quarter. 2 Units.**

This is the first of the 3-course series on beginning Cantonese. The primary objective of the beginning series is to help students build up a repertoire of vocabulary and basic grammatical structures so that they can: (a) introduce themselves in an informal social situation, (b) engage in simple transactions, (c) converse about themselves, their friends and families, and (d) talk about activities in daily lives. Authentic materials such as Cantopop and movie clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim-sum restaurant, or a Cantonese community every quarter to experience Cantonese culture.

**CHINLANG 15M. Beginning Conversational Cantonese for Mandarin Speakers, First Quarter. 2 Units.**

This is the first of the 3-course series on beginning Cantonese for Mandarin speakers. The primary objective of the beginning series is to help students build up a repertoire of vocabulary so that they can: (a) introduce themselves in an informal social situation, (b) engage in simple transactions, (c) converse about themselves, their friends and families, and (d) talk about activities in daily lives. Authentic materials such as Cantopop and movie clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. In addition, students work on common pronunciation and grammatical errors due to influences from Mandarin. Cantonese-Chinese characters will also be taught.

**CHINLANG 16. Beginning Cantonese Conversation, Second Quarter. 2 Units.**

Continuation of CHINLANG 15. This is the second of the 3-course series on beginning Cantonese. The primary objective of the beginning series is to help students build up a repertoire of vocabulary and basic grammatical structures so that they can: (a) introduce themselves in an informal social situation, (b) engage in simple transactions, (c) converse about themselves, their friends and families, and (d) talk about activities in daily lives. Authentic materials such as Cantopop and movie clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim-sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 15 or consent of instructor.

**CHINLANG 16M. Beginning Conversational Cantonese for Mandarin Speakers, Second Quarter. 2 Units.**

Continuation of CHINLANG 15M. This is the second of the 3-course series on beginning Cantonese for Mandarin speakers. The primary objective of the beginning series is to help students build up a repertoire of vocabulary so that they can: (a) introduce themselves in an informal social situation, (b) engage in simple transactions, (c) converse about themselves, their friends and families, and (d) talk about activities in daily lives. Authentic materials such as Cantopop and movie clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. In addition, students work on common pronunciation and grammatical errors due to influences from Mandarin. Cantonese-Chinese characters will also be taught. Prerequisite: CHINLANG 15M or consent of instructor.

**CHINLANG 17. Beginning Conversational Cantonese, Third Quarter. 2 Units.**

Continuation of CHINLANG 16. This is the third of the 3-course series on beginning Cantonese. The primary objective of the beginning series is to help students build up a repertoire of vocabulary and basic grammatical structures so that they can: (a) introduce themselves in an informal social situation, (b) engage in simple transactions, (c) converse about themselves, their friends and families, and (d) talk about activities in daily lives. Authentic materials such as Cantopop and movie clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim-sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 16 or consent of instructor.

**CHINLANG 17M. Beginning Conversational Cantonese for Mandarin Speakers, Third Quarter. 2 Units.**

Continuation of CHINLANG 16M. This is the third of the 3-course series on beginning Cantonese for Mandarin speakers. The primary objective of the beginning series is to help students build up a repertoire of vocabulary so that they can: (a) introduce themselves in an informal social situation, (b) engage in simple transactions, (c) converse about themselves, their friends and families, and (d) talk about activities in daily lives. Authentic materials such as Cantopop and movie clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. In addition, students work on common pronunciation and grammatical errors due to influences from Mandarin. Cantonese-Chinese characters will also be taught. Prerequisite: CHINLANG 16M or consent of instructor.

**CHINLANG 18. Intermediate Cantonese Conversation, First Quarter. 2 Units.**

Continuation of CHINLANG 17. This is the first of the 3-course series on intermediate Cantonese. The primary objective of the intermediate series is to help students acquire the vocabulary: (a) to engage in conversations about less concrete topics, (b) to give directions and instructions, and (c) to carry out transactions in linguistically unfamiliar situations. Students will work on more complex grammar that allows them to express their ideas in a variety of sentence structures. Authentic materials such as Cantopop, movies, and news clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 17 or consent of instructor.

**CHINLANG 19. Intermediate Conversational Cantonese, Second Quarter.. 2 Units.**

Continuation of CHINLANG 18. This is the second of the 3-course series on intermediate Cantonese. The primary objective of the intermediate series is to help students acquire the vocabulary: (a) to engage in conversations about less concrete topics, (b) to give directions and instructions, and (c) to carry out transactions in linguistically unfamiliar situations. Students will work on more complex grammar that allows them to express their ideas in a variety of sentence structures. Authentic materials such as Cantopop, movies, and news clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 18 or consent of instructor.

**CHINLANG 20. Intermediate Conversational Cantonese, Third Quarter. 2 Units.**

Continuation of CHINLANG 19. This is the third of the 3-course series on intermediate Cantonese. The primary objective of the intermediate series is to help students acquire the vocabulary: (a) to engage in conversations about less concrete topics, (b) to give directions and instructions, and (c) to carry out transactions in linguistically unfamiliar situations. Students will work on more complex grammar that allows them to express their ideas in a variety of sentence structures. Authentic materials such as Cantopop, movies, and news clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 19, or consent of instructor.

**CHINLANG 20A. Advanced Conversational Cantonese, First Quarter. 2 Units.**

Continuation of CHINLANG 20. This is the first of the 3-course series on advanced Cantonese. The primary objective of the advanced series is to help students become proficient speakers so that they can talk about a wide range of topics: students (a) review movies, (b) describe their communities, (c) narrate events in different time frames, and (d) talk about current events and topics of interest to them. Linguistic structures for textual cohesion, subordinating and coordinating sentences, and foregrounding and back grounding information are emphasized. Authentic materials such as movies and news clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 20 or consent of instructor.

**CHINLANG 20B. Advanced Conversational Cantonese, Second Quarter. 2 Units.**

Continuation of CHINLANG 20A. This is the second of the 3-course series on advanced Cantonese. The primary objective of the advanced series is to help students become proficient speakers so that they can talk about a wide range of topics: students (a) review movies, (b) describe their communities, (c) narrate events in different time frames, and (d) talk about current events and topics of interest to them. Linguistic structures for textual cohesion, subordinating and coordinating sentences, and foregrounding and back grounding information are emphasized. Authentic materials such as movies and news clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 20A or consent of instructor.

**CHINLANG 20C. Advanced Cantonese Conversation - Third Quarter. 2 Units.**

Continuation of CHINLANG 20B. This is the third of the 3-course series on advanced Cantonese. The primary objective of the advanced series is to help students become proficient speakers so that they can talk about a wide range of topics: students (a) review movies, (b) describe their communities, (c) narrate events in different time frames, and (d) talk about current events and topics of interest to them. Linguistic structures for textual cohesion, subordinating and coordinating sentences, and foregrounding and back grounding information are emphasized. Authentic materials such as movies and news clips are incorporated in the courses and Internet tools are used to enhance learning. There is also an optional field trip to a karaoke bar, a dim sum restaurant, or a Cantonese community every quarter to experience Cantonese culture. Prerequisite: CHINLANG 20B or consent of instructor.

**CHINLANG 21. Second-Year Modern Chinese, First Quarter. 5 Units.**

Continuation of CHINLANG 3. Grammar, reading, conversation, composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: Placement Test, CHINLANG 3 or consent of instructor.

**CHINLANG 21B. Second-Year Modern Chinese for Bilingual Students, First Quarter. 3 Units.**

Continuation of CHINLANG 3B. For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Equivalent to CHINLANG 21. Prerequisite: Placement Test, CHINLANG 3B or consent of instructor.

**CHINLANG 22. Second-Year Modern Chinese, Second Quarter. 5 Units.**

Continuation of CHINLANG 21. Grammar, reading, conversation, composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: Placement Test, CHINLANG 21 or consent of instructor.

**CHINLANG 22B. Second-Year Chinese for Bilingual Students, Second Quarter. 3 Units.**

Continuation of CHINLANG 21B. For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Prerequisite: Placement Test, CHINLANG 21B or consent of instructor.

**CHINLANG 23. Second-Year Modern Chinese, Third Quarter. 5 Units.**

Continuation of CHINLANG 22. Grammar, reading, conversation, composition. Daily sections may be set at the beginning of the quarter to suit schedule requirements. Prerequisite: Placement Test, CHINLANG 22 or consent of instructor.

**CHINLANG 23B. Second-Year Chinese for Bilingual Students, Third Quarter. 3 Units.**

Continuation of CHINLANG 22B. For students with advanced comprehension and speaking skills, but lacking equivalent knowledge of grammar, reading, and writing Chinese characters. Prerequisite: Placement Test, CHINLANG 22B or consent of instructor.

**CHINLANG 25. Intensive Second-Year Modern Chinese. 8 Units.**

Equivalent to 21,22,23 combined if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 3 or equivalent.

**CHINLANG 27. Intermediate Chinese Conversation, First Quarter. 2 Units.**

Prerequisite: CHINLANG 3 or consent of instructor.

**CHINLANG 28. Intermediate Chinese Conversation, Second Quarter. 2 Units.**

Continuation of CHINLANG 27. Prerequisite: CHINLANG 27 or consent of instructor.

**CHINLANG 29. Intermediate Chinese Conversation, Third Quarter. 2 Units.**

Continuation of CHINLANG 28. Prerequisite: CHINLANG 28 or consent of instructor.

**CHINLANG 31E. Accelerated Beginning Mandarin for Engineering Students, First Quarter. 4 Units.**

Restricted to engineering students participating in the China Internship Program. Prerequisite: consent of instructor. Grad students enroll in CHINLANG 331E.

**CHINLANG 33G. Accelerated Beginning Mandarin III. 4 Units.**

For GSB students only.

**CHINLANG 41. Intermediate-to-Advanced Chinese Conversation, First Quarter. 2 Units.**

Repeatable once for units. Prerequisite: CHINLANG 23 or consent of instructor.

**CHINLANG 42. Intermediate-to-Advanced Chinese Conversation, Second Quarter. 2 Units.**

Continuation of CHINLANG 41. Repeatable once for units. Prerequisite: CHINLANG 41 or consent of instructor.

**CHINLANG 43. Intermediate-to-Advanced Chinese Conversation, Third Quarter. 2 Units.**

Continuation of CHINLANG 42. Repeatable once for units. Prerequisite: CHINLANG 42 or consent of instructor.

**CHINLANG 99. Language Specials. 1-5 Units.**

Prerequisite: consent of instructor. (Staff).

**CHINLANG 101. Third-Year Modern Chinese, First Quarter. 5 Units.**

Continuation of CHINLANG 23. Written and spoken styles of modern Chinese. Reading and discussion of authentic writings on cultural topics; newspaper reports, radio, and TV broadcasts and films; online Chinese software and email network to facilitate study. Prerequisite: Placement Test, CHINLANG 23 or consent of instructor.

**CHINLANG 101B. Third-Year Modern Chinese for Bilingual Students, First Quarter. 3 Units.**

Continuation of CHINLANG 23B. Equivalent to CHINLANG 101.

For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Prerequisite: Placement Test, CHINLANG 23B or consent of instructor.

**CHINLANG 102. Third-Year Modern Chinese, Second Quarter. 5 Units.**

Continuation of CHINLANG 101. Written and spoken styles of modern Chinese. Reading and discussion of authentic writings on cultural topics; newspaper reports, radio, and TV broadcasts and films; online Chinese software and email network to facilitate study. Prerequisite: Placement Test, CHINLANG 101 or consent of instructor.

**CHINLANG 102B. Third-Year Modern Chinese for Bilingual Students, Second Quarter. 3 Units.**

Continuation of CHINLANG 101B. Equivalent to CHINLANG 102.

For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Prerequisite: Placement Test, CHINLANG 101B or consent of instructor.

**CHINLANG 103. Third-Year Modern Chinese, Third Quarter. 5 Units.**

Continuation of CHINLANG 102. Written and spoken styles of modern Chinese. Reading and discussion of authentic writings on cultural topics; newspaper reports, radio, and TV broadcasts and films; online Chinese software and email network to facilitate study. Prerequisite: Placement Test, CHINLANG 102 or consent of instructor.

**CHINLANG 103B. Third-Year Modern Chinese for Bilingual Students, Third Quarter. 3 Units.**

Continuation of CHINLANG 102B. Equivalent of CHINLANG 103.

For students with advanced listening and speaking abilities, but lacking equivalent knowledge in reading and writing. Prerequisite: CHINLANG 102B or consent of instructor.

**CHINLANG 105. Intensive Third-Year Modern Chinese. 8 Units.**

Equivalent to 101,102,103 combined if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 23 or equivalent.

**CHINLANG 121. Advanced Chinese Conversation, First Quarter. 2 Units.**

Continuation of CHINLANG 29. This is the first quarter of a three-quarter sequence designed for students who have completed Third-year Chinese, or its equivalent, and wish to continue to develop their speaking and listening skills. Content for the course is drawn from a wide variety of current multimedia materials. Topics include general interest and social issues, international relations, and others that lend themselves to lively and in-depth discussion. New grammatical structures and vocabulary will be regularly introduced, with occasional written assignments to support students; development of conversational skills. Placement Test, CHINLANG 103 or consent of instructor.

**CHINLANG 122. Advanced Chinese Conversation, Second Quarter. 2 Units.**

Continuation of CHINLANG 121. Second quarter of Advanced Conversational Chinese. It is designed for students who have completed Third-year Chinese, or its equivalent, and wish to continue to develop their speaking and listening skills. Content for the course is drawn from a wide variety of current multimedia materials. Topics include general interest and social issues, international relations, and others that lend themselves to lively and in-depth discussion. New grammatical structures and vocabulary will be regularly introduced, with occasional written assignments to support students; development of conversational skills. Prerequisite: CHINLANG 121 or equivalent consent of instructor.

**CHINLANG 123. Advanced Chinese Conversation, Third Quarter. 2 Units.**

Continuation of CHINLANG 122. Third quarter of Advanced Conversational Chinese. It is designed for students who have completed Third-year Chinese, or its equivalent, and wish to continue to develop their speaking and listening skills. Content for the course is drawn from a wide variety of current multimedia materials. Topics include general interest and social issues, international relations, and others that lend themselves to lively and in-depth discussion. New grammatical structures and vocabulary will be regularly introduced, with occasional written assignments to support students; development of conversational skills. Prerequisite: CHINLANG 122 or consent of instructor.

**CHINLANG 131. Business Chinese, First Quarter. 3-4 Units.**

Commercial, economic, and business-related vocabulary. Materials include formal business conversations, newspaper and journal articles, and TV news on trade and economic. Technical language and business etiquette. Student oral and written reports on their own research regarding recent economic developments, using sources in China. Prerequisite: CHINLANG 23 or equivalent.

**CHINLANG 132. Business Chinese, Second Quarter. 3-4 Units.**

Continuation of CHINLANG 131. Commercial, economic, and business-related vocabulary. Materials include formal business conversations, newspaper and journal articles, and TV news on trade and economic. Technical language and business etiquette. Student oral and written reports on their own research regarding recent economic developments, using sources in China. Prerequisite: CHINLANG 131 or consent of instructor.

**CHINLANG 133. Business Chinese, Third Quarter. 3-4 Units.**

Continuation of CHINLANG 132. Commercial, economic, and business-related vocabulary. Materials include formal business conversations, newspaper and journal articles, and TV news on trade and economic. Technical language and business etiquette. Student oral and written reports on their own research regarding recent economic developments, using sources in China. Prerequisite: CHINLANG 132 or equivalent consent of instructor.

**CHINLANG 199. individual Reading. 1-5 Units.****CHINLANG 200. Directed Reading. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.



**CHINLANG 205S. Intensive Third-Year Modern Chinese. 8 Units.** Equivalent to 101, 102, 103 if taken together with the Beijing portion of the Summer Program. Five weeks at Stanford and four weeks at Peking University. Prerequisite: 23 or equivalent. Grads only.

**CHINLANG 211. Fourth-Year Modern Chinese, First Quarter. 5 Units.**

Continuation of CHINLANG 103. This is the first quarter of a three-quarter sequence designed for students with advanced-level proficiency in Chinese. Discussions are based on short stories, essays and newspaper articles, and academic journal articles. Emphasis is on social and cultural issues in contemporary China. Students will learn speed-reading techniques and explore more subtle distinctions in Chinese language use, such as formal vs. informal styles and word choice, toward developing a more sophisticated understanding and command of the language. Having completed one year of study at this level, students will acquire sufficient skills in reading, writing, and speaking on various topics of personal, or academic, interests more effectively and accurately. Prerequisite: placement test, CHINLANG 103 or consent of instructor.

**CHINLANG 211B. Fourth year Modern Chinese for Bilingual Students, First Quarter. 3 Units.**

Continuation of CHINLANG 103B. This is the first quarter of a three-quarter sequence designed for bilingual students with advanced-level proficiency in Chinese. Discussions are based on short stories, essays and newspaper articles, along with related media materials. Emphasis is on social and cultural issues in contemporary China. Students will learn speed-reading techniques and explore more subtle distinctions in Chinese language use, such as formal vs. informal styles and word choice, toward developing a more sophisticated understanding and command of the language. Having completed one year of study at this level, students will acquire sufficient skills in reading, writing, and speaking on various topics of personal, or public, interests more effectively and accurately. Prerequisite: CHINLANG 103B or consent of instructor.

**CHINLANG 212. Fourth-Year Modern Chinese, Second Quarter. 5 Units.**

Continuation of CHINLANG 211. Second quarter of Fourth Year Chinese. Discussions are based on short stories, essays and newspaper articles, and academic journal articles. Emphasis is on social and cultural issues in contemporary China. Students will learn speed-reading techniques and explore more subtle distinctions in Chinese language use, such as formal vs. informal styles and word choice, toward developing a more sophisticated understanding and command of the language. Having completed one year of study at this level, students will acquire sufficient skills in reading, writing, and speaking on various topics of personal, or academic, interests more effectively and accurately. Prerequisite: Placement Test, CHINLANG 211 or consent of instructor.

**CHINLANG 212B. Fourth-Year Modern Chinese for Bilingual Students, Second Quarter. 3 Units.**

Continuation of CHINLANG 211B. Second quarter of Fourth Year Chinese for bilingual students. Discussions are based on short stories, essays and newspaper articles, along with related media materials. Emphasis is on social and cultural issues in contemporary China. Students will learn speed-reading techniques and explore more subtle distinctions in Chinese language use, such as formal vs. informal styles and word choice, toward developing a more sophisticated understanding and command of the language. Having completed one year of study at this level, students will acquire sufficient skills in reading, writing, and speaking on various topics of personal, or public, interests more effectively and accurately. Prerequisite: CHINLANG 211B or consent of instructor.

**CHINLANG 213. Fourth-Year Modern Chinese, Third Quarter. 5 Units.**

Continuation of CHINLANG 212. Third quarter of Fourth Year Chinese. Discussions are based on short stories, essays and newspaper articles, and academic journal articles. Emphasis is on social and cultural issues in contemporary China. Students will learn speed-reading techniques and explore more subtle distinctions in Chinese language use, such as formal vs. informal styles and word choice, toward developing a more sophisticated understanding and command of the language. Having completed one year of study at this level, students will acquire sufficient skills in reading, writing, and speaking on various topics of personal, or academic, interests more effectively and accurately. Prerequisite: Placement Test, CHINLANG 212 or consent of instructor.

**CHINLANG 213B. Fourth-Year Modern Chinese for Bilingual Students, Third Quarter. 3 Units.**

Continuation of CHINLANG 212B. Third quarter of Fourth Year Chinese for bilingual students. Discussions are based on short stories, essays and newspaper articles, along with related media materials. Emphasis is on social and cultural issues in contemporary China. Students will learn speed-reading techniques and explore more subtle distinctions in Chinese language use, such as formal vs. informal styles and word choice, toward developing a more sophisticated understanding and command of the language. Having completed one year of study at this level, students will acquire sufficient skills in reading, writing, and speaking on various topics of personal, or public, interests more effectively and accurately. Prerequisite: CHINLANG 212B or consent of instructor.

**CHINLANG 231. Fifth-Year Modern Chinese: Cultural China, First Quarter. 3 Units.**

Continuation of CHINLANG 213. Year-long sequence. Rhetorical devices through essays about China's cultural journey in relationship to geographical regions. Prerequisite: CHINLANG 213, 223B or consent of instructor.

**CHINLANG 232. Fifth-Year Modern Chinese: Cultural China, Second Quarter. 3 Units.**

Continuation of CHINLANG 231. Year-long sequence. Rhetorical devices through essays about China's cultural journey in relationship to geographical regions. Prerequisite: CHINLANG 231 or consent of instructor.

**CHINLANG 233. Fifth-Year Modern Chinese: Cultural China, Third Quarter. 3 Units.**

Continuation of CHINLANG 232. Year-long sequence. Rhetorical devices through essays about China's cultural journey in relationship to geographical regions. Prerequisite: CHINLANG 232 or consent of instructor.

**CHINLANG 331E. Accelerated Beginning Mandarin for Engineering Students, First Quarter. 2-5 Units.**

Restricted to graduate engineering students participating in the China Internship Program. Prerequisite: consent of instructor.

**CHINLANG 394. Graduate Studies in Chinese Conversation. 1-3 Units.**

Prerequisite: consent of instructor.

**CHINLANG 395. Graduate Studies in Chinese. 2-5 Units.**

Prerequisite: consent of instructor.

## Chinese Literature Courses

### CHINLIT 125. Beginning Classical Chinese, First Quarter. 2-5 Units.

Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127 to satisfy Chinese major requirements must begin with 125. Prerequisite: CHINLANG 23 or equivalent. Same as: CHINLIT 205.

### CHINLIT 126. Beginning Classical Chinese, Second Quarter. 2-5 Units.

Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 125/205 or equivalent. Same as: CHINLIT 206.

### CHINLIT 127. Beginning Classical Chinese, Third Quarter. 2-5 Units.

Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 126/206 or equivalent. Same as: CHINLIT 207.

### CHINLIT 166. Chinese Ci Poetry (Song Lyrics). 4 Units.

Introduction to poetry in the ci "song lyrics" form. This year the focus is on song lyrics of Li Qingzhao (1084-1150s), read against song lyrics composed by male writers of her day. Attention to the special challenges she faced as a woman writer, and the ways that the tradition struggled to accommodate this "talented woman." Prerequisite: Classical Chinese or advanced reading knowledge of Chinese. Same as: CHINLIT 266.

### CHINLIT 174. Modern Chinese Novel: Theory, Aesthetics, History. 4 Units.

From the May Fourth movement to the 40s. Themes include enlightenment, democracy, women's liberation, revolution, war, urban culture, and love. Prerequisite: advanced Chinese. Same as: CHINLIT 274, COMPLIT 254.

### CHINLIT 189A. Honors Research. 2-5 Units.

### CHINLIT 189B. Honors Research. 5 Units.

Open to senior honors students to write thesis.

### CHINLIT 190. Chinese Cultural Revolution: Performance, Politics, and Aesthetics. 4 Units.

Events, arts, films, and operas of the Chinese Cultural Revolution. Analysis of political passion, aesthetics, and psychology of mass movements. Places the Cultural Revolution in the long-range context of art, social movements, and politics. Chinese language is not required. Same as: CHINLIT 290, COMPLIT 135.

### CHINLIT 191. The Structure of Modern Chinese. 2-4 Units.

Focus is on syntax and semantics. Prerequisite: CHINLANG 3 or equivalent, or consent of instructor. Same as: CHINLIT 291.

### CHINLIT 199. Individual Reading in Chinese. 1-4 Units.

Asian Language majors only. Prerequisite: CHINLANG 103 or consent of instructor. Units by arrangement.

### CHINLIT 200. Directed Reading in Chinese. 1-12 Units.

### CHINLIT 201. Proseminar: Bibliographic and Research Methods in Chinese Studies. 3-5 Units.

Bibliographic and research methods in Chinese studies. Prerequisite: 127/207 or equivalent.

### CHINLIT 205. Beginning Classical Chinese, First Quarter. 2-5 Units.

Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127 to satisfy Chinese major requirements must begin with 125. Prerequisite: CHINLANG 23 or equivalent. Same as: CHINLIT 125.

### CHINLIT 206. Beginning Classical Chinese, Second Quarter. 2-5 Units.

Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 125/205 or equivalent. Same as: CHINLIT 126.

### CHINLIT 207. Beginning Classical Chinese, Third Quarter. 2-5 Units.

Goal is reading knowledge of classical Chinese. Basic grammar and commonly used vocabulary. Students with no background in classical Chinese who are taking 127/207 to satisfy Chinese major requirements must begin with 125/205. Prerequisite: CHINLANG 126/206 or equivalent. Same as: CHINLIT 127.

### CHINLIT 221. Advanced Classical Chinese: Philosophical Texts. 3-5 Units.

Prerequisite: 207 or equivalent.

### CHINLIT 222. Advanced Classical Chinese: Historical Narration. 2-5 Units.

Prerequisite: 127/207 or equivalent.

### CHINLIT 223. Advanced Classical Chinese: Literary Essays. 2-5 Units.

Readings and grammatical analyses of literary essays throughout imperial China. Prerequisite: CHINLIT 127/207 or equivalent.

### CHINLIT 261. Sources of Chinese Poetry. 4 Units.

The Book of Songs (ca. 1000-500 B.C.E.) and Songs of Chu (ca. 400 B.C.E.), the earliest anthologies of Chinese poetry.

### CHINLIT 263. Lyric (Shih) I. 2-4 Units.

Han through Sui dynasties.

### CHINLIT 265. Major Figures in Classical Chinese Shi Poetry. 2-4 Units.

Focus is on a major poet and relationships to previous and later poetry. Poetic form, including meter and rhyme schemes. Historical context. This year's poet is Tao Yuanming. May be repeated for credit. Prerequisites: 201, 207.

### CHINLIT 266. Chinese Ci Poetry (Song Lyrics). 4 Units.

Introduction to poetry in the ci "song lyrics" form. This year the focus is on song lyrics of Li Qingzhao (1084-1150s), read against song lyrics composed by male writers of her day. Attention to the special challenges she faced as a woman writer, and the ways that the tradition struggled to accommodate this "talented woman." Prerequisite: Classical Chinese or advanced reading knowledge of Chinese. Same as: CHINLIT 166.

### CHINLIT 272. Traditional Chinese Fiction: Novels. 2-4 Units.

Major novels of late imperial China. Prerequisite: 127/207 or consent of instructor.

### CHINLIT 273. Chinese Drama. 2-4 Units.

Yuan, Ming, and Qing periods emphasizing literary not theatrical qualities. Prerequisite: 127/207 or consent of instructor.

### CHINLIT 274. Modern Chinese Novel: Theory, Aesthetics, History. 4 Units.

From the May Fourth movement to the 40s. Themes include enlightenment, democracy, women's liberation, revolution, war, urban culture, and love. Prerequisite: advanced Chinese. Same as: CHINLIT 174, COMPLIT 254.

**CHINLIT 279. For Love of Country: National Narratives in Chinese Literature and Film. 3-5 Units.**

Explores the nation as it is constructed, deconstructed, and continuously contested in novels, short stories, films, and other media from the second half of the 20th century in mainland China and Taiwan. Asks how the trope of the nation and the ideology of nationalism mediate the relationships between politics and aesthetics. Explores the nation's internal fault lines of gender, ethnicity, geography, language, and citizenship.

**CHINLIT 289. The Poetics and Politics of Affect in Modern China. 3-5 Units.**

The role of affect in modern Chinese aesthetics and politics. Cultural and social theories of affect (love, hate, fear, grief, resentment, rage, sympathy, sincerity, shame, and nostalgia); affective discourses across genres and media including fiction, poetry, film, journalism, and television; and mass social movements such as protest, uprising, and revolution. Advanced undergraduates requires consent of instructor. Recommended: reading knowledge of Chinese.

**CHINLIT 290. Chinese Cultural Revolution: Performance, Politics, and Aesthetics. 4 Units.**

Events, arts, films, and operas of the Chinese Cultural Revolution. Analysis of political passion, aesthetics, and psychology of mass movements. Places the Cultural Revolution in the long-range context of art, social movements, and politics. Chinese language is not required.

Same as: CHINLIT 190, COMPLIT 135.

**CHINLIT 291. The Structure of Modern Chinese. 2-4 Units.**

Focus is on syntax and semantics. Prerequisite: CHINLANG 3 or equivalent, or consent of instructor.

Same as: CHINLIT 191.

**CHINLIT 292. The History of Chinese. 4 Units.**

Emphasis is on syntactic and semantic changes in the last 2,000 years and grammaticalization. Students use a computer corpus to do research on the history of Chinese. Prerequisite: 126 or consent of instructor.

Same as: CHINLIT 192.

**CHINLIT 299. Master's Thesis or Translation. 1-5 Units.**

A total of 5 units taken in one or more quarters.

**CHINLIT 369. Late Imperial Chinese Fiction. 2-5 Units.**

Primary works examined include Jin Ping Mei, Xingshi yinyuan zhuan, Hongloumeng, Qilu deng, Rulin waishi, and Ernu yingxiong zhuan. Secondary readings focus on social dimensions of the Chinese novel (ca. 1600-1850), but students may explore other aspects of the texts in their presentations and research papers. Comparisons with the English novel, particularly on the rise of the novel and the advent of modernity.

**CHINLIT 371. Aesthetics, Politics, and Literary Criticism: East and West. 2-5 Units.**

How aesthetics and politics intertwine and break apart in Western and Eastern traditions. Aesthetics for understanding culture, morality, and power in crosscultural contexts. Readings include Hegel, Kant, Marcuse, Lukacs, and Adorno; and Chinese thinkers Wang Guowei, Lu Xun, Li Zehou, and Mao. Prerequisite: CHINLIT 127/207 or consent of instructor.

Same as: COMPLIT 371.

**CHINLIT 399. Dissertation Research. 1-12 Units.**

**CHINLIT 400. Advanced Language Training. 1-15 Units.**

For students in the Inter-University Program for Chinese Language Studies in Beijing or Taipei. For more information, contact the consortium office at UC Berkeley: (510) 642-3873, or see [http://ieas.berkeley.edu/iup/contact\\_iup.html](http://ieas.berkeley.edu/iup/contact_iup.html).

## Civil Environmental Engineering Courses

**CEE 10. Introduction to the Civil & Environmental Engineering Professions. 1 Unitss.**

Open to freshman and sophomores; limited enrollment. Overview of undergraduate majors and possible career paths in Civil Engineering, Environmental Engineering, Atmosphere/Energy, and Architectural Design. Panel discussions with current undergraduate majors, and with faculty in CEE. For students with interest areas such as water resources, environmental biotechnologies, sustainability architecture, infrastructure planning global warming, green energy, structures, and construction.

**CEE 11SC. People, Land, and Water in the Heart of the West. 2 Units.**

Salmon River. Sun Valley. Pioneer Mountains. The names speak of powerful forces and ideas in the American West. Central Idaho - a landscape embracing snow-capped mountains, raging rivers, sagebrush deserts, farms, ranches, and resort communities - is our classroom for this field-based seminar led by David Freyberg, professor of Civil and Environmental Engineering, and David Kennedy, professor emeritus of History. This course focuses on the history and future of a broad range of natural resource management issues in the western United States. We will spend a week on campus preparing for a two-week field course in Idaho exploring working landscapes, private and public lands, water and fisheries, conservation, and the history and literature of the relationship between people and the land in the American West. After the first week spent on campus, we will drive to Idaho to begin the field portion of our seminar. In Idaho, we will spend time near Twin Falls, at Lava Lake Ranch near Craters of the Moon National Monument, in Custer County at the Upper Salmon River, and near Stanley in the Sawtooth National Forest. No prior camping experience is required, but students should be comfortable living outdoors in mobile base camps for periods of several days. Students will investigate specific issues in-depth and present their findings at the end of the course. Same as: EARTHSYS 13SC, HISTORY 23SC.

**CEE 12SC. Good Food, Fast Cars, Great Spaces: Connections Between Architecture, Cooking, Photography, Design. 2 Units.**

Why is it that architects almost routinely share passions for cuisine, vehicles, photography, and sailing? Many chefs were trained as architects, most architects are excellent cooks and photographers, and a stunning number of architects own boats. This course will explore the key design ideas, notions of creativity, and interest in form that thread through each of these professions. The first half of the course will focus on readings and discussion about creativity and form; the second half will test a single conceptual idea through a series of projects in two or three fields. Possible field trips may include a visit to Tesla, America's Cup events in SF, Baume (2 Michelin Star restaurant in Palo Alto), IDEO, and architecture firms.

**CEE 13SC. Energizing a Sustainable Future. 2 Units.**

The economic advancement, social equity, and planet earth habitat of your and future generations depend in major part on preparing for sustainable supply and efficient use of energy. The objective of this course is to provide a foundation for your future scholarship and action to increase energy sustainability. We will explore three major energy activities: development of fossil and renewable resources; conversion to useful forms; and use in buildings, transportation, and industry. All are strongly influenced by the energy markets, technologies, and policies that we will also study. Our quest for a sustainable energy future will begin at Stanford's Bass Center in Washington D.C. and conclude back on the Farm. This will allow access to policy makers and major organizations along with plans for major improvements to Stanford's energy system and buildings. The course requires: query responses on the readings in advance of class sessions; participation in morning class discussions and afternoon activities with key energy players; in teams of two, analysis of a self-selected topic related to an energy market or technology; and a group course project to analyze an energy policy or proposal. It is offered for two units with Satisfactory/No Credit grading. Students cover their own travel to the Bass center and arrive by 5 p.m. on September 6. The program will cover your travel to campus on September 16. Students planning to observe religious holidays during September Studies should check with the instructor to work through potential conflicts.

**CEE 13SI. Introduction to Architectural Modeling. 2 Units.**

Architecture is half design, half communicating design. In this course, students will gain the skills necessary to communicate architectural concepts through 3D modeling. From foam core to basswood to less known materials, students will gain a tactile understanding of material qualities and present their study models in portfolio format. Special focus will also be placed on techniques incorporating both computer-aided drafting and physical modeling through the laser cutter machine. No prior experience is necessary, but students will be expected to work in the studio outside of class time. Limited enrollment. Please contact Derek Ouyang at derekouyang@gmail.com for more info.. Class meets in PRL 36.

**CEE 20. Elementary Surveying. 0-60 Units.****CEE 31. Accessing Architecture Through Drawing. 4 Units.**

Preference to Architectural Design and CEE majors; others by consent of instructor. Drawing architecture to probe the intricacies and subtleties that characterize contemporary buildings. How to dissect buildings and appreciate the formal elements of a building, including scale, shape, proportion, colors and materials, and the problem solving reflected in the design. Students construct conventional architectural drawings, such as plans, elevations, and perspectives. Limited enrollment.

**CEE 31B. Architectural Drawing and Rendering. 4 Units.**

Course will expand on basics taught in CEE 31. Refresher on the basics of plans, sections, elevations, axonometrics, and perspectives. Students will be encouraged in conceptual thinking and translating concepts into Architecture. Introduction of computers for renderings and drafting as well as expanding on early model building. Field trip.

**CEE 31Q. Accessing Architecture Through Drawing. 4 Units.**

Preference to sophomores. Drawing architecture provides a deeper understanding of the intricacies and subtleties that characterize contemporary buildings. How to dissect buildings and appreciate the formal elements of a building, including scale, shape, proportion, colors and materials, and the problem solving reflected in the design. Students construct conventional architectural drawings, such as plans, elevations, and perspectives. Limited enrollment.

**CEE 32A. Psychology of Architecture. 3 Units.**

This course argues that architecture often neglects the interdisciplinary investigation of our internal psychological experience and the way it impacts our creation of space. How does our inner life influence external design? How are we impacted emotionally, physically, psychologically by the spaces we inhabit day to day? How might we intentionally imbue personal and public spaces with specific emotions? This seminar serves as a call to action for students interested in approaching architecture with a holistic understanding of the emotional impact of space. Sample topics addressed will include: conscious vs. unconscious design; the ego of architecture; psycho-spatial perspectives; ideas of home; integral/holistic architecture; phenomenology of inner and outer spaces; exploring archetypal architecture; and translating emotion through environment.

**CEE 32B. Design Theory. 4 Units.**

This seminar focuses on the key themes, histories, and methods of architectural theory -- a form of architectural practice that establishes the aims and philosophies of architecture. Architectural theory is primarily written, but it also incorporates drawing, photography, film, and other media. One of the distinctive features of modern and contemporary architecture is its pronounced use of theory to articulate its aims. One might argue that modern architecture is modern because of its incorporation of theory. This course focuses on those early-modern, modern, and late-modern writings that have been and remain entangled with contemporary architectural thought and design practice. Rather than examine the development of modern architectural theory chronologically, it is explored architectural through thematic topics. These themes enable the student to understand how certain architectural theoretical concepts endure, are transformed, and can be furthered through his/her own explorations. Same as: ARTHIST 232B.

**CEE 32Q. Place: Making Space Now. 3 Units.**

This seminar argues that architects are ultimately "placemakers," and questions what that means in the contemporary world. Part I investigates the meaning of the word "place." Additional background for understanding contemporary place making will include a critique of the history of modern place-making through an examination of modern form. Part II examines two traditional notions of place by scale: from "home" to "the city." What elements give these conceptions of space a sense of place? To answer this question, themes such as memory, mapping, and boundary, among others, will be investigated. Part III presents challenges to the traditional notions of place discussed in Part II. Topics addressed include: What does it mean to be "out of place"? What sense of place does a nomad have, and how is this represented? What are the "non-places" and how can architects design for these spaces? Part IV addresses the need to re-conceptualize contemporary space. The role of digital and cyber technologies, the construction of locality in a global world, and the in-between places that result from a world in flux are topics discussed in this section of the seminar. Learning goals: Specific goals include close reading of texts, understanding of philosophical thinking and writing, argument under uncertainty, and developed concepts of place, space and architecture. Same as: ARTHIST 232Q.

**CEE 44Q. Critical Thinking and Career Skills. 3 Units.**

Factors required for successful careers. Guest speakers. Case studies. Participation in real world corporate interviews, testing and reviews conducted by industry trainers. Limited enrollment.

**CEE 46Q. Fail Your Way to Success. 3 Units.**

Preference to sophomores. How to turn failures into successes; cases include minor personal failures and devastating engineering disasters. How personalities and willingness to take risks influence the way students approach problems. Field trips, case studies, and guest speakers applied to students day-to-day interactions and future careers. Goal is to redefine what it means to fail.

**CEE 48N. Organizing Global Projects. 4 Units.**

Preference to freshmen. Challenges associated with planning and managing both commercial and governmental/non-profit global projects; theory, methods, and tools to enhance global project outcomes. Students teams model and simulate crosscultural teams engaged in global projects. Opportunities to participate in research in the Collaboratory for Research on Global Projects involving faculty from Stanford departments and schools; see <http://crgp.stanford.edu>.

**CEE 50N. From the Foothills to the Bay. 3 Units.**

Stanford University sits on the shores of one of the world's great estuaries, the San Francisco Bay/Delta, the connection of the inland river systems of the Central Valley to the Pacific Ocean. This course is intended to provide an introduction to the San Francisco Bay/Delta including its history, current scientific understanding of its physical and ecological functioning, descriptions and underpinnings of engineering manipulations of the system, and the intersection of science and engineering with policies designed to manage its resources. Because of the important effects that water resources development, most notably upstream diversions, have had on the system, Bay-Delta science, engineering and policy are completely intertwined with the management of the water supply of California. Thus, we will also examine relevant issues in California water that touch on the Bay Delta including an overall description of California hydrology, the State and Federal water projects and how they are managed, legal and governance issues, including the application of the Endangered Species Act to several species of Bay-Delta fish, and recent and ongoing attempts at balancing protection/restoration of the ecological functioning with maintenance of a stable water supply for the state of California.

**CEE 63. Weather and Storms. 3 Units.**

Daily and severe weather and global climate. Topics: structure and composition of the atmosphere, fog and cloud formation, rainfall, local winds, wind energy, global circulation, jet streams, high and low pressure systems, inversions, el Niño, la Niña, atmosphere/ocean interactions, fronts, cyclones, thunderstorms, lightning, tornadoes, hurricanes, pollutant transport, global climate and atmospheric optics.  
Same as: CEE 263C.

**CEE 64. Air Pollution and Global Warming: History, Science, and Solutions. 3 Units.**

Survey of Survey of air pollution and global warming and their renewable energy solutions. Topics: evolution of the Earth's atmosphere, history of discovery of chemicals in the air, bases and particles in urban smog, visibility, indoor air pollution, acid rain, stratospheric and Antarctic ozone loss, the historic climate record, causes and effects of global warming, impacts of energy systems on pollution and climate, renewable energy solutions to air pollution and global warming. UG Reqs: GER: DBNatSci  
Same as: CEE 263D.

**CEE 70. Environmental Science and Technology. 3 Units.**

Introduction to environmental quality and the technical background necessary for understanding environmental issues, controlling environmental degradation, and preserving air and water quality. Material balance concepts for tracking substances in the environmental and engineering systems.  
Same as: ENGR 90.

**CEE 70N. Water, Public Health, and Engineering. 3 Units.**

Preference to sophomores. Linkages between water, wastewater and public health, with an emphasis on engineering interventions. Topics include the history of water and wastewater infrastructure development in the U.S. and Europe; evolution of epidemiological approaches for water-related health challenges; biological and chemical contaminants in water and wastewater and their management; and current trends and challenges in access to water and sanitation around the world. Identifying ways in which freshwater contributes to human health; exposure routes for water- and sanitation-illness. Classifying illnesses by pathogen type and their geographic distribution. Identifying the health and economic consequences of water- and sanitation-related illnesses; costs and benefits of curative and preventative interventions. Interpreting data related to epidemiological and environmental concepts. No previous experience in engineering is required.

**CEE 100. Managing Sustainable Building Projects. 4 Units.**

Managing the life cycle of buildings from the owner, designer, and contractor perspectives emphasizing sustainability goals; methods to define, communicate, coordinate, and manage multidisciplinary project objectives including scope, quality, life cycle cost and value, schedule, safety, energy, and social concerns; roles, responsibilities, and risks for project participants; virtual design and construction methods for product, organization, and process modeling; lifecycle assessment methods; individual writing assignment related to a real world project.

**CEE 101A. Mechanics of Materials. 4 Units.**

Introduction to beam and column theory. Normal stress and strain in beams under various loading conditions; shear stress and shear flow; deflections of determinate and indeterminate beams; analysis of column buckling; structural loads in design; strength and serviceability criteria. Lab experiments. Prerequisites: ENGR 14.

**CEE 101B. Mechanics of Fluids. 4 Units.**

Physical properties of fluids and their effect on flow behavior; equations of motion for incompressible ideal flow, including the special case of hydrostatics; continuity, energy, and momentum principles; control volume analysis; laminar and turbulent flows; internal and external flows in specific engineering applications including pipes, open channels, estuaries, and wind turbines. Prerequisites: PHYSICS 41 (formerly 53), MATH 51.

**CEE 101C. Geotechnical Engineering. 3-4 Units.**

Introduction to the principles of soil mechanics. Soil classification, shear strength and stress-strain behavior of soils, consolidation theory, analysis and design of earth retaining structures, introduction to shallow and deep foundation design, slope stability. Lab projects. Prerequisite: ENGR 14. Recommended: 101A.

**CEE 101D. Computations in Civil and Environmental Engineering. 3 Units.**

Computational and visualization methods in the design and analysis of civil and environmental engineering systems. Focus is on applications of MATLAB. How to develop a more lucid and better organized programming style.  
Same as: CEE 201D.

**CEE 102. Legal Aspects of Engineering and Construction. 3 Units.**

Introduction to the U.S. legal system as it applies to civil engineering and construction. Fundamental concepts of contract and tort law, claims, risk management, business formation and licensing, agency, insurance and bonding, and real property. (London).

**CEE 109. Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision. 2 Units.**

Examination of program-based local actions that promote resource conservation and an educational environment for sustainability. Examination of building-level actions that contribute to conservation, lower utility costs, and generate understanding of sustainability consistent with Stanford's commitment to sustainability as a core value. Overview of operational sustainability including energy, water, buildings, waste, and food systems. Practical training to enable students to become sustainability coordinators for their dorms or academic units.  
Same as: EARTHSYS 109, ENVRINST 109.

**CEE 110. Building Information Modeling. 2-4 Units.**

(Graduate students register for 210.) Creation, management, and application of building information models. Process and tools available for creating 2D and 3D computer representations of building components and geometries. Organizing and operating on models to produce architectural views and construction documents, renderings and animations, and interface with analysis tools. Lab exercises, class projects. Limited enrollment.  
Same as: CEE 210.

**CEE 112A. Industry Applications of Virtual Design & Construction. 2-4 Units.**

Building upon the concept of VDC Scorecard, CEE 112A/212A investigates in the management of Virtual Design and Construction (VDC) programs and projects in the building industry. Interacting with experts and professionals in real estate, architecture, engineering, construction and technology providers, students will learn from the industry applications of Building Information Modeling and its relationship with Integrated Project Delivery, Sustainable Design and Construction. Students will conduct case studies to evaluate the maturity of VDC planning, adoption, technology and performance in practice. Students taking 3 or 4 units will be paired up with independent research or case study projects on the industry applications of VDC. No prerequisite. See CEE112B/212B in the Winter Quarter and CEE 112C/212C in the Spring Quarter.

**CEE 112B. Industry Applications of Virtual Design & Construction. 2-4 Units.**

As a continuation of the Autumn-quarter course, CEE 112B/212B furthers the study of the VDC scorecard and investigates in the management of Virtual Design and Construction (VDC) programs and projects in the building industry. Students will be paired up with industry-based VDC projects with public owners and private developers, such as GSA Public Buildings Service, the Hong Kong Mass Transit Railway, Optima, Walt Disney Imagineering, Microsoft facilities and/or other CIFE International members. Independently, students will conduct case studies and/or develop VDC building information models (BIM) using off-the-shelf technologies for project analysis, collaboration, communication and optimization. Students will gain insights and develop skills that are essential for academic research, internships or industry practice in VDC. Prerequisite: CEE 112A/212A, CEE 159C/259C, CEE 159D/259D, or Instructor's approval. See CEE 112C/212C in the Spring Quarter.  
Same as: CEE 212B.

**CEE 112C. Industry Applications of Virtual Design & Construction. 2-4 Units.**

Following the Autumn- and Winter-quarter course series, CEE 112C/212C is an industry-focused and project-based practicum that focuses on the industry applications of Virtual Design and Construction (VDC). Students will be paired up with industry-based VDC projects with public owners and private developers, such as GSA Public Buildings Service, the Hong Kong Mass Transit Railway, Optima, Walt Disney Imagineering, Microsoft facilities and/or other CIFE International members. Independently, students will conduct case studies and/or develop VDC and building information models (BIM) using off-the-shelf technologies for project analysis, collaboration, communication and optimization. Students will gain insights and develop skills that are essential for academic research, internships or industry practice in VDC. Prerequisite: CEE 112A/212A, CEE 112B/212B, CEE 159C/259C, CEE 159D/259D, or Instructor's Approval.  
Same as: CEE 212C.

**CEE 115. Goals and Methods of Sustainable Building Projects. 3 Units.**

(Graduate students register for 215.) Goals related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and economic and social sustainability. Methods to integrate these goals and enhance the economic, ecological, and equitable value of building projects. Industry and academic rating systems, project case studies, guest lecturers, and group project.  
Same as: CEE 215.

**CEE 122A. Computer Integrated Architecture/Engineering/Construction. 2 Units.**

Undergraduates serve as apprentices to graduate students in the AEC global project teams in CEE 222A. Apprentices participate in all activities of the AEC team, including the goals, objectives, constraints, tasks, and process of a crossdisciplinary global AEC teamwork in the concept development phase of a comprehensive building project. Prerequisite: consent of instructor.  
Same as: A/E/C.

**CEE 122B. Computer Integrated A/E/C. 2 Units.**

Undergraduates serve as apprentices to graduate students in the AEC global project teams in CEE 222B. Project activity focuses on modeling, simulation, life-cycle cost, and cost benefit analysis in the project development phase. Prerequisite: CEE 122A.

**CEE 124. Sustainable Development Studio. 1-5 Units.**

(Graduate students register for 224A.) Project-based. Sustainable design, development, use and evolution of buildings; connections of building systems to broader resource systems. Areas include architecture, structure, materials, energy, water, air, landscape, and food. Projects use a cradle-to-cradle approach focusing on technical and biological nutrient cycles and information and knowledge generation and organization. May be repeated for credit.

**CEE 127E. Infrastructure, Disruptive Technologies and Entrepreneurship.. 1 Unitss.**

Silicon Valley provides a dynamic environment perfectly suited for developing the disruptive technologies that are changing the faces of today's mainstream infrastructure systems and essential service industries. This course will provide an overview of the most exciting technologies emerging from Silicon Valley right now and the potential that exists to disrupt mainstream transportation, electricity, intelligence gathering, and banking infrastructure systems that were dominant in the 20 th Century. Guest speakers include prominent CEOs, visionaries, investors, and serial entrepreneurs who are building game changing companies.  
Same as: CEE 227E.

**CEE 129. Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future. 3 Units.**

Interdisciplinary. Exploration of impacts of climate change on coastal ports and harbors around the world. The research team will utilize a broad range of tools to assess the engineering, construction, and policy responses necessary to protect ports and harbors from significant sea-level rise and storm surge. Collaborations with national and international experts. Consideration of economic, social and environmental implications. Independent and team projects will contribute to ongoing research. Guest speakers, case studies and field trips. [www.groupspaces.com/seaports2100](http://www.groupspaces.com/seaports2100). Recommended: CEE 129S/229S seminar series. Same as: CEE 229.

**CEE 129S. Climate Change Adaptation in the Coastal Built Environment. 1 Unitss.**

How will climate change impact coastal ports and harbors around the world? Leading experts discuss the latest science, policy, and engineering research on this important issue, including the necessary response to protect ports and harbors from significant sea-level rise and storm surge. Focus is on the built environment. Guest speakers. CEE 229/129 for research option. See [www.groupspaces.com/seaports2100](http://www.groupspaces.com/seaports2100). Same as: CEE 229S.

**CEE 130. Architectural Design: 3-D Modeling, Methodology, and Process. 4 Units.**

Preference to Architectural Design majors; others by consent of instructor. Projects investigate conceptual approaches to the design of key architectural elements, such as wall and roof. Functional and structural considerations. Focus is on constructing 3-D models in a range of materials; 3-D computer modeling. Students keep a graphic account of the evolution of their design process. Final project entails design of a simple structure. Limited enrollment. Pre- or corequisite: CEE 31 or 31Q.

**CEE 131. Architectural Design Process. 4 Units.**

Preference to Architectural Design and CEE majors; others by consent of instructor. Issues in the architectural profession including programming, site analysis, design process, and professional practice concerns. Building/landscape design case study project using architectural graphics and models. Limited enrollment.

**CEE 131A. Professional Practice: Mixed-Use Design in an Urban Setting. 3 Units.**

The delivery of a successful building design program involves unique collaboration between architect and client. This course will endeavor to teach the skills necessary for a designer to identify, evaluate, conceptualize and fully document a complex mixed-use urban design. Students will complete the course with a detailed knowledge of the consultants, engineers and other professionals needed for a complete program. Course deliverables will include three short assignments and a final project consisting of basic schematic drawings for the selected project. Guest presenters will cover topics of interest. Lectures, discussions, in-class studio-work and an oral presentation. Pre-requisite: CEE 130.

**CEE 132. Interplay of Architecture and Engineering. 4 Units.**

The range of requirements that drive a building's design including architecture, engineering, constructability, building codes, and budget. Case studies illustrate how structural and mechanical systems are integrated into building types including residential, office, commercial, and retail. In-class studio work. Same as: CEE 232.

**CEE 132Q. Office of Metropolitan Architecture: Workshop of the New. 4-5 Units.**

This seminar investigates all aspects of the work of the Office of Metropolitan Architecture (OMA) and its leader Rem Koolhaas. Topics for class research and inquiry include but are not limited to: Koolhaas's early work at the Architectural Association and the founding of OMA, the publications of OMA and their style of presentation and theoretical foundations, the importance of AMO, and the architects who have left OMA and founded their own practices and how these differ from OMA. Each student completes an in-depth research paper and an in-class presentation. Same as: ARTHIST 262.

**CEE 133. Integrated Modeling, Presentation & Production. 2 Units.**

The class will explore an integrated workflow between design environments. We will stretch the comprehension from simple 3D modeling to integrated conceptualization of the design process. In addition to the introduction to the various design software, students will study and implement an integrated workflow that connects powerful modeling with top level visualization and production methods in order to produce a top level outcome. We will look at the different challenges and limitations of each modeling environment, and how these limits can be bridged. Same as: CEE 233.

**CEE 133F. Principles of Freehand Drawing. 3 Units.**

Traditional methods of depicting shape, form, and surface are applied to the discipline of architectural drawing. Students develop abilities to observe visual phenomenon analytically and translate subjects onto a two-dimensional surface in a variety of media. Drawing techniques such as modeling form, shading, rendering materials, and articulating landscaping are explored. Linear perspective exercises provide a foundation for the construction of drawings to illustrate cohesive design proposals. Step-by-step constructions, quick freehand sketches from slides, and on-location studies.

**CEE 134A. Site and Space. 4 Units.**

Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring the Stanford Green Dorm project. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Enrollment limited to 14. Prerequisites: 31 or 31Q, and 110 and 130.

**CEE 134B. Intermediate Arch Studio. 4 Units.**

This studio offers students experience in working with a real site and a real client program to develop a community facility. Students will develop site analysis, review a program for development and ultimately design their own solutions that meet client and community goals. Sustainability, historic preservation, community needs and materials will all play a part in the development of students final project. Students will also gain an understanding of graphic conventions, verbal and presentation techniques. Course may be repeated for credit.

**CEE 136. Green Architecture. 4 Units.**

Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring green design and green design processes. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Prerequisites: 31 or 31Q, and 110 and 130. Enrollment is limited to 14 (or possibly 16) students. Please do not enroll in the class until after attending the first class meeting. If the number of students interested in taking the class is greater than 14 (or possibly 16), space will be assigned based on requirements for graduation. Same as: CEE 236.

**CEE 137A. Form and Structure. 4 Units.**

Preference to Architectural Design and CEE majors; others by consent of instructor. Intermediate architectural studio. The integration of structure, form, site, and program. Emphasis is on developing a schematic design in the context of site topography and structural systems. Limited enrollment. Prerequisites: 31 or 31Q, and 130.

**CEE 137B. Advanced Architecture Studio. 5 Units.**

This course will focus on the topic of interdisciplinary collaboration and its role in the development of design concepts. Specifically, the integration of structural with architectural considerations to produce a unified urban, spatial, tectonic and structural proposition will be our field of investigation. This course is an architecture studio course where class time will be spent primarily in individual or group desk critiques and pin-up sessions. Additionally, there will be lectures, case study presentations and a field trip. Prerequisites: required: CEE 31 (or 31Q) Drawing, CEE 110 BIM and CEE 130 Design.

**CEE 138A. Contemporary Architecture: Materials, Structures, and Innovations. 3 Units.**

Structural and material bases for contemporary architecture; its roots in modern innovations. Recent technological developments; new materials and structural expressions. Sources include specific buildings and construction techniques. How to think critically about design strategies, material properties, and structural techniques.

**CEE 139. Design Portfolio Methods. 2 Units.**

Students present designs completed in other studio courses to communicate design intentions and other aspects of their work. Instruction in photography; preparation of a design portfolio; and short essays that characterize portfolio contents. Oral presentation workshops offered through the Center for Teaching and Learning. Limited enrollment. Prerequisites: two Art or Architecture studio courses, or consent of instructor.

**CEE 140. Field Surveying Laboratory. 3 Units.**

Graduate students register for 225. Friday afternoon laboratory provides practical surveying experience. Additional morning classes to prepare for the afternoon sessions. Hands-on operation of common traditional field survey tools ; introduction to the newest generation of digital measuring, positioning, and mapping tools. Emphasis is on the concept of using the data collected in the field as the basis for subsequent engineering and economic decisions.

Same as: CEE 225.

**CEE 141A. Infrastructure Project Development. 3 Units.**

Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of the condition of the nation's infrastructure and how projects are planned and financed. Focus is on public works in the U.S. The role of public and private sectors through a step-by-step study of the project development process. Case studies of real infrastructure projects. Industry guest speakers. Student teams prepare project environmental impact statements.

Same as: CEE 241A.

**CEE 141B. Infrastructure Project Delivery. 3 Units.**

Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of how projects are designed, constructed, operated, and maintained. Focus is on public works projects in the U.S. Alternative project delivery approaches and organizational strategies. Case studies of real infrastructure projects. Industry guest speakers. Student teams prepare finance/design/build/operate/maintain project proposals.

Same as: CEE 241B.

**CEE 141C. Global Infrastructure Projects Seminar. 1-2 Units.**

Real infrastructure projects presented by industry guest speakers. Energy, transportation, water, public facilities and communications projects are featured. Course provides comparisons of project development and delivery approaches for mega-projects around the world. Alternative project delivery methods, the role of public and private sector, different project management strategies, and lessons learned. Field trips to local projects. Same as: CEE 241C.

**CEE 142A. Negotiating Sustainable Development. 3 Units.**

How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.

Same as: CEE 242A, EARTHSYS 142A, EARTHSYS 242A.

**CEE 146A. Engineering Economy. 3 Units.**

Fundamentals of financial and economic analysis. Engineering Economy Principles. Interest rates, Present value, annual cash flow, internal rate of return, benefit-cost analysis. Economic Life, Life Cycle Costs. Replacement analysis. Project Selection - Mutually Exclusive Alternatives, Multiple Objective Criteria. Depreciation. Inflation and Taxes. Sensitivity and risk analysis. Uncertainty and Probability. Decision Trees. Capital Budgeting. Same as: CEE 246A.

**CEE 147. Cases in Personality, Leadership, and Negotiation. 3 Units.**

Case studies target personality issues, risk willingness, and life skills essential for real world success. Failures, successes, and risk willingness in individual and group tasks based on the professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Application downloaded from coursework must be submitted before first class; mandatory first class attendance. No auditors. Same as: CEE 247.

**CEE 151. Negotiation. 3 Units.**

Students learn to prepare for and conduct negotiations in a variety of arenas including getting a job, managing workplace conflict, negotiating transactions, and managing personal relationships. Interactive class. The internationally travelled instructor who has mediated cases in over 75 countries will require students to negotiate real life case studies and discuss their results in class. Application required before first day of class; see Coursework.

Same as: CEE 251, EARTHSCI 251.

**CEE 154. Cases in Estimating Costs. 3 Units.**

Students participate in bidding contests requiring cost determination in competitive markets. Monetary forces driving the construction industry as general principles applicable to any competitive business. Cases based on field trips and professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Limited enrollment; no auditors. Prerequisites: consent or instructor and application downloaded from CourseWork prior to start of class. Same as: CEE 254.

**CEE 155. Introduction to Sensing Networks for CEE. 4 Units.**

Introduce the design and implementation of sensor networks for monitoring the built and natural environment. Emphasis on the integration of modern sensor and communication technologies, signal processing and statistical models for network data analysis and interpretation to create practical deployments to enable sustainable systems, in areas such as energy, weather, transportation and buildings. Students will be involved in a practical project that may involve deploying a small sensor system, data models and analysis and signal processing. Limited enrollment.



**CEE 156. Building Systems. 4 Units.**

HVAC, lighting, and envelope systems for commercial and institutional buildings, with a focus on energy efficient design. Knowledge and skills required in the development of low-energy buildings that provide high quality environment for occupants.  
Same as: CEE 256.

**CEE 160. Mechanics of Fluids Laboratory. 2 Units.**

Lab experiments illustrate conservation principles and flows of real fluids, analysis of error and modeling of simple fluid systems. Corequisite: 101B. Prerequisite: CEE 101D or CME 102, or familiarity with Matlab.

**CEE 161A. Rivers, Streams, and Canals. 3-4 Units.**

Introduction to the movement of water through natural and engineered channels, streams, and rivers. Basic equations and theory (mass, momentum, and energy equations) for steady and unsteady descriptions of the flow. Application of theory to the design of flood-control and canal systems. Flow controls such as weirs and sluice gates; gradually varied flow; Saint-Venant equations and flood waves; and method of characteristics. Open channel flow laboratory experiments: controls such as weirs and gates, gradually varied flow, and waves. Limited enrollment in lab section. Prerequisite: CEE 101B  
Same as: CEE 264A.

**CEE 164. Introduction to Physical Oceanography. 4 Units.**

The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53). (Note: this course will be offered Win Qtr 2012-13. For Academic Year 2013-14, this course will potentially be moved to Aut Qtr)  
Same as: CEE 262D, EARTHSYS 164, EESS 148.

**CEE 165C. Water Resources Management. 3 Units.**

Focus is on the basic principles of surface and ground water resources management in the context of water scarcity and hydrologic uncertainty. Topics include reservoir, river basin, and aquifer management, conjunctive use of surface and ground water, wastewater reuse, and demand management. Considers technical, economic, social, and political elements of water management. Open to undergraduates (juniors and seniors) as CEE 165C.  
Same as: CEE 265C.

**CEE 166A. Watersheds and Wetlands. 3 Units.**

Introduction to the occurrence and movement of water in the natural environment and its role in creating and maintaining terrestrial, wetland, and aquatic habitat. Hydrologic processes, including precipitation, evaporation, transpiration, snowmelt, infiltration, subsurface flow, runoff, and streamflow. Rivers and lakes, springs and swamps. Emphasis is on observation and measurement, data analysis, modeling, and prediction. Prerequisite: 101B or equivalent. (Freyberg)  
Same as: CEE 266A.

**CEE 166B. Floods and Droughts, Dams and Aqueducts. 3 Units.**

Sociotechnical systems associated with human use of water as a resource and the hazards posed by too much or too little water. Potable and non-potable water use and conservation. Irrigation, hydroelectric power generation, rural and urban water supply systems, storm water management, flood damage mitigation, and water law and institutions. Emphasis is on engineering design. Prerequisite: 166A or equivalent. (Freyberg)  
Same as: CEE 266B.

**CEE 166D. Water Resources and Water Hazards Field Trips. 2 Units.**

Introduction to water use and water hazards via weekly field trips to local and regional water resources facilities (dams, reservoirs, fish ladders and hatcheries, pumping plants, aqueducts, hydropower plants, and irrigation systems) and flood damage mitigation facilities (storm water detention ponds, channel modifications, flood control dams, and reservoirs). Each trip preceded by an orientation lecture.  
Same as: CEE 266D.

**CEE 171. Environmental Planning Methods. 3 Units.**

For juniors and seniors. Use of microeconomics and mathematical optimization theory in the design of environmental regulatory programs; tradeoffs between equity and efficiency in designing regulations; techniques for predicting adverse effects in environmental impact assessments; information disclosure requirements; and voluntary compliance of firms with international regulating norms. Prerequisites: MATH 51. Recommended: 70.

**CEE 171E. Environmental Challenges and Policies in Europe. 3 Units.**

Current and future environmental challenges in Europe and related public policies in the European Union (EU). State of the European environment and human development, European environmental policy-making (multi-level ecological governance), global ecological role of the EU. Specific challenges include climate change adaptation, mitigation (carbon taxes, carbon market), climate change and European cities, biodiversity and ecosystems preservation (economics of biodiversity), energy management. Specific policies include environmental justice (environmental inequalities), human development and environmental sustainability indicators (beyond GDP) and absolute and relative decoupling (carbon intensity and resource productivity improvement). Open to undergraduates (freshmen, sophomores, juniors and seniors) as CEE 171E.  
Same as: CEE 271E.

**CEE 172. Air Quality Management. 3 Units.**

Quantitative introduction to the engineering methods used to study and seek solutions to current air quality problems. Topics: global atmospheric changes, urban sources of air pollution, indoor air quality problems, design and efficiencies of pollution control devices, and engineering strategies for managing air quality. Prerequisites: 70, MATH 51.

**CEE 172A. Indoor Air Quality. 2-3 Units.**

Factors affecting the levels of air pollutants in the built indoor environment. The influence of ventilation, office equipment, floor coverings, furnishings, cleaning practices, and human activities on air quality including carbon dioxide, VOCs, resuspended dust, and airborne molds and fungi. Recommended: 172 or 278A.  
Same as: CEE 278C.

**CEE 172S. Green House Gas Mitigation. 1-3 Units.**

This course will introduce the main concepts of greenhouse gas (GHG) emissions measurement and management, and it will explore the main mitigation options for reducing emissions or sequestering carbon dioxide. It will address technical aspects of GHG mitigation via energy efficiency and demand-side management, energy in high-technology industry, distributed power and co-generation, the role of renewable energy in GHG management, carbon sequestration in forestry, agriculture, and geological formations. The course explores policy options, carbon trading and business strategies for GHG mitigation.  
Same as: CEE 272S.

**CEE 173A. Energy Resources. 4-5 Units.**

Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities. Optional discussion section for extra unit. CEE 173 is offered for 4-5 units; ES 103 is offered for 4-5 units; CEE 207A is offered for 3-5 units; instructor approval required for 3-unit option. Same as: CEE 207A, EARTHYSYS 103.

**CEE 173C. Introduction to Membrane Technology for Water / Wastewater Treatment. 3 Units.**

This course equips students with a basic understanding of membrane processes and their application in the water industry. Topics covered include: introduction to membrane separation, reverse osmosis, nanofiltration, membrane characterization techniques (XPS, TEM, ATR-FTIR, streaming potential), mass transport phenomena (concentration polarization, solution-diffusion, pore-flow) fouling processes (scaling, biofouling), rejection of salts and trace organics, brine disposal, system design, energy and cost considerations of membrane treatment, pre- and post-treatment, case studies. The course includes a field trip to a reverse osmosis pilot plant and evaluation of field data. Same as: CEE 273C.

**CEE 175A. California Coast: Science, Policy, and Law. 3-4 Units.**

Same as LAW 514. Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips. Same as: CEE 275A, EARTHYSYS 175, EARTHYSYS 275.

**CEE 176A. Energy Efficient Buildings. 3-4 Units.**

Analysis and design. Thermal analysis of building envelope, heating and cooling requirements, HVAC, and building integrated PV systems. Emphasis is on residential passive solar design and solar water heating. Lab.

**CEE 176B. Electric Power: Renewables and Efficiency. 3-4 Units.**

Renewable and efficient electric power systems emphasizing analysis and sizing of photovoltaic arrays and wind turbines. Basic electric power generation, transmission and distribution, distributed generation, combined heat and power, fuel cells. End use demand, including lighting and motors. Lab.

**CEE 176F. Energy Systems Field Trips: China Energy Systems. 1-2 Units.**

Energy resources and policies in use and under development in China. 12-day field trip to China during Spring Break 2012. One unit for seminar and readings; one unit for field trip. Tuesday section is required for all students, Thursday section is also required for students attending the field trip. Prerequisite: consent of instructor for field trip. Same as: CEE 276F.

**CEE 176S. Instrumental Analysis of Microconstituents in the Environment. 3 Units.**

Current research, practice, and thinking in environmental engineering and science. Featuring presentations by invited faculty, researchers and professionals to share their insight and perspectives on environmental issues. Students will prepare brief summaries of seminar presentations and associated readings. For 2-unit option, students will also prepare and give a short presentation on a relevant environmental topic. Same as: CEE 276S.

**CEE 177. Aquatic Chemistry and Biology. 4 Units.**

Introduction to chemical and biological processes in the aqueous environment. Basic aqueous equilibria; the structure, behavior, and fate of major classes of chemicals that dissolve in water; redox reactions; the biochemistry of aquatic microbial life; and biogeochemical processes that govern the fate of nutrients and metals in the environment and in engineered systems. Prerequisite: CHEM 31.

**CEE 177K. Environmental Information Engineering. 2-3 Units.**

The role of information technology (IT) in enabling mankind to understand its impact on the planet and balance that with improving the quality of life of a rapidly growing population. After surveying the field, the course will examine the specific impacts that IT may have, by reference to case studies from energy, transportation, water and urban design fields. While some specific information technologies will be examined, this will be from a business perspective - detailed technical knowledge of IT not required. Same as: CEE 277K.

**CEE 177P. Sustainability in Theory and Practice. 3 Units.**

The multidimensional concept of sustainable development. Students evaluate engineered systems using tools such as cost-benefit analysis, trade-off analysis, and lifecycle analysis. How to make judgments about sustainable and unsustainable courses of action. Case studies dealing with contemporary environmental and economic challenges.

**CEE 177S. Design for a Sustainable World. 1-5 Units.**

Technology-based problems faced by developing communities worldwide. Student groups partner with organizations abroad to work on concept, feasibility, design, implementation, and evaluation phases of various projects. Past projects include a water and health initiative, a green school design, seismic safety, and medical device. Admission based on written application and interview. See <http://esw.stanford.edu> for application. (Staff) Same as: CEE 277S.

**CEE 177X. Current Topics in Sustainable Engineering. 1-5 Units.**

Weekly seminar course run by Engineers for Sustainable World (ESW) student group in conjunction with faculty advisors. Speakers come in weekly to orient students to the science and engineering that is the foundation for current ESW projects. Instructor consent required. Same as: CEE 277X.

**CEE 178. Introduction to Human Exposure Analysis. 3 Units.**

(Graduate students register for 276.) Scientific and engineering issues involved in quantifying human exposure to toxic chemicals in the environment. Pollutant behavior, inhalation exposure, dermal exposure, and assessment tools. Overview of the complexities, uncertainties, and physical, chemical, and biological issues relevant to risk assessment. Lab projects. Recommended: MATH 51. Apply at first class for admission. Same as: CEE 276.

**CEE 179A. Water Chemistry Laboratory. 3 Units.**

(Graduate students register for 273A.) Laboratory application of techniques for the analysis of natural and contaminated waters, emphasizing instrumental techniques. Same as: CEE 273A.

**CEE 179C. Environmental Engineering Design. 5 Units.**

Application of engineering fundamentals including environmental engineering, hydrology, and engineering economy to a design problem. Enrollment limited; preference to seniors in Civil and Environmental Engineering.

**CEE 179S. Issues in Environmental Science, Technology and Sustainability. 1-2 Units.**

Weekly seminar series that explores a wide range of topics associated with the environmental science and engineering and sustainability. Students taking the class for one unit must generate critiques and participate in discussion sections for a subset of the seminars. Students taking the class for 2 units will in addition to the one unit requirements will give a presentation on a relevant topic of their own choosing.  
Same as: CEE 279S, EARTHYSYS 179S, EESS 179S.

**CEE 180. Structural Analysis. 4 Units.**

Analysis of beams, trusses, frames; method of indeterminate analysis by consistent displacement, least work, superposition equations, moment distribution. Introduction to matrix methods and computer methods of structural analysis. Prerequisite: 101A and ENGR 14.

**CEE 181. Design of Steel Structures. 4 Units.**

Concepts of the design of steel structures with a load and resistance factor design (LRFD) approach; types of loading; structural systems; design of tension members, compression members, beams, beam-columns, and connections; and design of trusses and frames. Prerequisite: 180.

**CEE 182. Design of Reinforced Concrete Structures. 3-4 Units.**

Properties of concrete and reinforcing steel; behavior of structural elements subject to bending moments, shear forces, torsion, axial loads, and combined actions; design of beams, slabs, columns and footings; strength design and serviceability requirements; design of simple structural systems for buildings. Prerequisite: 180.

**CEE 183. Integrated Civil Engineering Design Project. 4 Units.**

Studio format. Design concepts for civil engineering facilities from schematic design through construction, taking into account sustainable engineering issues. Design exercises culminating in the design of a civil engineering facility, emphasizing structural systems and materials and integration with construction and other project requirements. Prerequisites: CEE 180, 181, 182; civil engineering major; architectural design major with instructor consent.

**CEE 195. Fundamentals of Structural Geology. 3 Units.**

Techniques for mapping using GPS and differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; measurement and analysis of stress; elastic deformation and properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding and magma dynamics; model development and methodology. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisites: GES 1, MATH 51, 52  
Same as: GES 111.

**CEE 196. Engineering Geology and Global Change. 3 Units.**

The application of geology and global change to the planning, design, and operation of engineering projects. Case histories taught in a seminar setting and field trips emphasize the impact of geology and global change on both individual engineering works and the built environment by considering Quaternary history and tectonics, anthropogenic sea level rise, active geologic processes, engineering properties of geologic deposits, site exploration, and professional ethics. Prerequisite: GES 1 or consent of instructor.

Same as: GES 115.

**CEE 198. Directed Reading or Special Studies in Civil Engineering. 1-4 Units.**

Written report or oral presentation required. Students must obtain a faculty sponsor.

**CEE 199. Undergraduate Research in Civil and Environmental Engineering. 1-4 Units.**

Written report or oral presentation required. Students must obtain a faculty sponsor.

**CEE 199A. Special Projects in Architecture. 1-4 Units.**

Faculty-directed study or internship. May be repeated for credit.  
Prerequisite: consent of instructor.

**CEE 199B. Directed Studies in Architecture. 1-4 Units.**

Projects may include studio-mentoring activities, directed reading and writing on topics in the history and theory of architectural design, or investigations into design methodologies.

**CEE 199E. Outreach and Mentoring Program Development in CEE. 1-2 Units.**

Open to undergraduates who are declared majors in Civil Engineering, Environmental Engineering, Atmosphere/Energy, and Architectural Design. Will brainstorm and develop an innovative curriculum and engaging activities for CEE 10 (Intro. to the Civil & Environmental Engineering Professions).

**CEE 199H. Undergraduate Honors Thesis. 2-3 Units.**

For students who have declared the Civil Engineering B.S. honors major and have obtained approval of a topic for research under the guidance of a CEE faculty adviser. Letter grade only. Written thesis or oral presentation required. (Staff).

**CEE 200A. Teaching of Civil and Environmental Engineering. 1 Unitss.**

Required of CEE Ph.D. students. Strategies for effective teaching and introduction to engineering pedagogy. Topics: problem solving techniques and learning styles, individual and group instruction, the role of TAs, balancing other demands, grading. Teaching exercises. Register for quarter of teaching assistantship. 200A. Aut, 200B. Win, 200C. Spr.

**CEE 200B. Teaching of Civil and Environmental Engineering. 1 Unitss.**

Required of CEE Ph.D. students. Strategies for effective teaching and introduction to engineering pedagogy. Topics: problem solving techniques and learning styles, individual and group instruction, the role of TAs, balancing other demands, grading. Teaching exercises. Register for quarter of teaching assistantship. May be repeated for credit. 200A. Aut, 200B. Win, 200C. Spr.

**CEE 200C. Teaching of Civil and Environmental Engineering. 1 Unitss.**

Required of CEE Ph.D. students. Strategies for effective teaching and introduction to engineering pedagogy. Topics: problem solving techniques and learning styles, individual and group instruction, the role of TAs, balancing other demands, grading. Teaching exercises. Register for quarter of teaching assistantship. May be repeated for credit. 200A. Aut, 200B. Win, 200C. Spr.

**CEE 201D. Computations in Civil and Environmental Engineering. 3 Units.**

Computational and visualization methods in the design and analysis of civil and environmental engineering systems. Focus is on applications of MATLAB. How to develop a more lucid and better organized programming style.

Same as: CEE 101D.

**CEE 202. Construction Claims Analysis and Resolution. 3 Units.**

Concepts include the preparation and analysis of construction claims, cost overrun and schedule delay analysis, general legal principles, contracts, integrated project delivery, public private partnerships and the resolution of construction disputes through ADR and litigation. Requires attendance of the ten weeks of Monday classes (1/9/12 - 3/12/12) and the first five weeks of Tuesday classes (1/10/12-2/7/12).

**CEE 203. Probabilistic Models in Civil Engineering. 3-4 Units.**

Introduction to probability modeling and statistical analysis in civil engineering. Emphasis is on the practical issues of model selection, interpretation, and calibration. Application of common probability models used in civil engineering including Poisson processes and extreme value distributions. Parameter estimation. Linear regression.

**CEE 204. Structural Reliability. 3-4 Units.**

Procedures for evaluating the safety of structural components and systems. First-and second-order estimates of failure probabilities of engineered systems. Sensitivity of failure probabilities to assumed parameter values. Measures of the relative importance of random variables. Reliability of systems with multiple failure modes. Reliability updating. Simulation methods and variance reduction techniques. Prerequisite: 203 or equivalent.

**CEE 205A. Structural Materials Testing and Simulation. 3-4 Units.**

Hands-on laboratory experience with fabrication, computer simulation, and experimental testing of material and small-scale structural components. Comparison of innovative and traditional structural materials. Behavior and application of high-performance fiber reinforced concrete materials for new design, fiber-reinforced polymeric materials for structural retrofits and introduction to sustainable, bio-based composites. Prerequisites: basic course in reinforced concrete design CEE 182 or equivalent.

**CEE 205B. Advanced Topics in Structural Concrete. 3 Units.**

Concepts and application of strut and tie modeling including deep beams, design for torsion resistance, beam-column joints, bridge components, and post-tensioned anchor zones. Course project integrating computer simulation and physical experimentation of a structural concrete component. Prerequisites: CEE 285A or equivalent.

**CEE 206. Decision Analysis for Civil and Environmental Engineers. 3 Units.**

Current challenges in selecting an appropriate site, alternate design, or retrofit strategy based on environmental, economic, and social factors can be best addressed through applications of decision science. Basics of decision theory, including development of decision trees with discrete and continuous random variables, expected value decision making, utility theory value of information, and elementary multi-attribute decision making will be covered in the class. Examples will cover many areas of civil and environmental engineering problems. Prerequisite: CEE 203 or equivalent.

**CEE 206A. Decision Models in Civil Engineering. 2 Units.**

For advanced graduate students in CEE. Applications of decision science to address current challenges in selecting an appropriate site and appropriate design or retrofit strategy based on environmental, economic, and social factors. Examples from everyday civil and environmental engineering problems. Prerequisite: CEE 203 or equivalent.

**CEE 207A. Energy Resources. 4-5 Units.**

Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities. Optional discussion section for extra unit. CEE 173 is offered for 4-5 units; ES 103 is offered for 4-5 units; CEE 207A is offered for 3-5 units: instructor approval required for 3-unit option. Same as: CEE 173A, EARTHSYS 103.

**CEE 208. Structural Health Monitoring Using Statistical Methods. 1-2 Units.**

Structural health monitoring systems, which enables us to automatically diagnose structural damage, are important to ensure safe and functional built environment. This course provides theoretical background on damage diagnosis algorithms using model-based and signal-based methods for civil structures with an emphasis on the underlying physical interpretations and their practical usage.

**CEE 210. Building Information Modeling. 2-4 Units.**

(Graduate students register for 210.) Creation, management, and application of building information models. Process and tools available for creating 2D and 3D computer representations of building components and geometries. Organizing and operating on models to produce architectural views and construction documents, renderings and animations, and interface with analysis tools. Lab exercises, class projects. Limited enrollment. Same as: CEE 110.

**CEE 210A. Building Information Modeling with Short Course. 2-4 Units.**

Creation, management, and application of building information models. Process and tools available for creating 2D and 3D computer representations of building components and geometries. Organizing and operating on models to produce architectural views and construction documents, renderings and animations, and interface with analysis tools. Lab exercises, class projects. Limited enrollment /instructor consent required.

**CEE 212A. Industry Applications of Virtual Design & Construction. 2-4 Units.**

Building upon the concept of the VDC Scorecard, CEE 112A/212A investigates in the management of Virtual Design and Construction (VDC) programs and projects in the building industry. Interacting with experts and professionals in real estate, architecture, engineering, construction and technology providers, students will learn from the industry applications of Building Information Modeling and its relationship with Integrated Project Delivery, Sustainable Design and Construction, and Virtual Design and Construction. Students will conduct case studies to evaluate the maturity of VDC planning, adoption, technology and performance in practice. Students taking 3 or 4 units will be paired up with independent research or case study projects on the industry applications of VDC. No prerequisite. See CEE 112B/212B in the Winter Quarter and CEE 112C/212C in the Spring Quarter.

**CEE 212B. Industry Applications of Virtual Design & Construction. 2-4 Units.**

As a continuation of the Autumn-quarter course, CEE 112B/212B furthers the study of the VDC scorecard and investigates in the management of Virtual Design and Construction (VDC) programs and projects in the building industry. Students will be paired up with industry-based VDC projects with public owners and private developers, such as GSA Public Buildings Service, the Hong Kong Mass Transit Railway, Optima, Walt Disney Imagineering, Microsoft facilities and/or other CIFE International members. Independently, students will conduct case studies and/or develop VDC building information models (BIM) using off-the-shelf technologies for project analysis, collaboration, communication and optimization. Students will gain insights and develop skills that are essential for academic research, internships or industry practice in VDC. Prerequisite: CEE 112A/212A, CEE 159C/259C, CEE 159D/259D, or Instructor's approval. See CEE 112C/212C in the Spring Quarter. Same as: CEE 112B.

**CEE 212C. Industry Applications of Virtual Design & Construction. 2-4 Units.**

Following the Autumn- and Winter-quarter course series, CEE 112C/212C is an industry-focused and project-based practicum that focuses on the industry applications of Virtual Design and Construction (VDC). Students will be paired up with industry-based VDC projects with public owners and private developers, such as GSA Public Buildings Service, the Hong Kong Mass Transit Railway, Optima, Walt Disney Imagineering, Microsoft facilities and/or other CIFE International members. Independently, students will conduct case studies and/or develop VDC and building information models (BIM) using off-the-shelf technologies for project analysis, collaboration, communication and optimization. Students will gain insights and develop skills that are essential for academic research, internships or industry practice in VDC. Prerequisite: CEE 112A/212A, CEE 112B/212B, CEE 159C/259C, CEE 159D/259D, or Instructor's Approval. Same as: CEE 112C.

**CEE 214. Introduction to Modeling and Analysis in CEE. 3 Units.**

Introduces students to modeling of products, processes and organizations in the AEC industry. Modeling and analysis purposes include support of technical, social, psychological and ethical decision making for different stakeholders. Different purposes and levels of detail for different models. CEM/DCI integrated approach to building using physical, mathematical, graphical and computer models of products, organizations and processes.

**CEE 215. Goals and Methods of Sustainable Building Projects. 3 Units.**

(Graduate students register for 215.) Goals related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and economic and social sustainability. Methods to integrate these goals and enhance the economic, ecological, and equitable value of building projects. Industry and academic rating systems, project case studies, guest lecturers, and group project. Same as: CEE 115.

**CEE 217. Renewable Energy Infrastructure. 3 Units.**

Construction of renewable energy infrastructure: geothermal, solar thermal, solar photovoltaic, wind, biomass. Construction and engineering challenges and related issues and drivers for performance, cost, and environmental impact. Context of renewable energy infrastructure development including comparison of the types of renewable energy, key economic, environmental, and social contextual factors, applicability of a type of renewable energy given a context, related barriers and opportunities. Class project to plan a start-up for developing a type of energy infrastructure based on an engineering innovation.

**CEE 221A. Planning Tools and Methods in the Power Sector. 3 Units.**

This course covers the planning methods most commonly used in the power sector today. It covers both the fundamental methods used and their applications to electricity generation, transmission and distribution planning, integrated resource planning using both energy efficiency and renewable resources as well as utility finance and ratemaking. The methods covered will include forecasting (time series, regression and the use of markets), resource assessment (including energy efficiency and demand-side management) optimization (in power markets operation and in expansion planning) and the processes used in decision-making.

**CEE 222A. Computer Integrated Architecture/Engineering/Construction (AEC) Global Teamwork. 3 Units.**

AEC students engage in a crossdisciplinary, collaborative, geographically distributed, and multicultural project-based teamwork. AEC teams exercise their domain knowledge and information technologies in a multidisciplinary context focusing on the design and construction concept development phase of a comprehensive building project. Prerequisite: interview with Instructor in Autumn Quarter.

**CEE 222B. Computer Integrated Architecture/Engineering/Construction (AEC) Global Teamwork. 2 Units.**

Global AEC student teams continue their project activity focusing on the most challenging concept developed in 222A and chosen jointly with their client. Comprehensive team project focusing on design and construction, including: project development and documentation; detailing, 3D and 4D modeling, simulation, sustainable concepts, cost benefit analysis, and life-cycle cost analysis; and final project presentation of product and process. Prerequisite: CEE 222A.

**CEE 224A. Sustainable Development Studio. 1-5 Units.**

(Undergraduates, see 124.) Project-based. Sustainable design, development, use and evolution of buildings; connections of building systems to broader resource systems. Areas include architecture, structure, materials, energy, water, air, landscape, and food. Projects use a cradle-to-cradle approach focusing on technical and biological nutrient cycles and information and knowledge generation and organization. May be repeated for credit.

**CEE 225. Field Surveying Laboratory. 3 Units.**

Graduate students register for 225. Friday afternoon laboratory provides practical surveying experience. Additional morning classes to prepare for the afternoon sessions. Hands-on operation of common traditional field survey tools; introduction to the newest generation of digital measuring, positioning, and mapping tools. Emphasis is on the concept of using the data collected in the field as the basis for subsequent engineering and economic decisions.

Same as: CEE 140.

**CEE 226. Life Cycle Assessment for Complex Systems. 3-4 Units.**

Life cycle modeling of products, industrial processes, and infrastructure/building systems; material and energy balances for large interdependent systems; environmental accounting; and life cycle costing. These methods, based on ISO 14000 standards, are used to examine emerging technologies, such as biobased products, building materials, building integrated photovoltaics, and alternative design strategies, such as remanufacturing, dematerialization, LEED, and Design for Environment: DfE. Student teams complete a life cycle assessment of a product or system chosen from industry.

**CEE 226E. Advanced Topics in Integrated, Energy-Efficient Building Design. 2-3 Units.**

Innovative methods and systems for the integrated design and evaluation of energy efficient buildings. Guest practitioners and researchers in energy efficient buildings. Student initiated final project. Prerequisites: CEE 156 or CEE 256. All students are expected to participate in the group project assignments. Students taking the course for two units will not be required to complete in-class assignments or individual homework assignments.

**CEE 227. Global Project Finance. 3-5 Units.**

Public and private sources of finance for large, complex, capital-intensive projects in developed and developing countries. Benefits and disadvantages, major participants, risk sharing, and challenges of project finance in emerging markets. Financial, economic, political, cultural, and technological elements that affect project structures, processes, and outcomes. Case studies. Limited enrollment.

**CEE 227E. Infrastructure, Disruptive Technologies and Entrepreneurship. 1 Unit.**

Silicon Valley provides a dynamic environment perfectly suited for developing the disruptive technologies that are changing the faces of today's mainstream infrastructure systems and essential service industries. This course will provide an overview of the most exciting technologies emerging from Silicon Valley right now and the potential that exists to disrupt mainstream transportation, electricity, intelligence gathering, and banking infrastructure systems that were dominant in the 20th Century. Guest speakers include prominent CEOs, visionaries, investors, and serial entrepreneurs who are building game changing companies. Same as: CEE 127E.

**CEE 228. Innovative Global Construction Technology. 2 Units.**

(Formerly 245T.) Five-week class. How innovative companies invent new construction processes based on relative local labor, and materials and equipment cost, availability, and capabilities, and developed from experience and knowledge of construction technology in bridge, tunnel, and high-rise building. The process of generating new ideas. Industry guest speakers address the link between product/process innovation and construction technology.

**CEE 228C. Design and Construction for Sustainability in Extreme Environments. 2 Units.**

Course focuses on multi-disciplinary conceptual design of self-sustaining facilities in remote, extreme environments. Through this learn-by-doing course, students will apply an integrated sustainable design methodology for facility planning and operations. Research into environmental design criteria, opportunities, and constraints to logically guide facility form, shape, systems, and operational requirements. Additional independent study unit available for participation in process experiment. Guest lectures, discussion section, class project. Graduate only.

**CEE 229. Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future. 3 Units.**

Interdisciplinary. Exploration of impacts of climate change on coastal ports and harbors around the world. The research team will utilize a broad range of tools to assess the engineering, construction, and policy responses necessary to protect ports and harbors from significant sea-level rise and storm surge. Collaborations with national and international experts. Consideration of economic, social and environmental implications. Independent and team projects will contribute to ongoing research. Guest speakers, case studies and field trips. [www.groupspaces.com/seaports2100](http://www.groupspaces.com/seaports2100). Recommended: CEE 129S/229S seminar series. Same as: CEE 129.

**CEE 229S. Climate Change Adaptation in the Coastal Built Environment. 1 Unit.**

How will climate change impact coastal ports and harbors around the world? Leading experts discuss the latest science, policy, and engineering research on this important issue, including the necessary response to protect ports and harbors from significant sea-level rise and storm surge. Focus is on the built environment. Guest speakers. CEE 229/129 for research option. See [www.groupspaces.com/seaports2100](http://www.groupspaces.com/seaports2100). Same as: CEE 129S.

**CEE 232. Interplay of Architecture and Engineering. 4 Units.**

The range of requirements that drive a building's design including architecture, engineering, constructability, building codes, and budget. Case studies illustrate how structural and mechanical systems are integrated into building types including residential, office, commercial, and retail. In-class studio work. Same as: CEE 132.

**CEE 233. Integrated Modeling, Presentation & Production. 2 Units.**

The class will explore an integrated workflow between design environments. We will stretch the comprehension from simple 3D modeling to integrated conceptualization of the design process. In addition to the introduction to the various design software, students will study and implement an integrated workflow that connects powerful modeling with top level visualization and production methods in order to produce a top level outcome. We will look at the different challenges and limitations of each modeling environment, and how these limits can be bridged. Same as: CEE 133.

**CEE 236. Green Architecture. 4 Units.**

Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring green design and green design processes. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Prerequisites: 31 or 31Q, and 110 and 130. Enrollment is limited to 14 (or possibly 16) students. Please do not enroll in the class until after attending the first class meeting. If the number of students interested in taking the class is greater than 14 (or possibly 16), space will be assigned based on requirements for graduation. Same as: CEE 136.

**CEE 241. Managing Fabrication and Construction. 3-4 Units.**

Methods to manage the physical production of construction projects; design, analysis, and optimization of the fabricate-assemble process including performance metrics. Project management techniques and production system design including: push versus pull methods; master scheduling and look-ahead scheduling; scope, cost, and schedule control; earned value analysis; critical path method; location-based scheduling; 4D modeling; workflow; trade coordination; methods to understand uncertainty and reduce process variability; and supply chain systems including made-to-stock, engineered-to-order, and made-to-order. Prerequisite: 100 or consent of instructor. Recommended corequisite: 240.

**CEE 241A. Infrastructure Project Development. 3 Units.**

Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of the condition of the nation's infrastructure and how projects are planned and financed. Focus is on public works in the U.S. The role of public and private sectors through a step-by-step study of the project development process. Case studies of real infrastructure projects. Industry guest speakers. Student teams prepare project environmental impact statements. Same as: CEE 141A.

**CEE 241B. Infrastructure Project Delivery. 3 Units.**

Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of how projects are designed, constructed, operated, and maintained. Focus is on public works projects in the U.S. Alternative project delivery approaches and organizational strategies. Case studies of real infrastructure projects. Industry guest speakers. Student teams prepare finance/design/build/operate/maintain project proposals. Same as: CEE 141B.

**CEE 241C. Global Infrastructure Projects Seminar. 1-2 Units.**

Real infrastructure projects presented by industry guest speakers. Energy, transportation, water, public facilities and communications projects are featured. Course provides comparisons of project development and delivery approaches for mega-projects around the world. Alternative project delivery methods, the role of public and private sector, different project management strategies, and lessons learned. Field trips to local projects. Same as: CEE 141C.

**CEE 242. Organization Design for Projects and Companies. 3-4 Units.**

Introduction to organizational behavior and organizational design for construction projects and companies. Class incorporates readings, individual, small group and large group case study assignments. Students use computer simulation to design real-world project organizations.

**CEE 242A. Negotiating Sustainable Development. 3 Units.**

How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.  
Same as: CEE 142A, EARTHSYS 142A, EARTHSYS 242A.

**CEE 244. Fundamentals of Construction Accounting and Finance. 2 Units.**

Concepts of financial accounting and economics emphasizing the construction industry. Financial statements, accounting concepts, project accounting methods, and the nature of project costs. Case study of major construction contractor. Ownership structure, working capital, and the sources and uses of funds.

**CEE 245A. Global Project Seminar. 3 Units.**

Issues related to large, complex, global development projects including infrastructure development, urban and rural development, and the development of new cities. Guest presentations by industry practitioners and academics, including: Sabeer Bhatia, founder of Hotmail and architect of NanoCity; Ian Bremmer, CEO of the Eurasia Group, and Greg Huger, managing director of AirliePartners. May be repeated for credit.

**CEE 246. Entrepreneurship in Civil & Environmental Engineering. 3-4 Units.**

Developing and implementing successful strategies for all kinds of companies in the architecture-engineering-construction industry. Develop a strategy for, and play different management roles in, a simulated construction company. Develop business plans for a new company or new business activity within an existing company in this industry. Prerequisites: introductory engineering economy course such as E60 or CEE 246a; introductory accounting course such as CEE 244A, or MS&E 140 (on-line class available to meet prerequisites -- contact instructor). Enrollment limited to 36; no auditors. Instructions for applying to enroll are on Coursework website. Applications are due by midnight Friday February 24th.

**CEE 246A. Engineering Economy Primer. 2 Units.**

Satisfies the engineering economy prerequisite for 246 or 253. Application of engineering economy concepts and principles to the construction industry. Equivalence concept; interest formulas; value of money across time; present value, annual cash flow, internal rate of return and benefit-cost methods; retirement and replacement; depreciation; capital budgeting; and sensitivity and risk analysis.

**CEE 246A. Engineering Economy Primer. 2 Units.**

Satisfies the engineering economy prerequisite for 246 or 253. Application of engineering economy concepts and principles to the construction industry. Equivalence concept; interest formulas; value of money across time; present value, annual cash flow, internal rate of return and benefit-cost methods; retirement and replacement; depreciation; capital budgeting; and sensitivity and risk analysis.

**CEE 246B. Real Estate Finance Seminar. 1 Units.**

Real estate principles and process. Financial modeling. Feasibility analysis. Sources and uses of funds. Cash flow projections. Profit and loss reports. Financing issues for different types of real estate projects. Redevelopment projects. Financing green projects and technologies. Current challenges in financial markets. Group project and presentation. Limited enrollment with priority to CEM, DCI, and SDC students not enrolled in CEE 248. Prerequisites: CEE 246A or equivalent, ENGR 60. Recommended: knowledge of spreadsheets.

**CEE 247. Cases in Personality, Leadership, and Negotiation. 3 Units.**

Case studies target personality issues, risk willingness, and life skills essential for real world success. Failures, successes, and risk willingness in individual and group tasks based on the professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Application downloaded from coursework must be submitted before first class; mandatory first class attendance. No auditors. Same as: CEE 147.

**CEE 247A. Network Governance. 3-4 Units.**

This course aims at providing students with insights, concepts and skills needed to understand the dynamics of multi-actor interaction processes in uncertain and often highly politicized contexts and to be able to cope with technological and strategic uncertainties and risks including the unpredictable behavior of actors. They will develop knowledge, skills and competences about how to manage divergent and conflicting interests of different actors including principles of integrative negotiation, communication and mediation.

**CEE 248. Real Estate Development. 3 Units.**

Critical activities and key participants. Topics: conceptual and feasibility studies, market perspectives, the public roles, steps for project approval, project finance, contracting and construction, property management, and sales. Group projects focus on actual developments now in the planning stage. Enrollment limited to 24; priority to graduate majors in the department's CEM and GSB programs. Prerequisites: 241, 244A or equivalent, ENGR 60.

**CEE 248G. Certifying Green Buildings. 1 Units.**

Open to all disciplines. Goal is prepare students for the United States Green Building Council's professional accreditation exam. Basic metrics for project certification via USGBC's LEED rating system. Recommended: familiarity with design and construction terminology .

**CEE 249. Labor and Industrial Relations: Negotiations, Strikes, and Dispute Resolution. 2 Units.**

Labor/management negotiations, content of a labor agreement, strikes, dispute resolution, contemporary issues affecting labor and management, and union versus open shop competitiveness in the marketplace. Case studies; presentations by union leaders, legal experts, and contractor principals. Simulated negotiation session with union officials and role play in an arbitration hearing.

**CEE 251. Negotiation. 3 Units.**

Students learn to prepare for and conduct negotiations in a variety of arenas including getting a job, managing workplace conflict, negotiating transactions, and managing personal relationships. Interactive class. The internationally travelled instructor who has mediated cases in over 75 countries will require students to negotiate real life case studies and discuss their results in class. Application required before first day of class; see Coursework.  
Same as: CEE 151, EARTHSCI 251.

**CEE 252. Construction Methods for Concrete and Steel Structures. 3 Units.**

Providing technical support for concrete and steel construction operations on buildings or infrastructure projects. Concrete materials, construction properties of fresh concrete. Resources and operations for batching, transporting, placing, finishing, and curing concrete. Design, fabrication, and use of formwork. Special operations and formwork systems. Detailing, fabricating, erecting, and connecting structural steel. Lifting equipment and lift planning. Welding processes, operations, and quality control. Readings, exercises and course projects.

**CEE 252P. Construction Engineering Practicum. 1 Unitss.**

Discussion and group exercises related to technical fundamentals, resources, and field construction operations for earthwork, concrete and steel construction. Introduces construction engineering and prepares students for courses related to CEM and SDC degrees. Required: advance queries related to reading, class sessions, group exercises, summary paper. Time: prior to start of Autumn quarter.

**CEE 253A. Earthwork Construction. 1 Unitss.**

Construction properties of soil. Technical fundamentals of operations and equipment for earthwork. Description of systems and machine forms for construction equipment. Application of modeling techniques in planning, selecting equipment, estimating production rates. Field trip to infrastructure contractor.

**CEE 254. Cases in Estimating Costs. 3 Units.**

Students participate in bidding contests requiring cost determination in competitive markets. Monetary forces driving the construction industry as general principles applicable to any competitive business. Cases based on field trips and professor's experience as small business owner and construction engineer. Required full afternoon field trips to local sites. Limited enrollment; no auditors. Prerequisites: consent or instructor and application downloaded from CourseWork prior to start of class. Same as: CEE 154.

**CEE 256. Building Systems. 4 Units.**

HVAC, lighting, and envelope systems for commercial and institutional buildings, with a focus on energy efficient design. Knowledge and skills required in the development of low-energy buildings that provide high quality environment for occupants. Same as: CEE 156.

**CEE 258. Donald R. Watson Seminar in Construction Engineering and Management. 1 Unitss.**

Presentations from construction industry leaders. Discussions with speakers from various segments of industry regarding career options. Student groups interact with industry representatives after class.

**CEE 258B. Donald R. Watson Seminar in Construction Engineering and Management. 1 Unitss.**

Weekly seminars and field trips focusing on technical aspects of concrete and steel construction. Submission of abstract and paper required.

**CEE 259A. Construction Problems. 1-3 Units.**

Group-selected problems in construction techniques, equipment, or management; preparation of oral and written reports. Guest specialists from the construction industry. See 299 for individual studies. Prerequisites: graduate standing in CEM program and consent of instructor.

**CEE 259B. Construction Problems. 1-3 Units.**

Group-selected problems in construction techniques, equipment, or management; preparation of oral and written reports. Guest specialists from the construction industry. See 299 for individual studies. Prerequisites: graduate standing in CEM program and consent of instructor.

**CEE 260A. Physical Hydrogeology. 4 Units.**

(Formerly GES 230.) Theory of underground water occurrence and flow, analysis of field data and aquifer tests, geologic groundwater environments, solution of field problems, and groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Lab. Prerequisite: elementary calculus. Same as: EESS 220.

**CEE 260B. Surface and Near-Surface Hydrologic Response. 3 Units.**

Quantitative review of process-based hydrology and geomorphology. Introduction to finite-difference and finite-element methods of numerical analysis. Topics: biometeorology, unsaturated and saturated subsurface fluid flow, overland and open channel flow, and physically-based simulation of coupled surface and near-surface hydrologic response. Links hydrogeology, soil physics, and surface water hydrology. Same as: GES 237.

**CEE 260C. Contaminant Hydrogeology. 4 Units.**

(Formerly GES 231.) For earth scientists and engineers. Environmental and water resource problems involving contaminated groundwater. The processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Prerequisite: GES 230 or CEE 260A or equivalent. Same as: EESS 221.

**CEE 262A. Hydrodynamics. 3-4 Units.**

The flow of incompressible viscous fluid; emphasis is on developing an understanding of fluid dynamics that can be applied to environmental flows. Topics: kinematics of fluid flow; equations of mass and momentum conservation (including density variations); some exact solutions to the Navier-Stokes equations; appropriate analysis of fluid flows including Stokes flows, potential flows, and laminar boundary layers; and an introduction to the effects of rotation and stratification through scaling analysis of fluid flows. Prerequisites: 101B or consent of instructor; and some knowledge of vector calculus and differential equations.

**CEE 262B. Transport and Mixing in Surface Water Flows. 3-4 Units.**

Application of fluid mechanics to problems of pollutant transport and mixing in the water environment. Mathematical models of advection, diffusion, and dispersion. Application of theory to problems of transport and mixing in rivers, estuaries, and lakes and reservoirs. Recommended: 262A and CME 102 (formerly ENGR 155A), or equivalents.

**CEE 262C. Modeling Environmental Flows. 3 Units.**

Introduction to numerical methods for modeling surface water flows in rivers, lakes, estuaries and the coastal ocean. Topics include stability and accuracy analysis, curvilinear and unstructured grids, implicit/explicit methods, transport and diffusion, shallow water equations, nonhydrostatic equations, Navier-Stokes solvers, turbulence modeling. Prerequisites: CEE262A, CME206, or equivalent.

**CEE 262D. Introduction to Physical Oceanography. 4 Units.**

The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53). (Note: this course will be offered Win Qtr 2012-13. For Academic Year 2013-14, this course will potentially be moved to Aut Qtr) Same as: CEE 164, EARTHSYS 164, EESS 148.

**CEE 262E. Lakes and Reservoirs. 2-3 Units.**

Physics and water quality dynamics in lakes and reservoirs. Implementation of physical and biogeochemical processes in 1-D models. Recommended: 262B.

**CEE 262F. Ocean Waves. 3 Units.**

The fluid mechanics of surface gravity waves in the ocean of relevance to engineers and oceanographers. Topics include irrotational waves, wave dispersion, wave spectra, effects of bathymetry (shoaling), mass transport, effects of viscosity, and mean currents driven by radiation stresses. Prerequisite: CEE 262A or a graduate class in fluid mechanics.



**CEE 263A. Air Pollution Modeling. 3-4 Units.**

The numerical modeling of urban, regional, and global air pollution focusing on gas chemistry and radiative transfer. Stratospheric, free-tropospheric, and urban chemistry. Methods for solving stiff systems of chemical ordinary differential, including the multistep implicit-explicit method, Gear's method with sparse-matrix techniques, and the family method. Numerical methods of solving radiative transfer, coagulation, condensation, and chemical equilibrium problems. Project involves developing a basic chemical ordinary differential equation solver. Prerequisite: CS 106A or equivalent.

**CEE 263B. Numerical Weather Prediction. 3-4 Units.**

Numerical weather prediction. Continuity equations for air and water vapor, the thermodynamic energy equation, and momentum equations derived for the atmosphere. Numerical methods of solving partial differential equations, including finite-difference, finite-element, semi-Lagrangian, and pseudospectral methods. Time-stepping schemes: the forward-Euler, backward-Euler, Crank-Nicolson, Heun, Matsuno, leapfrog, and Adams-Bashforth schemes. Boundary-layer turbulence parameterizations, soil moisture, and cloud modeling. Project developing a basic weather prediction model. Prerequisite: CS 106A or equivalent.

**CEE 263C. Weather and Storms. 3 Units.**

Daily and severe weather and global climate. Topics: structure and composition of the atmosphere, fog and cloud formation, rainfall, local winds, wind energy, global circulation, jet streams, high and low pressure systems, inversions, el Niño, la Niña, atmosphere/ocean interactions, fronts, cyclones, thunderstorms, lightning, tornadoes, hurricanes, pollutant transport, global climate and atmospheric optics. Same as: CEE 63.

**CEE 263D. Air Pollution and Global Warming: History, Science, and Solutions. 3 Units.**

Survey of Survey of air pollution and global warming and their renewable energy solutions. Topics: evolution of the Earth's atmosphere, history of discovery of chemicals in the air, bases and particles in urban smog, visibility, indoor air pollution, acid rain, stratospheric and Antarctic ozone loss, the historic climate record, causes and effects of global warming, impacts of energy systems on pollution and climate, renewable energy solutions to air pollution and global warming. UG Req: GER: DBNatSci Same as: CEE 64.

**CEE 264. Sediment Transport Modeling. 3 Units.**

Mechanics of sediment transport in rivers, estuaries and coastal oceans, with an emphasis on development of models and application of three-dimensional software tools. Topics include bottom boundary layers in steady and wave-driven flows, bedform dynamics, suspended and bedload transport, cohesive sediments. Prerequisites: CEE262A or consent of instructor.

**CEE 264A. Rivers, Streams, and Canals. 3-4 Units.**

Introduction to the movement of water through natural and engineered channels, streams, and rivers. Basic equations and theory (mass, momentum, and energy equations) for steady and unsteady descriptions of the flow. Application of theory to the design of flood-control and canal systems. Flow controls such as weirs and sluice gates; gradually varied flow; Saint-Venant equations and flood waves; and method of characteristics. Open channel flow laboratory experiments: controls such as weirs and gates, gradually varied flow, and waves. Limited enrollment in lab section. Prerequisite: CEE 101B Same as: CEE 161A.

**CEE 265A. Sustainable Water Resources Development. 3 Units.**

Alternative criteria for judging the sustainability of projects. Application of criteria to evaluate sustainability of water resources projects in several countries. Case studies illustrate the role of political, social, economic, and environmental factors in decision making. Influence of international aid agencies and NGOs on water projects. Evaluation of benefit-cost analysis and environmental impact assessment as techniques for enhancing the sustainability of future projects. Limited enrollment. Prerequisite: graduate standing in Environmental and Water Studies, or consent of instructor.

**CEE 265C. Water Resources Management. 3 Units.**

Focus is on the basic principles of surface and ground water resources management in the context of water scarcity and hydrologic uncertainty. Topics include reservoir, river basin, and aquifer management, conjunctive use of surface and ground water, wastewater reuse, and demand management. Considers technical, economic, social, and political elements of water management. Open to undergraduates (juniors and seniors) as CEE 165C. Same as: CEE 165C.

**CEE 265D. Water and Sanitation in Developing Countries. 1-3 Units.**

Economic, social, political, and technical aspects of sustainable water supply and sanitation service provision in developing countries. Service pricing, alternative institutional structures including privatization, and the role of consumer demand and community participation in the planning process. Environmental and public health considerations, and strategies for serving low-income households. Limited enrollment. Prerequisite: consent of instructor, see [jennadavis.stanford.edu](http://jennadavis.stanford.edu) for application.

**CEE 266A. Watersheds and Wetlands. 3 Units.**

Introduction to the occurrence and movement of water in the natural environment and its role in creating and maintaining terrestrial, wetland, and aquatic habitat. Hydrologic processes, including precipitation, evaporation, transpiration, snowmelt, infiltration, subsurface flow, runoff, and streamflow. Rivers and lakes, springs and swamps. Emphasis is on observation and measurement, data analysis, modeling, and prediction. Prerequisite: 101B or equivalent. (Freyberg) Same as: CEE 166A.

**CEE 266B. Floods and Droughts, Dams and Aqueducts. 3 Units.**

Sociotechnical systems associated with human use of water as a resource and the hazards posed by too much or too little water. Potable and non-potable water use and conservation. Irrigation, hydroelectric power generation, rural and urban water supply systems, storm water management, flood damage mitigation, and water law and institutions. Emphasis is on engineering design. Prerequisite: 166A or equivalent. (Freyberg) Same as: CEE 166B.

**CEE 266C. Advanced Topics in Hydrology and Water Resources. 3 Units.**

Graduate seminar. Focus is on one or more hydrologic processes or water resources systems. Topics vary based on student and instructor interest. Examples include freshwater wetland hydrology, watershed-scale hydrologic modeling, renaturalization of stream channels, reservoir sediment management, and dam removal. Enrollment limited. Prerequisites: 266A,B, or equivalents. Recommended: 260A or equivalent.

**CEE 266D. Water Resources and Water Hazards Field Trips. 2 Units.**

Introduction to water use and water hazards via weekly field trips to local and regional water resources facilities (dams, reservoirs, fish ladders and hatcheries, pumping plants, aqueducts, hydropower plants, and irrigation systems) and flood damage mitigation facilities (storm water detention ponds, channel modifications, flood control dams, and reservoirs). Each trip preceded by an orientation lecture. Same as: CEE 166D.

**CEE 268. Groundwater Flow. 3-4 Units.**

Flow and mass transport in porous media. Applications of potential flow theory and numerical modeling methods to practical groundwater problems: flow to and from wells, rivers, lakes, drainage ditches; flow through and under dams; streamline tracing; capture zones of wells; and mixing schemes for in-situ remediation. Prerequisites: calculus and introductory fluid mechanics.

**CEE 269A. Environmental Fluid Mechanics and Hydrology Seminar. 1 Unitss.**

Problems in all branches of water resources. Talks by visitors, faculty, and students. May be repeated two times for credit.

**CEE 269B. Environmental Fluid Mechanics and Hydrology Seminar. 1 Unitss.**

Problems in all branches of water resources. Talks by visitors, faculty, and students. May be repeated two times for credit.

**CEE 269C. Environmental Fluid Mechanics and Hydrology. 1 Unitss.**

Problems in all branches of water resources. Talks by visitors, faculty, and students. May be repeated two times for credit.

**CEE 270. Movement and Fate of Organic Contaminants in Waters. 3 Units.**

Transport of chemical constituents in surface and groundwater including advection, dispersion, sorption, interphase mass transfer, and transformation; impacts on water quality. Emphasis is on physicochemical processes and the behavior of hazardous waste contaminants. Prerequisites: undergraduate chemistry and calculus. Recommended: 101B.

**CEE 271A. Physical and Chemical Treatment Processes. 3 Units.**

Physical and chemical unit operations for water treatment, emphasizing process combinations for drinking water supply. Application of the principles of chemistry, rate processes, fluid dynamics, and process engineering to define and solve water treatment problems by flocculation, sedimentation, filtration, disinfection, oxidation, aeration, and adsorption. Investigative paper on water supply and treatment. Prerequisites: 101B, 270. Recommended: 273.

**CEE 271B. Environmental Biotechnology. 4 Units.**

Stoichiometry, kinetics, and thermodynamics of microbial processes for the transformation of environmental contaminants. Design of dispersed growth and biofilm-based processes. Applications include treatment of municipal and industrial waste waters, detoxification of hazardous chemicals, and groundwater remediation. Prerequisites: 270; 177 or 274A or equivalents.

**CEE 271D. Introduction to Wastewater Treatment Process Modeling. 2 Units.**

The course will present a structured protocol for simulator application comprising project definition, data collection and reconciliation, model set-up, calibration and validation, and simulation and result interpretation. This course will include a series of guided simulation exercises evaluating resource consumption (e.g., electrical energy, natural gas, chemicals) and resource recovery (e.g., biogas, struvite, biosolids, recycled water) from a variety of treatment plant configurations. Coursework for all students will comprise guided simulation exercises begun in class. Students may elect to take the course for 2 units by completing a group project evaluating an assigned plant configuration and presenting the results before the class.

**CEE 271E. Environmental Challenges and Policies in Europe. 3 Units.**

Current and future environmental challenges in Europe and related public policies in the European Union (EU). State of the European environment and human development, European environmental policy-making (multi-level ecological governance), global ecological role of the EU. Specific challenges include climate change adaptation, mitigation (carbon taxes, carbon market), climate change and European cities, biodiversity and ecosystems preservation (economics of biodiversity), energy management. Specific policies include environmental justice (environmental inequalities), human development and environmental sustainability indicators (beyond GDP) and absolute and relative decoupling (carbon intensity and resource productivity improvement). Open to undergraduates (freshmen, sophomores, juniors and seniors) as CEE 171E. Same as: CEE 171E.

**CEE 271M. Transport Phenomena: Momentum, heat and mass transport. 3 Units.**

Heat, mass and momentum transfer theory from the viewpoint of basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory. Prerequisites: fluid mechanics, ordinary differential equations.

Same as: CEE 371M.

**CEE 272. Coastal Contaminants. 3-4 Units.**

Coastal pollution and its effects on ecosystems and human health. The sources, fate, and transport of human pathogens and nutrients. Background on coastal ecosystems and coastal transport phenomena including tides, waves, and cross shelf transport. Introduction to time series analysis with MATLAB. Undergraduates require consent of instructor.

**CEE 272R. Modern Power Systems Engineering. 3 Units.**

Focus is on Power Engineering from a systems point of view. Topics covered may include modeling of generation, transmission and distribution systems, load flow analysis, transient and steady-state stability analysis. Special emphasis given to modern market operations and dispatch, modeling intermittent controllable power sources, storage technologies, mechanisms for demand response, sensing the grid and the role of market mechanisms for deep integration. Course content may vary year to year.

**CEE 272S. Green House Gas Mitigation. 1-3 Units.**

This course will introduce the main concepts of greenhouse gas (GHG) emissions measurement and management, and it will explore the main mitigation options for reducing emissions or sequestering carbon dioxide. It will address technical aspects of GHG mitigation via energy efficiency and demand-side management, energy in high-technology industry, distributed power and co-generation, the role of renewable energy in GHG management, carbon sequestration in forestry, agriculture, and geological formations. The course explores policy options, carbon trading and business strategies for GHG mitigation. Same as: CEE 172S.

**CEE 272W. Wind Power project Development. 1 Unitss.**

Introduction to wind power resource assessment and project development. Topics include the dynamics of large-scale and small-scale wind systems, vertical scaling of winds in the boundary layer, measurement instruments used for resource assessments, wind turbine technology, and wind farm siting, planning and economics. Analysis methods of wind data, use of industry-standard software for optimizing turbine siting and project feasibility studies. Project work using existing resource assessment from local areas. Prerequisite: Math41/42 or equivalent. Limited enrollment.

**CEE 273. Aquatic Chemistry. 3 Units.**

Chemical principles and their application to the analysis and solution of problems in aqueous geochemistry (temperatures near 25° C and atmospheric pressure). Emphasis is on natural water systems and the solution of specific chemical problems in water purification technology and water pollution control. Prerequisites: CHEM 31 and 33, or equivalents.

**CEE 273A. Water Chemistry Laboratory. 3 Units.**  
(Graduate students register for 273A.) Laboratory application of techniques for the analysis of natural and contaminated waters, emphasizing instrumental techniques.  
Same as: CEE 179A.

**CEE 273C. Introduction to Membrane Technology for Water/Wastewater Treatment. 1 Unitss.**  
Membrane separation processes focusing on their use for water and wastewater purification. Topics will include membrane types and materials; transport across and rejection by membranes; membrane fouling, cleaning and degradation; and design and operation of membrane systems.

**CEE 273C. Introduction to Membrane Technology for Water/Wastewater Treatment. 1 Unitss.**  
Membrane separation processes focusing on their use for water and wastewater purification. Topics will include membrane types and materials; transport across and rejection by membranes; membrane fouling, cleaning and degradation; and design and operation of membrane systems.

**CEE 273S. Chemical Transformation of Environmental Organic Compounds. 3 Units.**  
This course provides an introduction to the chemistry of organic compounds focusing on chemical transformation and the application of this knowledge to understand and predict the fate of environmentally relevant organic chemicals. The course will cover fundamental rules that govern chemical transformations of organic compounds and will familiarize students with the major physical/chemical factors influencing the kinetics of organic reactions in nature. Prerequisites: CEE 270.

**CEE 274A. Environmental Microbiology I. 3 Units.**  
Basics of microbiology and biochemistry. The biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents.  
Same as: CHEMENG 174, CHEMENG 274.

**CEE 274B. Microbial Bioenergy Systems. 3 Units.**  
Introduction to microbial metabolic pathways and to the pathway logic with a special focus on microbial bioenergy systems. The first part of the course emphasizes the metabolic and biochemical principles of pathways, whereas the second part is more specifically directed toward using this knowledge to understand existing systems and to design innovative microbial bioenergy systems for biofuel, biorefinery, and environmental applications. There also is an emphasis on the implications of rerouting of energy and reducing equivalents for the fitness and ecology of the organism. Prerequisites: CHEMENG 174 or 181 and organic chemistry, or equivalents.  
Same as: CHEMENG 456.

**CEE 274D. Pathogens and Disinfection. 3 Units.**  
Introduction to epidemiology, major pathogens and infectious diseases, the immune system, movement and survival of pathogens in the environment, transfer of virulence and antibiotic resistance genes, and pathogen control, with an emphasis on public health engineering measures (disinfection). Prerequisite: 274A.

**CEE 274E. Pathogens in the Environment. 3 Units.**  
Sources, fates, movement, and ecology of waterborne pathogens in the natural environment and disinfection systems; epidemiology and microbial risk assessment. No microbiology background required; undergraduates may enroll with consent of instructor.

**CEE 274S. Hopkins Microbiology Course. 3-12 Units.**  
(Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.  
Same as: BIO 274S, BIOHOPK 274, EESS 253S.

**CEE 275A. California Coast: Science, Policy, and Law. 3-4 Units.**  
Same as LAW 514. Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.  
Same as: CEE 175A, EARTHSYS 175, EARTHSYS 275.

**CEE 275B. Process Design for Environmental Biotechnology. 3 Units.**  
Use of microbial bioreactors for degradation of contaminants and recovery of clean water, clean energy and/or green materials. Student teams design, operate, and analyze bioreactors and learn to write consulting style reports. Limited enrollment. Prerequisites: 271B.

**CEE 275C. Water, Sanitation and Health. 3-4 Units.**

**CEE 276. Introduction to Human Exposure Analysis. 3 Units.**  
(Graduate students register for 276.) Scientific and engineering issues involved in quantifying human exposure to toxic chemicals in the environment. Pollutant behavior, inhalation exposure, dermal exposure, and assessment tools. Overview of the complexities, uncertainties, and physical, chemical, and biological issues relevant to risk assessment. Lab projects. Recommended: MATH 51. Apply at first class for admission.  
Same as: CEE 178.

**CEE 276E. Environmental Toxicants. 2-3 Units.**  
Chemicals in the environment that pose toxicity risk. Introduction to environmental toxicology principles for identifying and characterizing toxicants based on sources, properties, pathways, and toxic action. Past and present environmental toxicant issues.

**CEE 276F. Energy Systems Field Trips: China Energy Systems. 1-2 Units.**  
Energy resources and policies in use and under development in China. 12-day field trip to China during Spring Break 2012. One unit for seminar and readings; one unit for field trip. Tuesday section is required for all students, Thursday section is also required for students attending the field trip. Prerequisite: consent of instructor for field trip.  
Same as: CEE 176F.

**CEE 276S. Instrumental Analysis of Microconstituents in the Environment. 3 Units.**  
Current research, practice, and thinking in environmental engineering and science. Featuring presentations by invited faculty, researchers and professionals to share their insight and perspectives on environmental issues. Students will prepare brief summaries of seminar presentations and associated readings. For 2-unit option, students will also prepare and give a short presentation on a relevant environmental topic.  
Same as: CEE 176S.

**CEE 277D. Water, Health & Development in Africa. 1 Unitss.**

Graduate seminar focused on emerging research in the areas of water supply, sanitation, hygiene and health in developing countries. Limited enrollment; instructor permission required.

**CEE 277F. Advanced Field Methods in Water, Health and Development. 1-10 Units.**

Field methods for assessing household stored water quality, hand contamination, behaviors, and knowledge related to water, sanitation and health. Limited enrollment. Instructor consent required.

**CEE 277G. Health and Development at the Food-Water Nexus. 1 Unitss.**

Linkages between water access, smallholder food production, poverty, and infectious disease, with particular emphasis on sub-Saharan Africa. Weekly reading, writing and discussion assignments focused on topics such as water supply, sanitation, and HIV: smallholder production, nutrition, and poverty; and infectious disease and child development. Permission of instructors required.

Same as: EESS 277G, MED 277.

**CEE 277K. Environmental Information Engineering. 2-3 Units.**

The role of information technology (IT) in enabling mankind to understand its impact on the planet and balance that with improving the quality of life of a rapidly growing population. After surveying the field, the course will examine the specific impacts that IT may have, by reference to case studies from energy, transportation, water and urban design fields. While some specific information technologies will be examined, this will be from a business perspective - detailed technical knowledge of IT not required. Same as: CEE 177K.

**CEE 277S. Design for a Sustainable World. 1-5 Units.**

Technology-based problems faced by developing communities worldwide. Student groups partner with organizations abroad to work on concept, feasibility, design, implementation, and evaluation phases of various projects. Past projects include a water and health initiative, a green school design, seismic safety, and medical device. Admission based on written application and interview. See <http://esw.stanford.edu> for application. (Staff)

Same as: CEE 177S.

**CEE 277X. Current Topics in Sustainable Engineering. 1-5 Units.**

Weekly seminar course run by Engineers for Sustainable World (ESW) student group in conjunction with faculty advisors. Speakers come in weekly to orient students to the science and engineering that is the foundation for current ESW projects. Instructor consent required.

Same as: CEE 177X.

**CEE 278A. Air Pollution Fundamentals. 3-4 Units.**

The sources and health effects of gaseous and particulate air pollutants. The influence of meteorology on pollution: temperature profiles, stability classes, inversion layers, turbulence. Atmospheric diffusion equations, downwind dispersion of emissions from point and line sources. Removal of air pollutants via settling, diffusion, coagulation, precipitation. Mechanisms for ozone formation, in the troposphere versus in the stratosphere. Effects of airborne particle size and composition on light scattering/absorption, and on visual range. Prerequisites: MATH 51 or equivalent. Recommended: 101B, CHEM 31A, or equivalents.

**CEE 278B. Atmospheric Aerosols. 3 Units.**

The characterization of atmospheric particulate matter: size distributions, chemical composition, health effects. Atmospheric diffusion and transport of particles: removal by convection, impaction, gravitational settling. Effect of aerosols on visibility: light scattering and absorption, reduction of visual range. Mechanics influencing ambient size distributions: Brownian coagulation, laminar shear flow, homogeneous nucleation, heterogeneous condensation. Prerequisite: MATH 51, or equivalent. Recommended: 101B or equivalent.

**CEE 278C. Indoor Air Quality. 2-3 Units.**

Factors affecting the levels of air pollutants in the built indoor environment. The influence of ventilation, office equipment, floor coverings, furnishings, cleaning practices, and human activities on air quality including carbon dioxide, VOCs, resuspended dust, and airborne molds and fungi.

Recommended: 172 or 278A.

Same as: CEE 172A.

**CEE 279. Environmental Engineering Seminar. 1 Unitss.**

Current research, practice, and thinking in environmental engineering and science. Attendance at seminars is self-directed, and may be accrued throughout the school year.

**CEE 279H. Urban Hydrology. 1 Unitss.**

Weekly seminar and roundtable on current topics involving hydrology in the urban environment. For graduate students only. Enrollment by instructor consent; attend first class. Prerequisites: At least one of the CEE 101B, CEE 161A, or CEE 270, or equivalent background in fluid mechanics or hydrology. Offered once only.

**CEE 279S. Issues in Environmental Science, Technology and Sustainability. 1-2 Units.**

Weekly seminar series that explores a wide range of topics associated with the environmental science and engineering and sustainability. Students taking the class for one unit must generate critiques and participate in discussion sections for a subset of the seminars. Students taking the class for 2 units will in addition to the one unit requirements will give a presentation on a relevant topic of their own choosing. Same as: CEE 179S, EARTHSYS 179S, EESS 179S.

**CEE 280. Advanced Structural Analysis. 3-4 Units.**

Theoretical development and computer implementation of direct stiffness method of structural analysis; virtual work principles; computation of element stiffness matrices and load vectors; direct assembly procedures; equation solution techniques. Analysis of two- and three-dimensional truss and frame structures, thermal loads, and substructuring and condensation techniques for large systems. Practical modeling techniques and programming assignments. Introduction to nonlinear analysis concepts. Prerequisites: elementary structural analysis and matrix algebra.

**CEE 281. Mechanics and Finite Elements. 3 Units.**

Fluid conduction and solid deformation; conservation laws: balance of mass and balance of momentum; generalized Darcy's law and Hooke's law in 3D; the use of tensors in mechanics; finite element formulation of boundary-value problems; variational equations and Galerkin approximations; basic shape functions, numerical integration, and assembly operations.

**CEE 282. Nonlinear Structural Analysis. 3-4 Units.**

Introduction to methods of geometric and material nonlinear analysis, emphasizing modeling approaches for framed structures. Large-displacement analysis, concentrated and distributed plasticity models, and nonlinear solution methods. Applications to frame stability and performance-based seismic design. Assignments emphasize computer implementation and applications. Prerequisites: 280 and an advanced course in structural behavior (e.g., 285A, 285B or equivalent).

**CEE 283. Structural Dynamics. 3-4 Units.**

Vibrations and dynamic response of simple structures under time dependent loads; dynamic analysis of single and multiple degrees of freedom systems; support motion; response spectra.

**CEE 284. Finite Element and Computational Methods in Structural Dynamics. 3-4 Units.**

Computational methods for structural dynamics analysis of discrete and continuous systems in free and forced vibration; finite element formulation; modal analysis; numerical methods; introduction to nonlinear dynamics; advanced topics. Prerequisites: 280, 283.

**CEE 285A. Advanced Structural Concrete Behavior and Design. 3-4 Units.**

Behavior and design of reinforced and prestressed concrete for building and bridge design. Emphasis on flexural behavior, prestressed concrete design, slender columns, and two-way slab design & analysis.

**CEE 285B. Advanced Structural Steel Behavior and Design. 3-4 Units.**

Advanced topics in structural steel design. Topics include composite floor systems; bolted and welded connections; beam-column connections; innovative lateral load resisting systems. As part of this course students design a 15-story steel building. Prerequisite: basic course in structural steel design CEE181 or equivalent.

**CEE 286. Behavior and Design of Structural Systems. 3-4 Units.**

Basic design concepts, performance criteria, loading, methods of design, behavior of various types of structural systems under gravity and lateral loads, approximate methods of analysis, preliminary conceptual design of structural elements. Prerequisites: CEE 280. Recommended: CEE 285A and/or CEE 285B.

**CEE 287. Earthquake Resistant Design and Construction. 3-4 Units.**

Evaluation, design, and construction of structures in seismic regions. Factors influencing earthquake ground motions, design spectra, design of linear and nonlinear single- and multiple-degree-of-freedom-system structures, force-based and displacement-based design methods, capacity design, detailing and construction of steel and reinforced concrete structures, introduction to performance-based design, seismic isolation, and energy dissipation. Prerequisites: 283, 288, and either 285A or 285B.

**CEE 288. Earthquake Hazard and Risk Analysis. 3-4 Units.**

Earthquake phenomena, faulting, ground motion, earthquake hazard formulation, effects of earthquakes on manmade structures, response spectra, Fourier spectra, soil effects on ground motion and structural damage, methods for structural damage evaluation, and formulation of the performance-based earthquake engineering problems. Prerequisites: 203, 283.

**CEE 289. Random Vibrations. 3-4 Units.**

Introduction to random processes. Correlation and power spectral density functions. Stochastic dynamic analysis of multi-degree-of-freedom structures subjected to stationary and non-stationary random excitations. Crossing rates, first-excursion probability, and distributions of peaks and extremes. Applications in earthquake, wind, and ocean engineering. Prerequisite: 203 or equivalent.

**CEE 290. Structural Performance and Failures. 2 Units.**

Basic concepts in the definition of satisfactory structural performance; key elements in structural performance; types of failures, ranging from reduced serviceability to total collapse; failure sources and their root cause allocation, emphasizing design/construction process failures; failure prevention mechanisms; illustration with real life examples.

**CEE 292. Computational Micromechanics. 3 Units.**

Thermodynamics of general internal variable formulations of inelasticity; 1D and 3D material models at small strains (nonlinear elasticity, viscoelasticity, plasticity, damage); development of efficient algorithms and finite element implementations; micromechanical based models for crystalline solids and soft matter materials; introduction to homogenization methods and micro-to-macro transitions. Prerequisite: CEE 281 or equivalent.

**CEE 293. Foundation Engineering. 3 Units.**

Types, characteristics, analysis, and design of shallow and deep foundations; rigid and flexible retaining walls; braced excavations; settlement of footings in sands and clays; slope stability analysis by method of slices including search algorithms for the critical slip surface. Prerequisite: 101C or equivalent.

**CEE 295. Plasticity Modeling and Computation. 3 Units.**

Theory of plasticity; micromechanical basis; classical yield models; return-mapping algorithm; multi-surface and bounding surface models; material instabilities; localization and bifurcation. Prerequisite: CEE 281 or equivalent.

**CEE 296. Special Topics in Fluid-Solid Interactions. 2 Units.**

Civil, mechanical, and biomedical engineering. Topics include surge and wave impact on structures, tsunami induced sediment transport and scour, wave-soil interactions, dam-reservoir-foundation interactions, shock and blast loads on composite structures, hydroelastic tailoring of composite structures, and blood-vessel interactions. Term project.

**CEE 297. Issues in Geotechnical and Environmental Failures. 3 Units.**

Causes and consequences of the failure of buildings, earth structures, waste storage, and high hazard facilities in contact with the environment; technical, ethical, economic, legal, and business aspects; failure analysis and forensic problems; prevention, liability, and dispute management. Case histories including earthquake, flood, and hazardous waste facilities. Student observation, participation in active lawsuits where possible.

**CEE 297M. Managing Critical Infrastructure Seminar. 1-2 Units.**

Safe and effective performance of infrastructure systems is critical to our economy, quality of life and safety. This course will present topics associated with risk analysis and management of critical civil infrastructure systems, acceptable risk and community resilience. Discuss lessons from Hurricane Katrina, Tohoku earthquake, among others which dictate the need for changes to how infrastructure systems are analyzed, designed and operated. Methods of risk analysis for spatially distributed infrastructure systems; seismic and flood risk analysis. Guest speakers. Student presentations. Units: 1-2 (Prerequisites for 2 units: consent of instructor).

**CEE 297R. Structural Geology and Rock Mechanics. 4 Units.**

Quantitative field and laboratory data integrated with solutions to boundary value problems of continuum mechanics to understand tectonic processes in Earth's crust that lead to the development of geological structures including folds, faults, fractures and fabrics. Topics include: techniques and tools for structural mapping; differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; traction and stress analysis, conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties; brittle deformation including fracture and faulting; model development and methodology. Data sets analyzed using MATLAB. Prerequisites: GES 1, MATH 53, MATLAB or equivalent. Same as: GEOPHYS 251, GES 215.

**CEE 298. Structural Engineering and Geomechanics Seminar. 1 Unitss.**

Recommended for all graduate students. Lectures on topics of current interest in professional practice and research.

**CEE 299. Independent Study in Civil Engineering. 1-5 Units.**

Directed study for graduate students on subjects of mutual interest to students and faculty. Student must obtain faculty sponsor.

**CEE 299S. Independent Project in Civil and Environmental Engineering. 1-4 Units.**

Prerequisite: consent of instructor.

**CEE 300. Thesis. 1-15 Units.**

Research by Engineer candidates. Same as: Engineer Degree.

**CEE 301. The Energy Seminar. 1 Unitss.**

Interdisciplinary exploration of current energy challenges and opportunities, with talks by faculty, visitors, and students. May be repeated for credit. Same as: ENERGY 301.

**CEE 305. Damage and Failure Mechanics of Structural Systems. 3-4 Units.**

Examine the mechanics and failure mechanisms of structural deterioration mechanisms and hazards. Overview of fracture mechanics concepts as a general basis for analyzing brittle failure modes in steel and concrete structures. Analysis and design theory for corrosion, fatigue, fire and other damage mechanisms in steel and concrete structures. New methods for mitigation of these failure modes and hazards will be introduced, including new construction materials, structural designs and protection methods.

**CEE 316. Sustainable Built Environment Research. 3-4 Units.**

Covers Ph.D. candidacy requirements of industry problem analysis and critical literature review for post-MS students conducting research on sustainable planning, design, management, and operation of buildings and infrastructure. Identify industry problems and related research questions. Design experiments and research methods for: ethnographies, case studies, surveys, classical experiments mathematical and computational simulations. Overview of statistical methods for data analysis. Publication strategies.

**CEE 320. Integrated Facility Engineering. 1 Unitss.**

Individual and group presentations on goals, research, and state-of-practice of virtual design and construction in support of integrated facility engineering, including objectives for the application and further development of virtual design and construction technologies. May be repeated for credit.

**CEE 321. Formal Models for Design. 3 Units.**

Theories, methods, and formal systems to support the design of buildings. Academic and industrial frameworks to represent and manage the products, organizations, and processes of building projects. May be repeated for credit.

**CEE 342. Computational Modeling of Organizations. 4 Units.**

For post-M.S. students interested in formal techniques for organization design. Computer simulations of organizations are used to conduct virtual experiments for developing organization theory or to analyze the performance of virtual organizations with different structures and decision support and communication technologies. Research on computational modeling and design of real-world organizations. Paper serves as a research proposal. Prerequisite: 242 or equivalent introductory organization design class.

**CEE 345. Game Theory Modeling in Engineering. 2-3 Units.**

Game theory involves the analysis of conflict, cooperation and communication, and is a novel and powerful tool for analyzing important issues in engineering management and engineering policy. Class will develop students' game theory skills in an applied context. Learn how to set up and solve fundamental game models and apply these skills to building new theories in engineering management through game theory modeling. Class illustrates the arts of game modeling by applying game theory in: (1) contracting and opportunistic bidding; (2) renegotiation in public-private partnerships; (3) partner selection strategies in global projects; and (4) knowledge management and sharing. Students are encouraged to apply game theory to their own research issues or disciplines, and extend their term projects into research papers or theses. Limited class size. Priority for CEE, IPER and MS&E students.

**CEE 362. Numerical Modeling of Subsurface Processes. 3-4 Units.**

Numerical modeling including: problem formulation, PDEs and weak formulations, and choice of boundary conditions; solution using the finite-element code COMSOL Multiphysics with a variety of solvers and pre- and postprocessing of data; and interpretation of results. Problems include: flow in saturated porous media with complex boundaries and heterogeneities; solute transport with common reaction models; effects of heterogeneity on dispersion, dilution, and mixing of solutes; variable-density flow and seawater intrusion; upscaling or coarsening of scale; and biofilm modeling. Enrollment limited to 5.

**CEE 362G. Stochastic Inverse Modeling and Data Assimilation Methods. 3-4 Units.**

Stochastic methods for the solution of inverse problems that are algebraically underdetermined or have solutions that are sensitive to data. Emphasis is on geostatistical methods that, in addition to using data, incorporate information about structure such as spatial continuity and smoothness. Methods for real-time processing of new data. Prerequisite: consent of instructor.

**CEE 362H. Heterogeneity and Scale in Groundwater. 3-4 Units.**

Geologic materials are complex and composite media, in the microscale, but modeled as continua at the macroscale. We examine how our understanding of processes and heterogeneity at the microscale support laws that describe fluxes and change of state variables at the macroscale. We study Darcy's law for porous media, Fickian dispersion, non-Fickian dispersion, dilution of solutes, and mixing of reactants under mass transfer (diffusional) limitations. We use mathematical tools such as homogenization theories and stochastic analysis to find relations among macroscopic quantities. To be taught in Winter, alternate years starting 2011-2012.

**CEE 363A. Mechanics of Stratified Flows. 3 Units.**

The effects of density stratification on flows in the natural environment. Basic properties of linear internal waves in layered and continuous stratification. Flows established by internal waves. Internal hydraulics and gravity currents. Turbulence in stratified fluids. Prerequisites: 262A,B, CME 204.

**CEE 363C. Ocean and Estuarine Modeling. 3 Units.**

Advanced topics in modeling for ocean and estuarine environments, including methods for shallow water, primitive, and nonhydrostatic equations on Cartesian, curvilinear, and unstructured finite-volume grid systems. Topics include free-surface methods, nonhydrostatic solvers, and advanced Eulerian and Lagrangian advection techniques. Focus is on existing techniques and code packages, and their methodologies, including POM, ROMS, TRIM, ELCOM, and SUNTANS. Prerequisites: CME 200, 206, or equivalents.

**CEE 363F. Oceanic Fluid Dynamics. 3 Units.**

Dynamics of rotating stratified fluids with application to oceanic flows. Topics include: inertia-gravity waves; geostrophic and cyclogeostrophic balance; vorticity and potential vorticity dynamics; quasi-geostrophic motions; planetary and topographic Rossby waves; inertial, symmetric, barotropic and baroclinic instability; Ekman layers; and the frictional spin-down of geostrophic flows. Prerequisite: CEE 262A or a graduate class in fluid mechanics. Same as: EESS 363F.

**CEE 363G. Field Techniques in Coastal Oceanography. 3 Units.**

This course focuses on the design and implementation of coastal oceanographic field studies from implementation through analysis. A wide range of field instrumentation and techniques, including AUVs and scientific diving is covered. Field studies. Data collection and analysis under instructor guidance.

**CEE 364F. Advanced Topics in Geophysical Fluid Dynamics. 2-3 Units.**

A seminar-style class covering the classic papers on the theory of the large-scale ocean circulation. Topics include: wind-driven gyres, mesoscale eddies and geostrophic turbulence, eddy-driven recirculation gyres, homogenization of potential vorticity, the ventilated thermocline, subduction, and the abyssal circulation. Prerequisite: EESS 363F or CEE 363F. Recommended: EESS 246B. Same as: EESS 364F.

**CEE 364Y. Advanced Topics in Coastal Oceanography. 1-2 Units.**

The dynamics and transport implications of features in estuaries and coastal oceans characterized by sharp gradients: fronts, interfaces, and layers. Analytic framework to describe the formation, maintenance, and dissipation of such features. Examples include tidal mixing fronts, buoyant plume fronts and tidal intrusions, biological thin layers, and axial convergent fronts. Second unit for students who give a presentation.

**CEE 365A. Advanced Topics in Environmental Fluid Mechanics and Hydrology. 2-6 Units.**

Students must obtain a faculty sponsor.

**CEE 365B. Advanced Topics in Environmental Fluid Mechanics and Hydrology. 2-6 Units.**

Students must obtain a faculty sponsor.

**CEE 365C. Advanced Topics in Environmental Fluid Mechanics and Hydrology. 2-6 Units.**

Students must obtain a faculty sponsor.

**CEE 365D. Advanced Topics in Environmental Fluid Mechanics and Hydrology. 2-6 Units.**

Students must obtain a faculty sponsor.

**CEE 370A. Environmental Research. 5-6 Units.**

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

**CEE 370B. Environmental Research. 5-6 Units.**

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

**CEE 370C. Environmental Research. 5-6 Units.**

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

**CEE 370D. Environmental Research. 3-6 Units.**

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

**CEE 371. Frontiers in Environmental Research. 1-2 Units.**

How to evaluate environmental research.

**CEE 371M. Transport Phenomena: Momentum, heat and mass transport. 3 Units.**

Heat, mass and momentum transfer theory from the viewpoint of basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory. Prerequisites: fluid mechanics, ordinary differential equations.

Same as: CEE 271M.

**CEE 374A. Introduction to Physiology of Microbes in Biofilms. 1-6 Units.**

Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.

**CEE 374B. Introduction to Physiology of Microbes in Biofilms. 1-6 Units.**

Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.

**CEE 374C. Introduction to Physiology of Microbes in Biofilms. 1-6 Units.**

Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.

**CEE 374D. Introduction to Physiology of Microbes in Biofilms. 1-6 Units.**

Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.

**CEE 374S. Advanced Topics in Microbial Pollution. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**CEE 374T. Advanced Topics in Coastal Pollution. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**CEE 374U. Advanced Topics in Submarine Groundwater Discharge. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**CEE 374V. Advanced Topics in Microbial Source Tracking. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**CEE 374W. Advanced Topics in Water, Health and Development. 1-6 Units.**

Advanced topics in water, health and development. Emphasis on low-and-middle-income countries. Class content varies according to interests of students. Instructor consent required.

**CEE 374X. Advanced Topics in Multivariate Statistical Analysis. 1-6 Units.**

Analysis of experimental and non-experimental data using multivariate modeling approaches. May be repeated for credit. Permission of instructor required for enrollment.

**CEE 375. Advanced Methods in Pathogen Detection. 2 Units.**

Molecular and culture-based techniques for pathogen detection in water.

**CEE 377. Research Proposal Writing in Environmental Engineering and Science. 1-3 Units.**

For first- and second-year post-master's students preparing for thesis defense. Students develop progress reports and agency-style research proposals, and present a proposal in oral form. Prerequisite: consent of thesis adviser.

**CEE 378. Statistical Analysis of Environmental Data: Tools and Applications. 2-3 Units.**

Preference to Environmental Engineering and Science Ph.D. students. Practical data analysis techniques applicable to environmental engineering. The role of statistics in data collection, experimental design, data exploration, and effective communication of results. Use of statistical packages such as Excel, Matlab, and R. Discussions partially based on student interest and available datasets. Topics may include summarizing data, hypothesis testing, nonparametric statistics, regression analysis, classification and regression trees, cluster analysis, and computationally intensive methods. Limited enrollment.

**CEE 378D. Seminar of Statistical Analysis of Multidisciplinary Primary Data. 1-3 Units.**

Practical management and analysis techniques for primary data collected in multidisciplinary projects. Selection of appropriate statistical tests, interpretation of results, and effective communication of findings to lay audiences. Univariate, bivariate and multivariate techniques, including hypothesis testing, nonparametric statistics, regression analysis and matching. Use of SPSS statistical package. Limited enrollment. Prerequisite: consent of instructor.

**CEE 381. Advanced Engineering Informatics. 1-4 Units.**

**CEE 385. Performance-Based Earthquake Engineering. 2-3 Units.** Synthesis and application of approaches to performance-based design and assessment that recently have been developed or are under development. Emphasis is on quantitative decision making based on life-cycle considerations that incorporate direct losses, downtime losses, and collapse, and the associated uncertainties. Hazard analysis, response simulation, damage and loss estimation, collapse prediction. Case studies. Prerequisites: 282, 287, and 288.

**CEE 398. Report on Civil Engineering Training. 1 Unit.**

On-the-job training under the guidance of experienced, on-site supervisors; meets the requirements for Curricular Practical Training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. Prerequisite: qualified offer of employment and consent of adviser as per I-Center procedures.

**CEE 399. Advanced Engineering Problems. 1-10 Units.**

Individual graduate work under the direction of a faculty member on a subject of mutual interest. Student obtain faculty sponsor. May be repeated for credit.

**CEE 400. Thesis. 1-15 Units.**

For students who have successfully completed the department general qualifying examination. Research and dissertation for the Ph.D. degree. Same as: Ph.D. Degree.

**CEE 801. TGR Project. 0 Unit.**

Same as: Engineer Degree.

**CEE 802. TGR Dissertation. 0 Unit.**

Same as: PhD degree.

## Classics Art/Archaeology Courses

**CLASSART 21Q. Eight Great Archaeological Sites in Europe. 3-5 Units.**

Preference to sophomores. Focus is on excavation, features and finds, arguments over interpretation, and the place of each site in understanding the archaeological history of Europe. Goal is to introduce the latest archaeological and anthropological thought, and raise key questions about ancient society. The archaeological perspective foregrounds interdisciplinary study: geophysics articulated with art history, source criticism with analytic modeling, statistics interpretation. A web site with resources about each site, including plans, photographs, video, and publications, is the basis for exploring.

**CLASSART 22N. The Artist in Ancient Greek Society. 3 Units.**

Given the importance of art to all aspects of their lives the Greeks had reason to respect their artists. Yet potters, painters and even sculptors possessed little social standing. Why did the Greeks value the work of craftsmen but not the men themselves? Why did Herodotus dismiss those who worked with their hands as "mechanics?" What prompted Homer to claim that, "there is no greater glory for a man; than what he achieves with his own hands," provided that he was throwing a discus and not a vase on a wheel? Painted pottery was essential to the religious and secular lives of the Greeks. Libations to the gods and to the dead required vases from which to pour them. Economic prosperity depended on the export of wine and oil in durable clay containers. At home, vases depicting gods and heroes reinforced Greek values and helped parents to educate their children. Ceramic sets with scenes of Dionysian excess were reserved for elite symposia from which craftsmen were excluded. Sculptors were less lowly but even those who carved the Parthenon's pediments and frieze were still "mechanics," with soft bodies and soft minds (Xenophon), "indifferent to higher things" (Plutarch). The seminar addresses these issues. Students will read and discuss texts, write response papers and present slide lectures on aspects of the artist's profession.

Same as: ARTHIST 200N.

**CLASSART 85. The Archaeology of Roman Imperialism. 3-5 Units.**

Analysis of the material culture of the early Roman empire (1st and 2nd c. CE). Focus is on new archaeological perspectives, theories and anthropological insights. Imperialism, colonialism and novel perspectives on centres, peripheries and frontiers. Imperial conceptualizations of time and space. Imperial landscapes: colonies, cities (private and public buildings), the country side, roads and ports. Imperial memories: the past in the past, ancestor cult in the house and the tomb, imperial funerals. Experiencing empire, discrepant identities (gender, age, the Roman 'others').

Same as: ARCHLGY 85.

**CLASSART 101. Archaic Greek Art. 4 Units.**

The development of Greek art and culture from protogeometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientaling phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E.

Same as: ARTHIST 101, ARTHIST 301, CLASSART 201.

**CLASSART 102. Empire and Aftermath: Greek Art from the Parthenon to Praxiteles. 4 Units.**

The course explores the art and architecture of the Athenian Empire in the age of Pericles, and then considers the effects of civil war and plague on Greek art and society in the later 5th and early 4th centuries.

Same as: ARTHIST 102, ARTHIST 302.



**CLASSART 109. Greek Art In and Out of Context. 4-5 Units.**

The cultural contexts in which art served religious, political, commercial, athletic, sympotic, and erotic needs of Greek life.

Same as: ARTHIST 203.

**CLASSART 110. Appropriations of Greek Art. 4-5 Units.**

Upper division seminar. The history of the appropriation of Greek art by Rome, the Renaissance, Lord Elgin, and Manet. Enrollment limited to 6.

Prerequisite: ARTHIST 102 or consent of instructor.

Same as: ARTHIST 204A.

**CLASSART 113. Ten Things: An Archaeology of Design. 3-5 Units.**

Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgewood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology.

Same as: CLASSART 213, STS 112.

**CLASSART 115. Art & Architecture in the Medieval Mediterranean. 4 Units.**

Chronological survey of Byzantine, Islamic, and Western Medieval art and architecture from the early Christian period to the Gothic age. Broad art-historical developments and more detailed examinations of individual monuments and works of art. Topics include devotional art, court and monastic culture, relics and the cult of saints, pilgrimage and crusades, and the rise of cities and cathedrals.

Same as: ARTHIST 105, ARTHIST 305, CLASSART 215.

**CLASSART 118. Hagia Sophia. 5 Units.**

By employing a methodology based in psychoacoustics, semiotics, and phenomenology, this course explores the relationship among sound, water, marble, meaning, and religious experience in the sixth-century church of Hagia Sophia built by emperor Justinian in Constantinople. We will read medieval sources describing the interior and ritual, make short movies exploring the shimmer of marble in buildings on campus, and study the acoustics of domed buildings through computer auralization done at Stanford's CCRMA (Center for Computer Research in Music and Acoustics)

Same as: ARTHIST 208.

**CLASSART 125. To the Gods of the Underworld: Roman Funerary Archaeology. 3-5 Units.**

Contextual study of archaeological objects linked to funerary practices and traditions during the late Roman Republic and the early Empire (2nd c. BCE-1st c. CE). Funerary rituals and ritualization of space  $\zeta$  the outskirts of the city. Beautiful and dangerous dead. Ancestor cult and ancestor representation. Funerary landscapes: monumental and not so monumental tombs. Grave offerings and grave assemblages. Public personas and funerary iconography: gender, age, occupation. Death in Rome and death in the provinces.

Same as: ARCHLGY 130.

**CLASSART 132. Lost and found: Roman Coinage. 4-5 Units.**

New trends in Roman numismatics (from the late Republic to the early Empire, 3rd c. BCE-1st c. CE). Archaeology from coins. Barter, money and coinage. The introduction of coinage in Rome and the provinces. Making money (coin production), using money (monetary, non-monetary and ritual uses), losing money (coin circulation, hoards, single finds): contextual interpretations. Monetary systems: coins from Rome and coins from the provinces. Coinage and identity. False coinage.

Same as: ARCHLGY 142, ARCHLGY 242, CLASSART 232.

**CLASSART 139. Art and Religious Experience in Byzantium and Islam. 5 Units.**

This course presents a comparative study of Christian and Islamic paradigms (sixth to the thirteenth centuries) in the construction of religious experience through the material fabric of the building, the interior decor, objects, and rituals. We will read medieval ekphrastic texts and poetry, which stirred the viewer/participant to experience the building/object as animate. Among the sites we will study are: Hagia Sophia, the Ka'ba, the Dome of the Rock, the Mosque at Damascus and at Cordoba. We will read Byzantine and Arabic writers such as Paul the Silentiary, Patriarch Germanos, Maximus Confessor, Shahrawardi, and Ibn Arabi.

Same as: ARTHIST 209.

**CLASSART 201. Archaic Greek Art. 4 Units.**

The development of Greek art and culture from proto-geometric beginnings to the Persian Wars, 1000-480 B.C.E. The genesis of a native Greek style; the orientaling phase during which contact with the Near East and Egypt transformed Greek art; and the synthesis of East and West in the 6th century B.C.E.

Same as: ARTHIST 101, ARTHIST 301, CLASSART 101.

**CLASSART 213. Ten Things: An Archaeology of Design. 3-5 Units.**

Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgewood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology.

Same as: CLASSART 113, STS 112.

**CLASSART 215. Art & Architecture in the Medieval Mediterranean. 4 Units.**

Chronological survey of Byzantine, Islamic, and Western Medieval art and architecture from the early Christian period to the Gothic age. Broad art-historical developments and more detailed examinations of individual monuments and works of art. Topics include devotional art, court and monastic culture, relics and the cult of saints, pilgrimage and crusades, and the rise of cities and cathedrals.

Same as: ARTHIST 105, ARTHIST 305, CLASSART 115.

**CLASSART 232. Lost and found: Roman Coinage. 4-5 Units.**

New trends in Roman numismatics (from the late Republic to the early Empire, 3rd c. BCE-1st c. CE). Archaeology from coins. Barter, money and coinage. The introduction of coinage in Rome and the provinces. Making money (coin production), using money (monetary, non-monetary and ritual uses), losing money (coin circulation, hoards, single finds): contextual interpretations. Monetary systems: coins from Rome and coins from the provinces. Coinage and identity. False coinage.

Same as: ARCHLGY 142, ARCHLGY 242, CLASSART 132.

**CLASSART 305. Art, Ekphrasis, and Music in Byzantium and Islam. 5 Units.**

Focus is on the interrelation of art, architecture, verbal description, poetry, and music (including the singing of psalms and recitation of the Qur'an). We explore how ekphrasis - the style of writing vividly intended to transform the listeners into spectators - structures the perception of and response to artistic production be it an art object, building, or a musical performance. More specifically, we will study the role of ekphrasis in animating the inanimate and the importance of breath and spirit, which become manifest in visual, acoustic, olfactory, and gustatory terms. The material covers both religious and courtly settings: Hagia Sophia, The Great Palace of Constantinople, The Dome of the Rock, The palaces of Baghdad and Samarra, the mosque at Cordoba, Medinat al-Zahra and the Alhambra. We will read Greek and Arabic writers on ekphrasis in translation, juxtaposing the medieval material to the ancient theories of ekphrasis and modern scholarship.

Same as: ARTHIST 405.

**CLASSART 308. Hispania: The Making of a Roman Province. 4-5 Units.**

Overview of the archaeology of early Roman Spain (3rd c. BCE-1st c. CE) and the processes involved in the creation of the Roman provinces. What is a province? Critical (postcolonial) analysis of the Romanization paradigm. Study of the role of the army, early Roman settlements and Roman provincial capitals in tying province and metropolis together. Change and the persistence of local heritage (temples, houses, tombs, coins). Hispania in Rome and Rome in Hispania. Same as: ARCHLGY 308.

**CLASSART 319. Theory for Arch and Classics. 3-5 Units.**

TBA  
Same as: ARCHLGY 319.

## Classics General Courses

**CLASSGEN 6N. Antigone: From Ancient Democracy to Contemporary Dissent. 4 Units.**

Preference to freshmen. Tensions inherent in the democracy of ancient Athens; how the character of Antigone emerges in later drama, film, and political thought as a figure of resistance against illegitimate authority; and her relevance to contemporary struggles for women's and workers' rights and national liberation. Readings and screenings include versions of *Antigone* by Sophocles, Anouilh, Brecht, Fugard/Kani/Ntshona, Paulin, Glowacki, Gurney, and von Trotta. Same as: TAPS 12N.

**CLASSGEN 8N. Saints, Warriors, Queens, and Cows. 4-5 Units.**

The literature of medieval Ireland (600-1400 AD) is rich in tales about war and adventure, pagan gods, and otherworld voyages. The sagas of kings and queens sit side by side (sometimes in the same medieval manuscripts) with stories of holy men and women, and exquisite poetry in praise of nature or important persons. We will explore this largely unfamiliar but fascinating world through careful reading of the primary texts, backed up by some secondary works on history, myth, and society. In addition, the influence of early Irish literature on such later writers as W. B. Yeats and Flann O'Brien will be investigated. Readings include heroic stories of Finn and Cú Chulainn; the Cattle Raid of Cooley; the Voyage of Bran; satires; bardic praise-poems; monastic poems; and Sweeney Astray (Buile Shuibhne).

**CLASSGEN 9. Greek and Latin Roots of English. 3 Units.**

Goal is to improve vocabulary, comprehension of written English, and standardized test scores through learning the Greek and Latin components of English. Focus is on patterns and processes in the formation of the lexicon. Terminology used in medicine, business, education, law, and humanities; introduction to principles of language history and etymology. Greek or Latin not required.

**CLASSGEN 11N. Eloquence Personified: How To Speak Like Cicero. 4-5 Units.**

This course is an introduction to Roman rhetoric, Cicero's Rome, and the active practice of speaking well. Participants read a short rhetorical treatise by Cicero, analyze one of his speeches as well as more recent ones by, e.g., Kennedy, Martin Luther King Jr., and Obama, and watch their oratorical performances. During the remainder of the term they practice rhetoric, prepare and deliver in class two (short) speeches, and write an essay.

**CLASSGEN 15. The Bible and Archaeology. 4 Units.**

An introduction to how archaeology has been used to illumine the Bible and biblical history. Did Abraham exist? Was there an Exodus? Did Joshua really conquer Canaan? What does archaeology reveal about ancient Israel beyond what is recorded in the Bible? This course will address such questions as it seeks to introduce biblical archaeology to students with no prior introduction to either the Bible or to archaeology. Same as: JEWISHST 15A, RELIGST 15A.

**CLASSGEN 17. Gender and Power in Ancient Greece. 3-4 Units.**

Introduction to the sex-gender system of ancient Greece, with comparative material from modern America. How myths, religious rituals, athletics, politics and theater reinforced gender stereotypes and sometimes undermined them. Skills: finding clues, identifying patterns and making connections amongst the components of a strange and beautiful culture very different from our own.

**CLASSGEN 18. Greek Mythology. 3-5 Units.**

The heroic and divine in the literature, mythology, and culture of archaic Greece. Interdisciplinary approach to the study of individuals and society. Illustrated lectures. Readings in translation of Homer, Hesiod, Herodotus, and the poets of lyric and tragedy.

**CLASSGEN 20N. Mapping the Mediterranean. 4-5 Units.**

A sample of premodern material from among the various ways the Mediterranean sea and adjacent lands have been represented over the centuries. This will involve both maps in the conventional sense and also texts and documents (inscriptions and papyri). Much of the material involves actual travel. What kinds of power dynamics have been implicated in such representations? Texts will include extracts from Homer's *Odyssey*; the Hebrew Bible; ancient Egyptian literature; and the Hereford Mappa Mundi.

**CLASSGEN 22N. Technologies of Civilization: Writing, Number, and Money. 4-5 Units.**

For the last 5,000 years, civilization has been growing at an exponential rate. The keys to this growth are the technologies of civilization: writing, numbers, and money. These technologies allow the creation of complex societies and enhance human cognition. We will investigate the role of cognition in shaping history and the role of history in shaping cognition. The perspective of the course is global, with an emphasis on the Western tradition and its ancient Greek roots.

**CLASSGEN 24N. Sappho: Erotic Poetess of Lesbos. 4-5 Units.**

Preference to freshmen. Sappho's surviving fragments in English; traditions referring to or fantasizing about her disputed life. How her poetry and legend inspired women authors and male poets such as Swinburne, Baudelaire, and Pound. Paintings inspired by Sappho in ancient and modern times, and composers who put her poetry to music.

**CLASSGEN 34. Ancient Athletics. 3-4 Units.**

How the Olympic Games developed and how they were organized. Many other Greek festivals featured sport and dance competitions, including some for women, and showcased the citizen athlete as a civic ideal. Roman athletics in contrast saw the growth of large-scale spectator sports and professional athletes. Some toured like media stars; others regularly risked death in gladiatorial contests and chariot-racing. We will also explore how large-scale games were funded and how they fostered the development of sports medicine.

**CLASSGEN 35. Becoming Like God: An Introduction to Greek Ethical Philosophy. 3-5 Units.**

This course investigates key ethical philosophies in classical Greece. After reading several Greek tragedies (representing traditional Greek values), we examine the Greek philosophers' rejection of this tradition and their radically new ethical theories. Socrates, Plato, and Aristotle offered different ethical theories, but they shared basic conceptions of goodness and happiness. They argued that we could become like gods by achieving philosophic wisdom. What kind of wisdom is this? How does it make us ethically good and supremely happy people?

**CLASSGEN 66. Herodotus. 4-5 Units.**

For Ancient History field of study majors; others by consent of instructor. Close reading technique. Historical background to the Greco-Persian Wars; ancient views of empire, culture, and geography; the wars and their aftermath; ancient ethnography and historiography, including the first narrative of ancient Egypt.

**CLASSGEN 81. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track; majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English. Same as: COMPLIT 181, ENGLISH 81, FRENCH 181, GERMAN 181, ITALIAN 181, PHIL 81, SLAVIC 181.

**CLASSGEN 103. The Greek Invention of Mathematics. 3-5 Units.**

How was mathematics invented? A survey of the main creative ideas of ancient Greek mathematics. Among the issues explored are the axiomatic system of Euclid's Elements, the origins of the calculus in Greek measurements of solids and surfaces, and Archimedes' creation of mathematical physics. We will provide proofs of ancient theorems, and also learn how such theorems are even known today thanks to the recovery of ancient manuscripts. Same as: MATH 163.

**CLASSGEN 106. Priests, Prophets, and Kings: Religion and Society in Late Antique Iran. 4-5 Units.**

From India to the Levant and from the Caspian Sea to the Arabian Peninsula, the Sasanian Empire (224-651 CE) was the dominant power in the Middle East till the advent of Islam. Diverse religious institutions and social practices of the Zoroastrians, Manicheans, Jews, and Christians in late antique Iran. Complex relationships between the Zoroastrian priesthood, the Sasanian monarchs, and these minority religions within the context of imperial rule. Profound religious and social changes that occurred with the Islamic conquests of Iran as well as examine the rich cultural continuities that survived from the Pre-Islamic past. Same as: CLASSGEN 206, RELIGST 209, RELIGST 309.

**CLASSGEN 109. Emperor, Explorer, and God: Alexander the Great in the Global Imagination. 3 Units.**

Survey of the image of Alexander the Great from the Hellenistic world to the contemporary. We shall discuss the appropriation of Alexander's life and legend and examine his reception as both a divine and a secular figure in a variety of cultures both East and West. Students will engage with a variety of media including texts (primary and secondary) and images (statues, coins, mosaics, illuminated manuscripts, film, and TV) in the Hellenistic, Roman, Byzantine, Jewish, Islamic, Medieval, Renaissance, and Early Modern contexts. Finally, we will evaluate contemporary representations of Alexander in TV, film and popular culture, such as William Shatner's and Adam West's 1968 TV pilot, Oliver Stone's 2004 film, and Andy Warhol's Pop art. Same as: RELIGST 109.

**CLASSGEN 116. Ecology in Philosophy and Literature. 3-5 Units.**

We examine the basic principles of ecological thinking, exploring the ways that different writers represent and relate to the 'natural' world. Some key questions: What is nature, and where do humans fit in the natural world? How exactly do humans differ from other animals? Do these differences make us superior beings? What are our ethical responsibilities towards the earth and its inhabitants? In what ways have the technologies of writing, television, and computers affected humankind's relationship to the natural world?.

**CLASSGEN 117. The Language of Homer. 4-5 Units.**

A linguistic introduction to the history of the Greek language by way of focussed readings and intensive analysis of Homeric poetry. Attention will be given to problems of diachronic change, including developments in morphology tied to the demands of the hexameter; phenomena related to loss of digamma, vowel contractions, and dactylis; particle usage; development of the definite article; preposed relative clauses; and the dialect mix represented in the Homeric Kunstsprache. In addition to 80-100 pages of densely-packed handbook reading each week in English, students will be expected to complete weekly reading assignments in either French or German, and required reading of appx. 300 lines of Greek per session. Same as: CLASSGEN 217.

**CLASSGEN 123. Urban Sustainability: Long-Term Archaeological Perspectives. 3-5 Units.**

Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas. Same as: CLASSGEN 223, URBANST 115.

**CLASSGEN 126. Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict. 5 Units.**

Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Iudaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world. Same as: CLASSGEN 226, JEWISHST 226B, JEWISHST 326B, RELIGST 226B, RELIGST 326B.

**CLASSGEN 126B. Jewish-Christian Relations in Antiquity. 1-2 Units.**

Constructions of identity, community, ethnicity: these considerations frame the investigation of ancient Christian rhetoric and theology contra Iudaeos. This historical project will be set within the larger intellectual and cultural context of a) learned Graeco-Roman traditions of ethnic stereotyping; b) forensic rhetoric; and c) philosophical paideia; and these traditions will be considered within their larger social context of the Mediterranean city (I-III). Specifically, various Christian, and especially Latin traditions contra Iudaeos (IV-VI) will be studied. Same as: JEWISHST 226D, RELIGST 226D.

**CLASSGEN 132. Early Christian Gospels. 4 Units.**

An exploration of Christian gospels of the first and second century. Emphasis on the variety of images and interpretations of Jesus and the good news, the broader Hellenistic and Jewish contexts of the gospels, the processes of developing and transmitting gospels, and the creation of the canon. Readings include the Gospel of John, the Gospel of Mark, the Gospel of Thomas, the Gospel of Mary and other canonical and non-canonical gospels. Same as: RELIGST 132D.

**CLASSGEN 134. Early Christianity, Early Judaism, and Gender. 4 Units.**

An exploration of gender in Early Christianity and Early Judaism. Possible topics include: an examination of Pre-Christian writings which are indicative of the foundational social contexts in which early Christian and Jewish writers operated; how women's preaching was portrayed in Paul's letters and the implications for what was actually going on in the community in Corinth; later interpretations of Paul's attitudes towards women and marriage, which diverge between a pro-marriage and further restrictive understanding of women's involvement in the Church in the pastorals (1 and 2 Timothy and Titus) and a pro-ascetic, cross-dressing, understanding of greater women's freedom in the Acts of Paul and Thecla; female Christian martyrs who had visions of themselves as men entering battle and male Rabbis who understood themselves as female virgins and who hid in warehouses to avoid martyrdom; and a survey of early Rabbinic laws pertaining to men and women and what they reveal about early Jewish conceptions of gender.

Same as: JEWISHST 122B, RELIGST 132B.

**CLASSGEN 145. Reinventing the Other: Greeks, Romans, Barbarians. 3-5 Units.**

Ancient ethnography was a highly conventionalized tradition stretching from "the father of History," Herodotus, to the last historian of the ancient world, Procopius. We will read selections of these two authors' works as well as of Sallust, Tacitus, and lesser known ones. Within various theoretical frameworks' rhetorical, anthropological, structuralist we will reconstruct the shifting images of The Other, explore what they tell us about their producers, and reflect on what ancient ethnography contributed to its modern descendant.

**CLASSGEN 149. Ancient and Modern Medicine. 3-4 Units.**

Imagine a world where the Universe has a built-in purpose and point. How would this belief impact man's place in nature? Imagine a world where natural substances have "powers." How might this impact diet and pharmacology? Magical vs. scientific healing: a clear divide? Disease and dehumanization: epilepsy, rabies. Physical and mental health: black bile and melancholy. The ethical and scientific assumptions hidden in medical language and imagery. How ancient medicine and modern medicine (especially alternative medicine) illuminate each other.

**CLASSGEN 153. Images of Women in Ancient China and Greece. 4 Units.**

Representation of women in ancient Chinese and Greek texts. How men viewed women and what women had to say about themselves and their societies. Primary readings in poetry, drama, and didactic writings. Relevance for understanding modern concerns; use of comparison for discovering historical and cultural patterns.

Same as: CHINGEN 143, CHINGEN 243, CLASSGEN 253.

**CLASSGEN 159. Winged Bulls and Sun Disks: Religion and Politics in the Persian Empire. 3-5 Units.**

Since Herodotus in the 5th century BCE, the Persian Empire has been represented as the exemplar of oriental despotism and imperial arrogance, a looming presence and worthy foil for the West and Greek democracy. History of the Achaemenid Empire, beginning with the rise of the Medes in the 7th century BCE to the fall of the Achaemenids to Alexander the Great's armies in 331 BCE. Focus on the intimate relationship between religion and empire and will also survey the diverse cultural institutions and religious practices found within the Empire. Evaluate contemporary representations of the Persians in politics and popular culture, such as the recent film "300" and the graphic novel on which it is based, in an attempt to better appreciate the enduring cultural legacy of the Greco-Persian wars.

Same as: CLASSGEN 259, RELIGST 229, RELIGST 329.

**CLASSGEN 160. Directed Readings. 1-15 Units.**

May be repeated for credit.

Same as: Undergraduate.

**CLASSGEN 174. Martyrdom in the Ancient World. 4 Units.**

Jewish, pagan and Christian groups under Roman rule all told tales of persecution and resistance. How did they use these stories, and the historical experiences behind them, to form group identity? Emphasis is on ancient documents in translation, and modern scholarly interpretations, to examine the competing agendas of parties involved, group dynamics, individual motivation, symbolic violence, and the body as a locus of power and control.

Same as: RELIGST 174.

**CLASSGEN 176. Majors Seminar. 5 Units.**

Required of Classics majors and minors in junior or senior year; students contemplating honors should take this course in junior year. Advanced skills course involving close reading, critical thinking, editing, and writing. In-class and take-home writing and revising exercises. Final paper topic may be on any subject related to Classics.

**CLASSGEN 189. Imperishable Heroes and Unblemished Goddesses: Myth, Ritual, and Epic in Ancient Iran. 3-5 Units.**

Designed as a broad introduction to the world of ancient Iran, students will be introduced to the Indo-European inheritance in ancient Iranian culture; the shared world of ritual, religion, and mythology between Zoroastrianism in Iran and Vedic Hinduism in India; and to the contours of early Zoroastrian religious thought. We will also survey mythoepic literature in translation from the archaic Avesta through the late antique Zoroastrian Middle Persian corpus to the early medieval national epic of Iran, the Book of Kings of Ferdowsi.

Same as: CLASSGEN 289, RELIGST 209E, RELIGST 309E.

**CLASSGEN 199. Undergraduate Thesis: Senior Research. 2-10 Units.****CLASSGEN 205A. The Semantics of Grammar. 2 Units.**

Supplements CLASSLAT/CLASSGRK 275. Introduction to the grammatical encoding of semantic and pragmatic meaning. 205A: morphology-semantics interface (gender, tense, aspect, case). 205B: syntax-pragmatics interface (Latin word order). Begins in Autumn Quarter and continues through 5th week of Winter Quarter.

**CLASSGEN 205B. The Semantics of Grammar. 2 Units.**

Supplements CLASSLAT/CLASSGRK 275. Introduction to the grammatical encoding of semantic and pragmatic meaning. 205A: morphology-semantics interface (gender, tense, aspect, case). 205B: syntax-pragmatics interface (Latin word order). Begins in Autumn Quarter and continues through 5th week of Winter Quarter.

**CLASSGEN 206. Priests, Prophets, and Kings: Religion and Society in Late Antique Iran. 4-5 Units.**

From India to the Levant and from the Caspian Sea to the Arabian Peninsula, the Sasanian Empire (224-651 CE) was the dominant power in the Middle East till the advent of Islam. Diverse religious institutions and social practices of the Zoroastrians, Manicheans, Jews, and Christians in late antique Iran. Complex relationships between the Zoroastrian priesthood, the Sasanian monarchs, and these minority religions within the context of imperial rule. Profound religious and social changes that occurred with the Islamic conquests of Iran as well as examine the rich cultural continuities that survived from the Pre-Islamic past.

Same as: CLASSGEN 106, RELIGST 209, RELIGST 309.

**CLASSGEN 207A. Survey of Greek and Latin Literature: Literature of the Roman Republic. 3-5 Units.**

First course in a required two-year sequence. Focus is on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years. Focus is on translation, textual criticism, genre, the role of Greece in shaping Roman literature, and oral versus written discourse.

**CLASSGEN 207B. Survey of Greek and Latin Literature: Augustan Age Latin. 3-5 Units.**

Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Texts of Augustan literature required by the graduate syllabus, emphasizing poetry and major authors.

**CLASSGEN 207C. Survey of Greek and Latin Literature: Imperial Latin. 4-5 Units.**

Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years.

**CLASSGEN 208A. Survey of Greek and Latin Literature: Archaic Greek. 3-5 Units.**

Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years.

**CLASSGEN 208B. Survey of Greek and Latin Literature: Classical Greek. 3-5 Units.**

Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years.

**CLASSGEN 208C. Survey of Greek and Latin Literature: Hellenistic and Late Greek. 3-5 Units.**

Required two-year sequence focusing on the origins, development, and interaction of Greek and Latin literature, history, and philosophy. Greek and Latin material taught in alternate years.

**CLASSGEN 217. The Language of Homer. 4-5 Units.**

A linguistic introduction to the history of the Greek language by way of focussed readings and intensive analysis of Homeric poetry. Attention will be given to problems of diachronic change, including developments in morphology tied to the demands of the hexameter; phenomena related to loss of digamma, vowel contractions, and diectasis; particle usage; development of the definite article; preposed relative clauses; and the dialect mix represented in the Homeric *Kunstsprache*. In addition to 80-100 pages of densely-packed handbook reading each week in English, students will be expected to complete weekly reading assignments in either French or German, and required reading of appx. 300 lines of Greek per session. Same as: CLASSGEN 117.

**CLASSGEN 223. Urban Sustainability: Long-Term Archaeological Perspectives. 3-5 Units.**

Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas. Same as: CLASSGEN 123, URBANST 115.

**CLASSGEN 226. Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict. 5 Units.**

Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the *Adversus Judaeos* tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (*Mishnah*, *Midrash* and *Talmud*), along with current literature on religion, ethnicity, and identity in the Roman world.

Same as: CLASSGEN 126, JEWISHST 226B, JEWISHST 326B, RELIGST 226B, RELIGST 326B.

**CLASSGEN 229. Classical Epic and the English Renaissance. 3-5 Units.**

The reception of Greek and Latin epics in 16th- and 17th-century England. How were the ancient epics read and interpreted? What kinds of commentary were being used and written? The creative appropriation of the ancient epics in new poems: Spenser and Milton set against the background of less well-known epics of the period, with focus on civil war epics. Same as: CLASSGEN 129.

**CLASSGEN 241. Words and Things in the History of Classical Scholarship. 4-5 Units.**

How have scholars used ancient texts and objects since the revival of the classical tradition? How did antiquarians study and depict objects and relate them to texts and reconstructions of the past? What changed and what stayed the same as humanist scholarship gave way to professional archaeologists, historians, and philologists? Focus is on key works in the history of classics, such as Erasmus and Winckelmann, in their scholarly, cultural, and political contexts, and recent critical trends in intellectual history and the history of disciplines.

**CLASSGEN 243. Second Sophistic Science. 3-4 Units.**

Scientific works from the Roman Empire. Focus is on how such works can be understood within the wider context of the Greco-Roman civilization of the Roman Empire, not only of Roman imperial science but also of Roman imperial civilization as a whole. Readings depend on student interests but may begin with Vitruvius, Nicomachus, Galen, and Ptolemy. Readings in translation.

Same as: CLASSGEN 143.

**CLASSGEN 253. Images of Women in Ancient China and Greece. 4 Units.**

Representation of women in ancient Chinese and Greek texts. How men viewed women and what women had to say about themselves and their societies. Primary readings in poetry, drama, and didactic writings. Relevance for understanding modern concerns; use of comparison for discovering historical and cultural patterns.

Same as: CHINGEN 143, CHINGEN 243, CLASSGEN 153.

**CLASSGEN 259. Winged Bulls and Sun Disks: Religion and Politics in the Persian Empire. 3-5 Units.**

Since Herodotus in the 5th century BCE, the Persian Empire has been represented as the exemplar of oriental despotism and imperial arrogance, a looming presence and worthy foil for the West and Greek democracy. History of the Achaemenid Empire, beginning with the rise of the Medes in the 7th century BCE to the fall of the Achaemenids to Alexander the Great's armies in 331 BCE. Focus on the intimate relationship between religion and empire and will also survey the diverse cultural institutions and religious practices found within the Empire. Evaluate contemporary representations of the Persians in politics and popular culture, such as the recent film "300" and the graphic novel on which it is based, in an attempt to better appreciate the enduring cultural legacy of the Greco-Persian wars. Same as: CLASSGEN 159, RELIGST 229, RELIGST 329.

**CLASSGEN 260. Directed Reading in Classics. 1-15 Units.**

Same as: Graduate Students.

**CLASSGEN 289. Imperishable Heroes and Unblemished Goddesses: Myth, Ritual, and Epic in Ancient Iran. 3-5 Units.**

Designed as a broad introduction to the world of ancient Iran, students will be introduced to the Indo-European inheritance in ancient Iranian culture; the shared world of ritual, religion, and mythology between Zoroastrianism in Iran and Vedic Hinduism in India; and to the contours of early Zoroastrian religious thought. We will also survey mythoeptic literature in translation from the archaic Avesta through the late antique Zoroastrian Middle Persian corpus to the early medieval national epic of Iran, the *Book of Kings of Ferdowsi*.

Same as: CLASSGEN 189, RELIGST 209E, RELIGST 309E.

**CLASSGEN 311. Paleography of Medieval and Early Modern Manuscripts. 3-5 Units.**

Introductory course in the history of writing and of the book, from the late antique period until the advent of printing. Opportunity to learn to read and interpret medieval manuscripts through hands-on examination of original materials in Special Collections of Stanford Libraries as well as through digital images. Offers critical training in the reading of manuscripts for students from departments as diverse as Classics, History, Philosophy, Religious Studies, English, and the Division of Languages Cultures and Literatures.

Same as: DLCL 209, ENGLISH 209, HISTORY 309G, RELIGST 204.

**CLASSGEN 313. Literary and Art Criticism in Greece. 4-5 Units.**

Plato, Aristotle, Dionysius of Halicarnassus, Demetrius, Plutarch, Philostratus, Longinus are some of the authors we will read and discuss in this seminar. The main questions we will explore are: How do these authors talk about aesthetic judgments in the realm of art, performance, and literature? Is there a concept of taste in Greek antiquity? The vocabulary of judgment about visual and verbal artifacts. Does visual perception affect aural perception? Sociological and political parameters in aesthetic judgment.

**CLASSGEN 321. Classical Seminar: Rethinking Classics. 4-5 Units.**

Literary and philosophical texts from Antiquity (including Homer, the Greek tragedians, Plato, Aristotle, Virgil, and Augustine). In each case, we will examine the cultural contexts in which each text was composed (e.g. political regimes and ideologies; attitudes towards gender and sexuality; hierarchies of class and status; discourses on "barbarians" and resident aliens). We will study various theoretical approaches to these books in an effort to "rethink" these texts in the 21st century.

Same as: DLCL 321, HUMNTIES 321.

**CLASSGEN 333B. Imperial Greek Prose B. 2-5 Units.**

Continuation of Imperial Greek Prose A through regular colloquium meetings.

**CLASSGEN 334. Sallust and Virgil. 3-5 Units.**

Sallust, called the brightest flower among Roman historians, and Virgil, whose verses caused the Roman people to rise in homage, were contemporaries and members of the circle of Asinius Pollio. Yet (and even though Virgil's ancient commentators and scholiasts refer to Sallust dozens of times) the relationship between the two has hardly received any attention. We will study the works of both authors in their respective Greek and Roman traditions and explore their (possible) linguistic and ideological parallels.

**CLASSGEN 336. Augustine on Memory, Time, and the Self. 4-5 Units.**

This course examines Augustine's "Confessions" as an autobiographical discourse. It investigates his theories of memory and of time and address different theories of the "self." How does memory and the passing of time affect the notion of the self? Does Augustine's "subjective" theory of time offer an identifiable self? Is the self constructed by narratives? We will locate these issues in their cultural context by investigating Christian and pagan discourses and practices in Late Antiquity.

**CLASSGEN 337. Narrative, Persuasion and Emotion in Classical Athens. 5 Units.**

What makes a narrative persuasive? How did Athenian authors use language to make narrated events vivid and plausible to an audience who had not seen them? What emotions did they try to excite? This seminar will consider questions like these by focusing on ancient rhetorical theory and Classical Athenian practice. We will read widely in the corpus of Athenian oratory, but we will also consider examples of narrative in drama and historiography. Theoretical readings will include Plato's *Gorgias* and *Phaedrus*, the pseudo-Aristotelian *Rhetoric to Alexander*, Aristotle's *Rhetoric*, and selections from later critics and theorists like Dionysius of Halicarnassus and anonymous scholiasts. We will discuss how well ancient rhetorical treatises explain the relationship between narrative, persuasion and emotion as it was practiced in Classical Athens. We will also investigate modern theories of narrative, including narratology and legal storytelling.

**CLASSGEN 338. Aristotle and the Object of Mathematical Reasoning. 4 Units.**

The concept of definition plays a central role in Aristotle's treatment of both philosophical and scientific inquiry, as well as explanation. A definition is an account of what something is, and some definitions are used to guide causal inquiry whereas others function as explanatory starting points. In this course we will examine texts from his logic, natural science and metaphysics in order to see what the different kinds of definition are, how they obtained, and how they capture the nature or essence of a definable object. Particular attention will be given to the role of matter in the definition of the form of a natural substance, state, process or activity. For instance, what role does a specification of physiological processes play in the definitions of emotions such as anger? No knowledge of Greek is required.

Same as: PHIL 318.

**CLASSGEN 341. Aztecs, Romans Spaniards: History of scholarship in a colonial context. 4-5 Units.**

A direct and detailed exploration of the uses of classical learning during the first decades after the Spanish conquest of Mexico, showing how Renaissance knowledge of Latin and Greek and of classical antiquity was rapidly transformed or customized for a non-European environment. The focus will be on scholarly categories of the period (grammar, rhetoric, dialectic, epistolography, historiography, poetry) approached primarily through analysis of Latin texts authored by missionary friars and by scholars from the indigenous Nahua elites of central Mexico. The course will demonstrate the relevance of classical philology and traditions of knowledge to contemporary colonial studies, ethnohistory and missionary linguistics.

**CLASSGEN 343. The Poetics of the Odyssey. 4-5 Units.**

An intensive study of the entire poem, with particular attention given to problems of narrative construction, characterization, diction, and themes. Basic knowledge of Homeric language and versemaking is a prerequisite. Reading will cover about 500 lines of Greek each week in addition to secondary readings (several book chapters or articles).

**CLASSGEN 352. Ovid's Metamorphoses. 4-5 Units.**

Competing 20th-century approaches. Emphasis is on new research and how to compose research papers. Topics include: narratology, reception, gender, poetics, time and space, mythology, material culture, hellenization, romanization, orientalism, allusion and intertextuality, and emotions.

**CLASSGEN 354. Social Power: The Law and the State, a Comparative Study of Ancient Legal Systems. 3-5 Units.**

For ancient history majors and those interested in the history of law. Ancient Mediterranean legal systems, from ancient Egypt and the Near East to Greece and Rome. Focus is on ancient documents including the *Code of Hammurabi*, Egyptian sale contracts, as well as analysis of ancient law such as Maine's *Ancient Law*, and Weber. The development of the law; solutions in ancient societies to the common problems of crime, contract, inheritance, marriage, and the family; and the enforcement of property rights. Same as: CLASSGEN 154.

**CLASSGEN 360. Dissertation Research in Classics. 1-10 Units.**

**CLASSGEN 361. German for Classicists. 1 Unitss.**

Restricted to Classics graduate students preparing for the modern language translation exam in German. Will utilize classical selections for translation and some guided study for mastery of the exam.

**CLASSGEN 801. TGR Project. 0 Unit.**

**CLASSGEN 802. TGR Dissertation. 0 Unit.**

## Classics Greek Courses

**CLASSGRK 1. Beginning Greek. 3-5 Units.**

No knowledge of Greek is assumed. Classics majors and minors must take course for letter grade. Vocabulary and syntax of the classical language.

**CLASSGRK 2. Beginning Greek. 3-5 Units.**

Continuation of CLASSGRK 1. Classics majors and minors must take course for letter grade.

**CLASSGRK 3. Beginning Greek. 3-5 Units.**

Continuation of CLASSGRK 2. Classics majors and minors must take course for letter grade. Vocabulary and syntax of the classical language. CLASSGRK 3 fulfills University language requirement.

**CLASSGRK 5. Biblical Greek. 3-5 Units.**

This is a one term intensive class in Biblical Greek. After quickly learning the basics of the language, we will then dive right into readings from the New Testament and the Septuagint, which is the ancient Greek translation of the Hebrew Bible. By the end of the term everyone will be able to read the Greek Bible with ease. No previous knowledge of Greek required. Those wishing to continue study of Biblical Greek may enroll in Biblical Greek II (CLASSGRK 5B) when offered. Same as: JEWISHST 5, RELIGST 5.

**CLASSGRK 5B. Biblical Greek II. 3-5 Units.**

This is a continuation of the Winter Quarter Biblical Greek Course. We will be reading selections primarily from the New Testament (both Gospels and Epistles) as well as focusing on knowledge of key vocabulary and grammar needed to read the Greek Bible with ease. Readings will be supplemented with sections from the Septuagint and Early Christian texts (Apostolic Fathers and Early Creeds). Pre-requisite: ClassGrk 5 or a similar introductory course in Ancient Greek. Same as: JEWISHST 5B, RELIGST 5B.

**CLASSGRK 101. Intermediate Greek: Symposium. 3-5 Units.**

Vocabulary building, ongoing review of forms and constructions. Classics majors and minors must take course for letter grade. May be repeated for credit.

**CLASSGRK 102. Intermediate Greek. 4-5 Units.**

In this course, we will read a very great tragedy, Aeschylus' *Prometheus Bound*. We will use the edition and commentary of M. Griffith (Cambridge 1983). My assumption will be that this is the first Greek tragedy in Greek for almost all students in the class, and we will proceed extremely carefully and thoroughly, covering as much of the text as we can in a short quarter. We will discuss and debate the immense themes and issues at every point, and we will read in English the six other Aeschylean tragedies. There will be two midterms and, by the end of the term, a serious paper. Reading a Greek tragedy in Greek will be one of the most important things all students in the class will ever do. Classics majors and minors must take course for letter grade. May be repeated for credit.

**CLASSGRK 103. Intermediate Greek. 3-5 Units.**

Classics majors and minors must take course for letter grade. May be repeated for credit.

**CLASSGRK 111. Advanced Greek: Homer's Helen and Helen in Prose. 3-5 Units.**

The figure of Helen will serve as a lens to analyze a number of genres of ancient Greek prose. Helen's role in the Iliad and Odyssey will ground our consideration of writers such as Herodotus, Gorgias, Isocrates and Lucian. Special attention will be paid to grammar, syntax and style, but we will also explore broader themes: the relationship between rhetoric and truth; the stability or discontinuity of the image of Helen; and her role in shaping ancient discourse and genre. Classics majors and minors must take course for letter grade. May be repeated for credit. Same as: CLASSGRK 211.

**CLASSGRK 112. Advanced Greek: Lyric Poetry. 3-5 Units.**

Invectives, love songs, drinking songs, elegies, and choral odes from 700-500 B.C.E. Readings include Sappho, Alcaeus, Archilochus, Mimnermus, Alcman, Solon, and Pindar. Classics majors and minors must take course for letter grade. May be repeated for credit. Same as: CLASSGRK 212.

**CLASSGRK 113. Advanced Greek: Scientific Writing. 3-5 Units.**

Euclid and Archimedes. Reading texts from Greek science. The relationship between form and meaning in the presentation of scientific information, introduction to Greek Paleography. Classics majors and minors must take course for letter grade. May be repeated for credit.

**CLASSGRK 175A. Greek Syntax: Prose Composition. 2 Units.**

(First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek. Same as: CLASSGRK 275A.

**CLASSGRK 175B. Greek Syntax: Prose Composition. 3-5 Units.**

(First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek. Same as: CLASSGRK 275B.

**CLASSGRK 211. Advanced Greek: Homer's Helen and Helen in Prose. 3-5 Units.**

The figure of Helen will serve as a lens to analyze a number of genres of ancient Greek prose. Helen's role in the Iliad and Odyssey will ground our consideration of writers such as Herodotus, Gorgias, Isocrates and Lucian. Special attention will be paid to grammar, syntax and style, but we will also explore broader themes: the relationship between rhetoric and truth; the stability or discontinuity of the image of Helen; and her role in shaping ancient discourse and genre. Classics majors and minors must take course for letter grade. May be repeated for credit.  
Same as: CLASSGRK 111.

**CLASSGRK 212. Advanced Greek: Lyric Poetry. 3-5 Units.**

Invectives, love songs, drinking songs, elegies, and choral odes from 700-500 B.C.E. Readings include Sappho, Alcaeus, Archilochus, Mimnermus, Alcman, Solon, and Pindar. Classics majors and minors must take course for letter grade. May be repeated for credit.  
Same as: CLASSGRK 112.

**CLASSGRK 275A. Greek Syntax: Prose Composition. 2 Units.**

(First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek.  
Same as: CLASSGRK 175A.

**CLASSGRK 275B. Greek Syntax: Prose Composition. 3-5 Units.**

(First-year graduate students register for 275A,B.) Review of Greek grammar and instruction in Greek prose composition skills. Begins sixth week of Winter Quarter and continues through Spring Quarter. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Greek.  
Same as: CLASSGRK 175B.

## Classics History Courses

**CLASSHIS 60. The Romans. 3-5 Units.**

How did a tiny village create a huge empire and shape the world, and why did it fail? Roman history, imperialism, politics, social life, economic growth, and religious change.  
Same as: HISTORY 102A.

**CLASSHIS 101. The Greeks. 4-5 Units.**

Greek history from the rise of the city state through Alexander the Great's conquest of Persia. Economics, society, culture, and technology. Competition and cooperation within and between states; the emergence of strong forms of citizenship along with chattel slavery and gender inequality; the origins and practices of democracy; and relations with non-Greek peoples. Focus is on ancient sources and archaeological remains.  
Same as: HISTORY 101.

**CLASSHIS 105. The Egyptians. 3-5 Units.**

Overview of ancient Egyptian pasts, from predynastic times to Greco-Roman rule, roughly 3000 BCE to 30 BCE. Attention to archaeological sites and artifacts; workings of society; and cultural productions, both artistic and literary.  
Same as: AFRICAAM 30.

**CLASSHIS 114. Economy and Economics of Ancient Greece. 5 Units.**

Cultural and political background for Athens of the 5th and 4th century BC. Athenian economy of the 4th century BC. Economic ideas of Plato, Aristotle, and Xenophon. Pros and Cons of utilitarianism in light of the ethical theories of Plato and Aristotle. Economy and economics of ancient Greece will be compared to the same of ancient China. There is an interesting parallel.  
Same as: ECON 114.

**CLASSHIS 133. Classical Seminar: Origins of Political Thought. 4-5 Units.**

Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change. Same as: CLASSHIS 333, PHIL 176A, PHIL 276A, POLISCI 230A, POLISCI 330A.

**CLASSHIS 322A. Dark Age Greece and the Demise of Godlike Kings. 4-5 Units.**

Compared to most ancient societies, classical Greeks strongly opposed the idea that some humans had a divine right to rule over others. This unusual attitude may have played a major part in the Greeks' invention of male democracy. This seminar asks how, when, and why Greeks rejected divine kingship. It contrasts two broad theories; that Greeks rejected godlike kings in the Dark Age (1200-700 BC) and that godlike kings had never flourished in Greece.

**CLASSHIS 322B. Dark Age Greece and the Demise of Godlike Kings. 4-5 Units.**

Compared to most ancient societies, classical Greeks strongly opposed the idea that some humans had a divine right to rule over others. This unusual attitude may have played a major part in the Greeks' invention of male democracy. This seminar asks how, when, and why Greeks rejected divine kingship. It contrasts two broad theories; that Greeks rejected godlike kings in the Dark Age (1200-700 BC) and that godlike kings had never flourished in Greece.

**CLASSHIS 332. High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests. 4-5 Units.**

Normative political theory combined with positive political theory to better explain how major texts may have responded to and influenced changes in formal and informal institutions. Emphasis is on historical periods in which catastrophic institutional failure was a recent memory or a realistic possibility. Case studies include Greek city-states in the classical period and the northern Atlantic community of the 17th and 18th centuries including upheavals in England and the American Revolutionary era.  
Same as: POLISCI 231, POLISCI 331.

**CLASSHIS 333. Classical Seminar: Origins of Political Thought. 4-5 Units.**

Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change. Same as: CLASSHIS 133, PHIL 176A, PHIL 276A, POLISCI 230A, POLISCI 330A.

**CLASSHIS 340A. Roman Emperors. 3-5 Units.**

Restricted to graduate students. We focus on the question of how to study the Roman monarchy today: as Roman history or as part of the global history of monarchy? Focus is on methodology, emphasizing comparative and transdisciplinary approaches.

## Classics Latin Courses

**CLASSLAT 1. Beginning Latin: Vocabulary and Syntax. 3-5 Units.**

Vocabulary and syntax of the classical language. No previous knowledge of Latin is assumed. Classics majors and minors must take course for letter grade.  
Same as: CLASSLAT 201.

**CLASSLAT 2. Beginning Latin. 3-5 Units.**

Continuation of CLASSLAT 1. Classics majors and minors must take course for letter grade.  
Same as: CLASSLAT 202.



**CLASSLAT 3. Beginning Latin. 3-5 Units.**

Continuation of CLASSLAT 2. Classics majors and minors must take course for letter grade. CLASSLAT 3 fulfills the University language requirement.

Same as: CLASSLAT 203.

**CLASSLAT 10. Intensive Beginning Latin. 9-15 Units.**

Equivalent to a year of beginning Latin (three quarters: CLASSLAT 1, 2 and 3), this course is designed to teach the fundamentals of the Latin language in eight weeks. We will focus primarily on acquiring the basics of Latin grammar, morphology, and vocabulary and developing basic reading skills. At the end of the course, students should be able to read easy Latin prose and poetry. We will be using Wheelock's Latin textbook and meeting three hours a day, four days a week. Grades will depend on class participation and on performance in weekly quizzes and in a final written exam. Classics majors and minors must take course for letter grade. CLASSLAT 10 fulfills the University language requirement.

**CLASSLAT 101. Intermediate Latin: Introduction to Literature. 3-5 Units.**

Phonology, morphology, semantics, and syntax. Readings in prose and poetry. Analysis of literary language, including rhythm, meter, word order, narrative, and figures of speech. May be repeated for credit.

**CLASSLAT 102. Intermediate Latin: Catullus and Pliny. 3-5 Units.**

Selections from the poetry of Catullus and the letters of Pliny the Younger. The course primarily aims to improve your control of Latin grammar and fluency in reading authentic Latin. You will have opportunities to examine and discuss each author's language and style and their literary, political, and social contexts. Classics majors and minors must take this course for a letter grade. Course can be repeated for credit.

**CLASSLAT 103. Intermediate Latin: Cicero and Ovid. 3-5 Units.**

In this class you will practice with and reinforce the advanced vocabulary, forms, and syntax of classical Latin you have previously acquired by reading continuous works of Latin prose (Cicero) and poetry (Ovid). While the primary emphasis of this course is on developing fluency in reading Latin, you will have opportunities to discuss and research the biographical, political, and literary issues raised by the readings. Your knowledge of the content and syntax of the readings will be assessed by several short translation/grammar quizzes in addition to a mid-term test and a final examination. Classics majors and minors must take course for a letter grade. May be repeated for credit.

**CLASSLAT 111. Advanced Latin: Virgil's Eclogues. 3-5 Units.**

Classic majors and minors must take course for a letter grade. May be repeated for credit.

**CLASSLAT 112. Advanced Latin: Cicero and Sallust on Catiline. 3-5 Units.**

Reading of selections of Cicero's Catilinarians and In Defense of Caelius, and Sallust's Catilinarian Conspiracy. We will compare the three different Catilinarian villains within the framework of rhetoric, Cicero's and Sallust's styles (esp. metaphors), and explore the historian's possible debts to the orator. As needed, we will review questions of grammar and syntax, rhetorical terms, and historical context. Classics majors and minors must take course for letter grade. May be repeated for credit.

**CLASSLAT 113. Advanced Latin: Ovid and Lucan. 3-5 Units.**

We will read a book each from Ovid's *Metamorphoses* and Lucan's *Civil War*. Focus will be on the literary aspect of the texts as well as how each author engages with previous literary models, especially Virgil's *Aeneid*. Questions of grammar, syntax and historical context of the works discussed as necessary. Classics majors and minors must take course for a letter grade. May be repeated for credit.

**CLASSLAT 175A. Latin Syntax. 3-5 Units.**

(First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.

Same as: CLASSLAT 275A.

**CLASSLAT 175B. Latin Syntax. 2 Units.**

(First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.

Same as: CLASSLAT 275B.

**CLASSLAT 201. Beginning Latin: Vocabulary and Syntax. 3-5 Units.**

Vocabulary and syntax of the classical language. No previous knowledge of Latin is assumed. Classics majors and minors must take course for letter grade.

Same as: CLASSLAT 1.

**CLASSLAT 202. Beginning Latin. 3-5 Units.**

Continuation of CLASSLAT 1. Classics majors and minors must take course for letter grade.

Same as: CLASSLAT 2.

**CLASSLAT 203. Beginning Latin. 3-5 Units.**

Continuation of CLASSLAT 2. Classics majors and minors must take course for letter grade. CLASSLAT 3 fulfills the University language requirement.

Same as: CLASSLAT 3.

**CLASSLAT 275A. Latin Syntax. 3-5 Units.**

(First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.

Same as: CLASSLAT 175A.

**CLASSLAT 275B. Latin Syntax. 2 Units.**

(First-year graduate students register for 275A,B.) Intensive review of Latin syntax. Begins Autumn Quarter and continues through the fifth week of Winter Quarter. See CLASSGEN 205A,B for supplemental courses. Classics majors and minors must take course for letter grade. Prerequisite for undergraduates: three years of Latin.

Same as: CLASSLAT 175B.

## Communication Courses

**COMM 1A. Media Technologies, People, and Society. 4-5 Units.**

(Graduate students register for COMM 211.) Open to non-majors. Introduction to the concepts and contexts of communication. A topics-structured orientation emphasizing the field and the scholarly endeavors represented in the department.

Same as: COMM 211.

**COMM 1B. Media, Culture, and Society. 5 Units.**

The institutions and practices of mass media, including television, film, radio, and digital media, and their role in shaping culture and social life. The media's shifting relationships to politics, commerce, and identity.

Same as: AMSTUD 1B.

**COMM 103S. Media Entertainment. 3-5 Units.**

The impact of media entertainment on individuals, social groups, and societies. Sources include a diverse cross-section of entertainment. Introduction to psychological and socio-psychological theories. Empirical findings relating to media entertainment as a stimulus and a reception phenomenon. What renders diverse genres of media content and format enjoyable? Why do individuals pursue entertainment experiences in ever-increasing numbers? What is the political impact of apolitical media entertainment?.

**COMM 104W. Reporting, Writing, and Understanding the News. 5 Units.**

Techniques of news reporting and writing. The value and role of news in democratic societies. Gateway class to journalism. Prerequisite for all COMM 177/277 classes. Limited enrollment. Preference to sophomores and juniors.

**COMM 106. Communication Research Methods. 4-5 Units.**

(Graduate students register for COMM 206.) Conceptual and practical concerns underlying commonly used quantitative approaches, including experimental, survey, content analysis, and field research in communication. Pre- or corequisite: STATS 60 or consent of instructor. Same as: COMM 206.

**COMM 106S. Communication Research Methods. 3-5 Units.**

An introduction to social science research methods for those who have little or no prior experience in statistics. Designed to provide students with a critical framework and a set of tools to examine social problems - especially those related to the area of communication and the media. Students will be guided through the process of formulating real-world research questions, parsing them into analyzable statements, engaging in systematic data collection and analysis, and finally, thinking about value and limits of its outcome. Hands-on research experience provided.

**COMM 108. Media Processes and Effects. 4-5 Units.**

(Graduate students register for COMM 208.) The process of communication theory construction including a survey of social science paradigms and major theories of communication. Recommended: 1 or PSYCH 1. Same as: COMM 208.

**COMM 115S. Fun & Games: Motivational Design of User Experiences. 3-5 Units.**

Various interventions are employing virtual rewards, teams, and badges to incentivize real world behavior ranging from commercial purchases to reductions in home energy use. These are examples of motivational design, in which the engaging qualities common to games and other enjoyable activities are leveraged to drive particular behaviors. Using scientific research and industry examples we will examine the key processes and concepts that make up such designs. Along the way we will compare different theoretical approaches to motivation, consider the potential application of emerging technologies for new motivational designs, and discuss the ethics of designing for behavior change.

**COMM 116. Journalism Law. 4-5 Units.**

(Graduate students register for 216.) Laws and regulation impacting journalists. Topics include libel, privacy, news gathering, protection sources, fair trial and free press, theories of the First Amendment, and broadcast regulation. Prerequisite: Journalism M.A. student or advanced Communication major. Same as: COMM 216.

**COMM 117. Digital Journalism. 4-5 Units.**

(Graduate students register for COMM 217.) Seminar and practicum. The implications of new media for journalists. Professional and social issues related to the web as a case of new media deployment, as a story, as a research and reporting tool, and as a publishing channel. Prerequisite: Journalism M.A. student or consent of instructor. Same as: COMM 217.

**COMM 118S. Entrepreneurial Communication. 3 Units.**

New business ventures are often incubated on college campuses. What makes the difference between a successful and unsuccessful entrepreneurial communication. Specifically, the entrepreneur's ability to communicate their vision to potential investors, employees, and customers. This seminar will explore successful and unsuccessful entrepreneurial communication. Students will learn the basics of persuasive oral and written communication, and then apply these principles to their own ideas. This course will help you to develop confidence in your speaking and writing as an entrepreneur through presentations and assignments, lectures and discussions, guest speakers, simulated activities, and video recorded feedback. In this course you will learn to: - Create communication strategies at an individual and organizational level - Develop clearly organized and effective presentations and documents - Diagnose and expand your personal writing and oral delivery style - Adapt your delivery style to different material and audiences - Enhance oral delivery through effective visual aids Same as: COMM 218S.

**COMM 120W. Digital Media in Society. 4-5 Units.**

(Graduate students register for 220.) Contemporary debates concerning the social and cultural impact of digital media. Topics include the historical origins of digital media, cultural contexts of their development and use, and influence of digital media on conceptions of self, community, and state. Priority to Juniors and Seniors. Same as: AMSTUD 120, COMM 220.

**COMM 122. Content Analysis: Studying Communication Artifacts. 4-5 Units.**

An empirical and systematic investigation of documented messages in print, graphical, and audio-visual forms and observed human communication behaviors. Focuses on the design and execution of content analytic studies, including manifest vs. latent content, measurement issues, reliability and validity assessment, computer text analysis, and traditional human-coder techniques. Prerequisite: junior, senior or grad standing; COMM 106/206 or an equivalent course in basic social science research. Limited enrollment; preference to doctoral students. Same as: COMM 222.

**COMM 123. Argumentation and Persuasion. 4-5 Units.**

We all know that appeals based on logic and sound evidence often fail where less rational appeals that "shouldn't" work, succeed. This course examines persuasion, the influencing of attitudes, beliefs or behavior, and locates within that broad subject argumentation, the process of reasoning methodically from evidence. Argumentation, the socially acceptable method of persuasion, typically confines itself to the rules of logic and has as its goal the recognition of states and causal relationships held by the arguer to objectively exist. Other methods of persuasion can succeed while flouting those rules, but only within limits, as the story of the Emperor's New Clothes reminds us. This course will explore whether those limits be accounted for by the capacity limitations and heuristics and biases of human information processing. Topics to be covered include evolutionary explanations; the central and peripheral routes to persuasion; source, channel and receiver factors; attitude-behavior consistency; the roles of involvement, elaboration, affect and social influence; critical thinking skills and logical fallacies. Limited enrollment; preference to juniors, seniors and graduate students, and within these, to Communication majors. Same as: COMM 223.

**COMM 125. Perspectives on American Journalism. 4-5 Units.**

(Graduate students register for COMM 225.) An examination of the practice of American journalism, focusing on the political, social, cultural, economic and technological forces that have shaped the U. S. press since the early 1800s. Aimed at consumers as well as producers of news, the objective of this course is to provide a framework and vocabulary for judging the value and quality of everyday journalism. Same as: COMM 225.

**COMM 130N. The idea of a free press. 3-4 Units.**

Preference to freshmen. An examination of the meaning of freedom of the press, tied to but not bound by various Supreme Court rulings on the scope and purpose of the First Amendment's speech and press clauses. Discussions will include a look at the recent and rapid computerization of communication and what it portends for the future of a free press.

**COMM 131. Media Ethics and Responsibility. 4-5 Units.**

(Graduate students register for COMM 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and the epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism. Same as: COMM 231.

**COMM 133. Need to Know: The Tension between a Free Press and National Security Decision Making. 4-5 Units.**

The course will examine the dynamic interaction at the highest levels of government and the media when news coverage of secret national security policy and operations impinges on United States defense, diplomatic and intelligence decision making. Attitudes, practices and actions by the media and the government will be explored through a series of case studies and simulations. Former editors, reporters and government officials will appear as guest speakers. The goal of the course is to inform students about the vital but often fraught relationship between a free press and the government in a democratic society, especially in the management of national security affairs. And to give students background and experience in how to weigh conflicting interests and make enlightened decisions that serve the public and national interest. Preference to juniors, seniors, graduate students. Same as: COMM 233.

**COMM 134. Public Participation and Public Policy. 4-5 Units.**

Examines the role of public participation in public policy making. Around the world, policymakers seek to engage their publics. But, even though public participation is important, it is also problematic. Public meetings can become dysfunctional and turn into media spectacles instead of actually gathering the opinions of the public. The question becomes, when and how should the public be consulted in order to effectively impact public policies? There are consequences of engaging the public, and this seminar explores the methods used to engage publics around the world. Same as: COMM 234.

**COMM 135. Deliberative Democracy and its Critics. 3-5 Units.**

This course examines the theory and practice of deliberative democracy and engages both in a dialogue with critics. Can a democracy which emphasizes people thinking and talking together on the basis of good information be made practical in the modern age? What kinds of distortions arise when people try to discuss politics or policy together? The course draws on ideas of deliberation from Madison and Mill to Rawls and Habermas as well as criticisms from the jury literature, from the psychology of group processes and from the most recent normative and empirical literature on deliberative forums. Deliberative Polling, its applications, defenders and critics, both normative and empirical, will provide a key case for discussion. Same as: AMSTUD 135, COMM 235, COMM 335, POLISCI 234P, POLISCI 334P.

**COMM 137W. The Dialogue of Democracy. 4-5 Units.**

All forms of democracy require some kind of communication so people can be aware of issues and make decisions. This course looks at competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small scale discussions or sound bites on television? Or social media? What is the role of technology in changing our democratic practices, to mobilize, to persuade, to solve public problems? This course will include readings from political theory about democratic ideals - from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. It will also include contemporary examinations of the media and the internet to see how those practices are changing and how the ideals can or cannot be realized. Same as: AMSTUD 137, COMM 237, POLISCI 232T, POLISCI 332T.

**COMM 140. Digital Media Entrepreneurship. 3-5 Units.**

(Graduate students register for COMM 240.) Primarily for graduate journalism and computer science students. Silicon Valley's new media culture, digital storytelling skills and techniques, web-based skills, and entrepreneurial ventures. Guest speakers. Same as: COMM 240.

**COMM 147. Modern History and Future of Journalism. 4-5 Units.**

(Graduate students register for COMM 247.) The birth and evolution of local and national television news. The modern history of newspapers. Can they survive in the era of online journalism? Same as: COMM 247.

**COMM 160. The Press and the Political Process. 4-5 Units.**

(Graduate students register for COMM 260.) The role of mass media and other channels of communication in political and electoral processes. Same as: COMM 260, POLISCI 323R.

**COMM 162. Campaigns, Voting, Media, and Elections. 4-5 Units.**

This course examines the theory and practice of American campaigns and elections. First, we will attempt to explain the behavior of the key players -- candidates, parties, journalists, and voters -- in terms of the institutional arrangements and political incentives that confront them. Second, we will use current and recent election campaigns as "laboratories" for testing generalizations about campaign strategy and voter behavior. Third, we examine selections from the academic literature dealing with the origins of partisan identity, electoral design, and the immediate effects of campaigns on public opinion, voter turnout, and voter choice. As well, we'll explore issues of electoral reform and their more long-term consequences for governance and the political process. Same as: COMM 262, POLISCI 120B.

**COMM 164. The Psychology of Communication About Politics in America. 4 Units.**

Focus is on how politicians and government learn what Americans want and how the public's preferences shape government action; how surveys measure beliefs, preferences, and experiences; how poll results are criticized and interpreted; how conflict between polls is viewed by the public; how accurate surveys are and when they are accurate; how to conduct survey research to produce accurate measurements; designing questionnaires that people can understand and use comfortably; how question wording can manipulate poll results; corruption in survey research. Same as: COMM 264, POLISCI 224L, PSYCH 170.

**COMM 165N. Cars: Past, Present, and Future. 3 Units.**

Focus on the past, present and future of the automobile, bridging the Humanities, Social Sciences, Design, and Engineering. Focus on the human experiences of designing, making, driving, being driven, living with, and dreaming of the automobile. A different theme will be featured each week in discussion around a talk and supported by key readings and media. The course is informed by history, archaeology, ethnography, human-technology interaction, mechanical engineering, and cognitive science. Preference to freshmen.

**COMM 166. Virtual People. 4-5 Units.**

(Graduate students register for COMM 266.) The concept of virtual people or digital human representations; methods of constructing and using virtual people; methodological approaches to interactions with and among virtual people; and current applications. Viewpoints including popular culture, literature, film, engineering, behavioral science, computer science, and communication.

Same as: COMM 266.

**COMM 167. Advanced Seminar in Virtual Reality Research. 1-3 Units.**

Restricted to students with previous research experience in virtual reality. Experimental methods and other issues.

**COMM 168. Experimental Research in Advanced User Interfaces. 1-5 Units.**

Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.

Same as: COMM 268, COMM 368, ME 468.

**COMM 169. Computers and Interfaces. 4-5 Units.**

(Graduate students register for COMM 269.) Interdisciplinary. User responses to interfaces and design implications of those responses. Theories from different disciplines illustrate responses to textual, voice-based, pictorial, metaphoric, conversational, adaptive, agent-based, intelligent, and anthropomorphic interfaces. Group design project applying theory to the design of products or services for developing countries.

Same as: COMM 269.

**COMM 171. Moving Pictures: How the Web, Mobile and Tablets are Revolutionizing Video Journalism. 3-5 Units.**

(Graduate students register for 271.) Production of multimedia assignments for traditional news beats using audio, still photography, graphics and video. 2-hour lab class for creative, conceptual and technical skills for production of multimedia stories. Prerequisite: Journalism MA student or instructor's consent.

Same as: COMM 271.

**COMM 172. Media Psychology. 4-5 Units.**

(Graduate students register for COMM 272.) The literature related to psychological processing and the effects of media. Topics: unconscious processing; picture perception; attention and memory; emotion; the physiology of processing media; person perception; pornography; consumer behavior; advanced film and television systems; and differences among reading, watching, and listening.

Same as: COMM 272.

**COMM 176. Advanced Digital Media Production. 4-5 Units.**

In-depth reporting and production using audio, images and video. Focus on an in-depth journalism project with appropriate uses of digital media: audio, photography, graphics, and video. Topics include advanced field techniques and approaches (audio, video, still) and emphasis on creating a non-fiction narrative arc in a multimedia piece of 10-12 minutes. Prerequisite: COMM 275 or consent of instructor

Same as: COMM 276.

**COMM 177C. Specialized Writing and Reporting: Environmental Journalism. 4-5 Units.**

(Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in science-based environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: COMM 104, ENVRES 200 or consent of instructor. Admissions by application only, available from thayden@stanford.edu and due 3/28/12.

Same as: COMM 277C, ENVRES 277C.

**COMM 177D. Specialized Writing and Reporting: Magazine Journalism. 4-5 Units.**

(Graduate students register for COMM 277D.) How to report, write, edit, and read magazine articles, emphasizing long-form narrative. Tools and templates of story telling such as scenes, characters, dialogue, and narrative arc. How the best magazine stories defy or subvert conventional wisdom and bring fresh light to the human experience through reporting, writing, and moral passion. Prerequisite: 104 or consent of instructor.

Same as: COMM 277D.

**COMM 177G. Specialized Writing and Reporting: Covering Silicon Valley. 4-5 Units.**

(Graduate students register for COMM 277G.) Business reporting basics in the context of Silicon Valley's technology scene. Prerequisite: 104 or consent of instructor.

Same as: COMM 277G.

**COMM 177I. Specialized Writing and Reporting: Investigative Reporting. 4-5 Units.**

Graduate students register for COMM 277I.) Under the supervision of editors from the Center for Investigative Reporting, students will work on a group investigative project with the end-goal of publication and distribution through CIR's California Watch project. The class will emphasize the history and role of investigative reporting as well as skills and techniques needed to do it. Limited enrollment. Prerequisite: instructor consent. Go to <http://comm.stanford.edu/faculty/grimes> for application instructions.

Same as: COMM 277I.

**COMM 177S. Specialized Writing and Reporting: Sports Journalism. 4-5 Units.**

(Graduate students register for COMM 277S.) Workshop. An examination of American sports writing from the 1920's Golden Age of Sports to present. Students become practitioners of the sports writing craft in an intensive laboratory. Hones journalistic skills such as specialized reporting, interviewing, deadline writing, creation of video projects, and conceptualizing and developing stories for print and online. Prerequisite: 104 or consent of instructor.

Same as: COMM 277S.

**COMM 177Y. Specialized Writing and Reporting: Foreign Correspondence in the Middle East and Asia. 4-5 Units.**

(Graduate students register for COMM 277Y.) What's involved in working as a foreign correspondent in these important and volatile parts of the world, where in many cases journalists are not respected and may face danger -- taught by a journalist who has worked extensively in both regions. (no prerequisites)

Same as: COMM 277Y.

**COMM 182. Virtual Communities and Social Media. 4-5 Units.**  
(Graduate students register for COMM 282.) Students will take away from this course a set of conceptual tools, a vocabulary, and an analytical framework with which to recognize, understand, and more effectively manage new social practices online, together with a familiarity with the literature regarding social media and identity, community, collective action, public sphere, social capital, networks, and social networks. Students will also develop skills at using online forums, blogs, microblogs, wikis for research, collaboration, and communication. Limited enrollment. Prerequisite: instructor consent. Go to <http://comm.stanford.edu/faculty/rheingold/> for application instructions. Same as: COMM 282.

**COMM 183. Social Media Literacies. 4-5 Units.**  
Today's personal, social, political, economic worlds are all affected by digital media and networked publics. Viral videos, uprisings from Tahrir to #OWS, free search engines, abundant inaccuracy and sophisticated disinformation online, indelible and searchable digital footprints, laptops in lecture halls and BlackBerries at the dinner table, twenty-something social media billionaires, massive online university courses -- it's hard to find an aspect of daily life around the world that is not being transformed by the tweets, blogs, wikis, apps, movements, likes and plusses, tags, text messages, and comments two billion Internet users and six billion mobile phone users emit. New individual and collaborative skills are emerging. This course introduces students to both the literature about and direct experience of these new literacies: research foundations and practical methods to control attention, attitudes and tools necessary for critical consumption of information, best practices of individual digital participation and collective participatory culture, the use of collaborative media and methodologies, and the application of network know-how to life online. Contrasting perspectives are offered in the readings and explored through classroom and online discussion. In each three hour class, the instructor will lecture for approximately one half hour, student project teams will present and facilitate discussion about mindmaps and the lexicon for approximately one half hour, students will engage in group activities for about an hour, and instructor will facilitate full class discussion for about an hour. Students actively collaborate and cooperate in their learning during and between classes through small group discussions and face to face exercises, forums, blogs, mindmaps and wikis. Prerequisite: Instructor consent. Go to <http://socialmediaclassroom.com/host/vircom/lockedwiki/comm183> for application instructions. Same as: COMM 283.

**COMM 195. Honors Thesis. 5 Units.**  
Qualifies students to conduct communication research. Student must apply for department honors thesis program during Spring Quarter of junior year.

**COMM 199. Individual Work. 1-5 Units.**  
For students with high academic standing. May be repeated for credit.

**COMM 206. Communication Research Methods. 4-5 Units.**  
(Graduate students register for COMM 206.) Conceptual and practical concerns underlying commonly used quantitative approaches, including experimental, survey, content analysis, and field research in communication. Pre- or corequisite: STATS 60 or consent of instructor. Same as: COMM 106.

**COMM 208. Media Processes and Effects. 4-5 Units.**  
(Graduate students register for COMM 208.) The process of communication theory construction including a survey of social science paradigms and major theories of communication. Recommended: 1 or PSYCH 1. Same as: COMM 108.

**COMM 211. Media Technologies, People, and Society. 4-5 Units.**  
(Graduate students register for COMM 211.) Open to non-majors. Introduction to the concepts and contexts of communication. A topics-structured orientation emphasizing the field and the scholarly endeavors represented in the department. Same as: COMM 1A.

**COMM 212. Models of Democracy. 3-5 Units.**  
Ancient and modern varieties of democracy; debates about their normative and practical strengths and the pathologies to which each is subject. Focus is on participation, deliberation, representation, and elite competition, as values and political processes. Formal institutions, political rhetoric, technological change, and philosophical critique. Models tested by reference to long-term historical natural experiments such as Athens and Rome, recent large-scale political experiments such as the British Columbia Citizens' Assembly, and controlled experiments. Same as: COMM 312, POLISCI 237, POLISCI 337.

**COMM 216. Journalism Law. 4-5 Units.**  
(Graduate students register for 216.) Laws and regulation impacting journalists. Topics include libel, privacy, news gathering, protection sources, fair trial and free press, theories of the First Amendment, and broadcast regulation. Prerequisite: Journalism M.A. student or advanced Communication major. Same as: COMM 116.

**COMM 217. Digital Journalism. 4-5 Units.**  
(Graduate students register for COMM 217.) Seminar and practicum. The implications of new media for journalists. Professional and social issues related to the web as a case of new media deployment, as a story, as a research and reporting tool, and as a publishing channel. Prerequisite: Journalism M.A. student or consent of instructor. Same as: COMM 117.

**COMM 218S. Entrepreneurial Communication. 3 Units.**  
New business ventures are often incubated on college campuses. What makes the difference between a successful and unsuccessful entrepreneur-communication. Specifically, the entrepreneur's ability to communicate their vision to potential investors, employees, and customers. This seminar will explore successful and unsuccessful entrepreneurial communication. Students will learn the basics of persuasive oral and written communication, and then apply these principles to their own ideas. This course will help you to develop confidence in your speaking and writing as an entrepreneur through presentations and assignments, lectures and discussions, guest speakers, simulated activities, and video recorded feedback. In this course you will learn to: - Create communication strategies at an individual and organizational level - Develop clearly organized and effective presentations and documents - Diagnose and expand your personal writing and oral delivery style - Adapt your delivery style to different material and audiences - Enhance oral delivery through effective visual aids. Same as: COMM 118S.

**COMM 220. Digital Media in Society. 4-5 Units.**  
(Graduate students register for 220.) Contemporary debates concerning the social and cultural impact of digital media. Topics include the historical origins of digital media, cultural contexts of their development and use, and influence of digital media on conceptions of self, community, and state. Priority to Juniors and Seniors. Same as: AMSTUD 120, COMM 120W.

**COMM 222. Content Analysis: Studying Communication Artifacts. 4-5 Units.**

An empirical and systematic investigation of documented messages in print, graphical, and audio-visual forms and observed human communication behaviors. Focuses on the design and execution of content analytic studies, including manifest vs. latent content, measurement issues, reliability and validity assessment, computer text analysis, and traditional human-coder techniques. Prerequisite: junior, senior or grad standing; COMM 106/206 or an equivalent course in basic social science research. Limited enrollment; preference to doctoral students. Same as: COMM 122.

**COMM 223. Argumentation and Persuasion. 4-5 Units.**

We all know that appeals based on logic and sound evidence often fail where less rational appeals that "shouldn't" work, succeed. This course examines persuasion, the influencing of attitudes, beliefs or behavior, and locates within that broad subject argumentation, the process of reasoning methodically from evidence. Argumentation, the socially acceptable method of persuasion, typically confines itself to the rules of logic and has as its goal the recognition of states and causal relationships held by the arguer to objectively exist. Other methods of persuasion can succeed while flouting those rules, but only within limits, as the story of the Emperor's New Clothes reminds us. This course will explore whether those limits be accounted for by the capacity limitations and heuristics and biases of human information processing. Topics to be covered include evolutionary explanations; the central and peripheral routes to persuasion; source, channel and receiver factors; attitude-behavior consistency; the roles of involvement, elaboration, affect and social influence; critical thinking skills and logical fallacies. Limited enrollment; preference to juniors, seniors and graduate students, and within these, to Communication majors. Same as: COMM 123.

**COMM 225. Perspectives on American Journalism. 4-5 Units.**

(Graduate students register for COMM 225.) An examination of the practice of American journalism, focusing on the political, social, cultural, economic and technological forces that have shaped the U. S. press since the early 1800s. Aimed at consumers as well as producers of news, the objective of this course is to provide a framework and vocabulary for judging the value and quality of everyday journalism. Same as: COMM 125.

**COMM 231. Media Ethics and Responsibility. 4-5 Units.**

(Graduate students register for COMM 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and the epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism. Same as: COMM 131.

**COMM 233. Need to Know: The Tension between a Free Press and National Security Decision Making. 4-5 Units.**

The course will examine the dynamic interaction at the highest levels of government and the media when news coverage of secret national security policy and operations impinges on United States defense, diplomatic and intelligence decision making. Attitudes, practices and actions by the media and the government will be explored through a series of case studies and simulations. Former editors, reporters and government officials will appear as guest speakers. The goal of the course is to inform students about the vital but often fraught relationship between a free press and the government in a democratic society, especially in the management of national security affairs. And to give students background and experience in how to weigh conflicting interests and make enlightened decisions that serve the public and national interest. Preference to juniors, seniors, graduate students. Same as: COMM 133.

**COMM 234. Public Participation and Public Policy. 4-5 Units.**

Examines the role of public participation in public policy making. Around the world, policymakers seek to engage their publics. But, even though public participation is important, it is also problematic. Public meetings can become dysfunctional and turn into media spectacles instead of actually gathering the opinions of the public. The question becomes, when and how should the public be consulted in order to effectively impact public policies? There are consequences of engaging the public, and this seminar explores the methods used to engage publics around the world. Same as: COMM 134.

**COMM 235. Deliberative Democracy and its Critics. 3-5 Units.**

This course examines the theory and practice of deliberative democracy and engages both in a dialogue with critics. Can a democracy which emphasizes people thinking and talking together on the basis of good information be made practical in the modern age? What kinds of distortions arise when people try to discuss politics or policy together? The course draws on ideas of deliberation from Madison and Mill to Rawls and Habermas as well as criticisms from the jury literature, from the psychology of group processes and from the most recent normative and empirical literature on deliberative forums. Deliberative Polling, its applications, defenders and critics, both normative and empirical, will provide a key case for discussion. Same as: AMSTUD 135, COMM 135, COMM 335, POLISCI 234P, POLISCI 334P.

**COMM 237. The Dialogue of Democracy. 4-5 Units.**

All forms of democracy require some kind of communication so people can be aware of issues and make decisions. This course looks at competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small scale discussions or sound bites on television? Or social media? What is the role of technology in changing our democratic practices, to mobilize, to persuade, to solve public problems? This course will include readings from political theory about democratic ideals - from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. It will also include contemporary examinations of the media and the internet to see how those practices are changing and how the ideals can or cannot be realized. Same as: AMSTUD 137, COMM 137W, POLISCI 232T, POLISCI 332T.

**COMM 240. Digital Media Entrepreneurship. 3-5 Units.**

(Graduate students register for COMM 240.) Primarily for graduate journalism and computer science students. Silicon Valley's new media culture, digital storytelling skills and techniques, web-based skills, and entrepreneurial ventures. Guest speakers. Same as: COMM 140.

**COMM 247. Modern History and Future of Journalism. 4-5 Units.**

(Graduate students register for COMM 247.) The birth and evolution of local and national television news. The modern history of newspapers. Can they survive in the era of online journalism? Same as: COMM 147.

**COMM 260. The Press and the Political Process. 4-5 Units.**

(Graduate students register for COMM 260.) The role of mass media and other channels of communication in political and electoral processes. Same as: COMM 160, POLISCI 323R.

**COMM 262. Campaigns, Voting, Media, and Elections. 4-5 Units.**

This course examines the theory and practice of American campaigns and elections. First, we will attempt to explain the behavior of the key players -- candidates, parties, journalists, and voters -- in terms of the institutional arrangements and political incentives that confront them. Second, we will use current and recent election campaigns as "laboratories" for testing generalizations about campaign strategy and voter behavior. Third, we examine selections from the academic literature dealing with the origins of partisan identity, electoral design, and the immediate effects of campaigns on public opinion, voter turnout, and voter choice. As well, we'll explore issues of electoral reform and their more long-term consequences for governance and the political process.  
Same as: COMM 162, POLISCI 120B.

**COMM 264. The Psychology of Communication About Politics in America. 4 Units.**

Focus is on how politicians and government learn what Americans want and how the public's preferences shape government action; how surveys measure beliefs, preferences, and experiences; how poll results are criticized and interpreted; how conflict between polls is viewed by the public; how accurate surveys are and when they are accurate; how to conduct survey research to produce accurate measurements; designing questionnaires that people can understand and use comfortably; how question wording can manipulate poll results; corruption in survey research.  
Same as: COMM 164, POLISCI 224L, PSYCH 170.

**COMM 266. Virtual People. 4-5 Units.**

(Graduate students register for COMM 266.) The concept of virtual people or digital human representations; methods of constructing and using virtual people; methodological approaches to interactions with and among virtual people; and current applications. Viewpoints including popular culture, literature, film, engineering, behavioral science, computer science, and communication.  
Same as: COMM 166.

**COMM 268. Experimental Research in Advanced User Interfaces. 1-5 Units.**

Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.  
Same as: COMM 168, COMM 368, ME 468.

**COMM 269. Computers and Interfaces. 4-5 Units.**

(Graduate students register for COMM 269.) Interdisciplinary. User responses to interfaces and design implications of those responses. Theories from different disciplines illustrate responses to textual, voice-based, pictorial, metaphoric, conversational, adaptive, agent-based, intelligent, and anthropomorphic interfaces. Group design project applying theory to the design of products or services for developing countries.  
Same as: COMM 169.

**COMM 271. Moving Pictures: How the Web, Mobile and Tablets are Revolutionizing Video Journalism. 3-5 Units.**

(Graduate students register for 271.) Production of multimedia assignments for traditional news beats using audio, still photography, graphics and video. 2-hour lab class for creative, conceptual and technical skills for production of multimedia stories. Prerequisite: Journalism MA student or instructor's consent.  
Same as: COMM 171.

**COMM 272. Media Psychology. 4-5 Units.**

(Graduate students register for COMM 272.) The literature related to psychological processing and the effects of media. Topics: unconscious processing; picture perception; attention and memory; emotion; the physiology of processing media; person perception; pornography; consumer behavior; advanced film and television systems; and differences among reading, watching, and listening.  
Same as: COMM 172.

**COMM 273. Public Issues Reporting I. 3-4 Units.**

Reporting and writing on government and public policies and issues; their implications for the people and the press. Required for journalism M.A. students.

**COMM 274. Public Issues Reporting II. 3-4 Units.**

Almost everything a journalist writes about involves government, either directly or indirectly. In this course we learn about the hidden forces that control government decisions: lobbying, campaign finance, budgets and more. Students write stories and do two accompanying multimedia pieces. Prerequisites: 273, Journalism M.A. student.

**COMM 275. Multimedia Storytelling: Reporting and Production Using Audio, Still Images, and Video. 4 Units.**

Multimedia assignments coordinated with deadline reporting efforts in COMM 273 from traditional news beats using audio, still photography, and video. Use of digital audio recorders and audio production to leverage voice-over narration, interviews, and natural sound; use of digital still cameras and audio to produce audio slideshows; and the combination of these media with video in post-production with Final Cut Pro. Prerequisite: Journalism M.A. student. Corequisite: COMM 273.

**COMM 276. Advanced Digital Media Production. 4-5 Units.**

In-depth reporting and production using audio, images and video. Focus on an in-depth journalism project with appropriate uses of digital media: audio, photography, graphics, and video. Topics include advanced field techniques and approaches (audio, video, still) and emphasis on creating a non-fiction narrative arc in a multimedia piece of 10-12 minutes. Prerequisite: COMM 275 or consent of instructor  
Same as: COMM 176.

**COMM 277C. Specialized Writing and Reporting: Environmental Journalism. 4-5 Units.**

(Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in science-based environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: COMM 104, ENVRES 200 or consent of instructor. Admissions by application only, available from thayden@stanford.edu and due 3/28/12.  
Same as: COMM 177C, ENVRES 277C.

**COMM 277D. Specialized Writing and Reporting: Magazine Journalism. 4-5 Units.**

(Graduate students register for COMM 277D.) How to report, write, edit, and read magazine articles, emphasizing long-form narrative. Tools and templates of story telling such as scenes, characters, dialogue, and narrative arc. How the best magazine stories defy or subvert conventional wisdom and bring fresh light to the human experience through reporting, writing, and moral passion. Prerequisite: 104 or consent of instructor.  
Same as: COMM 177D.

**COMM 277G. Specialized Writing and Reporting: Covering Silicon Valley. 4-5 Units.**

(Graduate students register for COMM 277G.) Business reporting basics in the context of Silicon Valley's technology scene. Prerequisite: 104 or consent of instructor.

Same as: COMM 177G.

**COMM 277I. Specialized Writing and Reporting: Investigative Reporting. 4-5 Units.**

Graduate students register for COMM 277I.) Under the supervision of editors from the Center for Investigative Reporting, students will work on a group investigative project with the end-goal of publication and distribution through CIR's California Watch project. The class will emphasize the history and role of investigative reporting as well as skills and techniques needed to do it. Limited enrollment. Prerequisite: instructor consent. Go to <http://comm.stanford.edu/faculty/grimes> for application instructions.

Same as: COMM 177I.

**COMM 277S. Specialized Writing and Reporting: Sports Journalism. 4-5 Units.**

(Graduate students register for COMM 277S.) Workshop. An examination of American sports writing from the 1920s Golden Age of Sports to present. Students become practitioners of the sports writing craft in an intensive laboratory. Hones journalistic skills such as specialized reporting, interviewing, deadline writing, creation of video projects, and conceptualizing and developing stories for print and online. Prerequisite: 104 or consent of instructor.

Same as: COMM 177S.

**COMM 277Y. Specialized Writing and Reporting: Foreign Correspondence in the Middle East and Asia. 4-5 Units.**

(Graduate students register for COMM 277Y.) What's involved in working as a foreign correspondent in these important and volatile parts of the world, where in many cases journalists are not respected and may face danger -- taught by a journalist who has worked extensively in both regions. (no prerequisites)

Same as: COMM 177Y.

**COMM 278. Journalism and Imaginative Writing in America. 5 Units.**

Walt Whitman spent twenty-five years as a journalist before publishing his first book of poems. Mark Twain was a journalist for twenty years before publishing his first novel. Topics include examination of how writers' backgrounds in journalism shaped the poetry or fiction for which they are best known; study of recent controversies surrounding writers who blurred the line between journalism and fiction. Writers include Whitman, Fanny Fern, Twain, Pauline Hopkins, Theodore Dreiser, Charlotte Perkins Gilman, Ernest Hemingway, Meridel LeSueur.

Same as: AMSTUD 257, ENGLISH 257.

**COMM 282. Virtual Communities and Social Media. 4-5 Units.**

(Graduate students register for COMM 282.) Students will take away from this course a set of conceptual tools, a vocabulary, and an analytical framework with which to recognize, understand, and more effectively manage new social practices online, together with a familiarity with the literature regarding social media and identity, community, collective action, public sphere, social capital, networks, and social networks. Students will also develop skills at using online forums, blogs, microblogs, wikis for research, collaboration, and communication. Limited enrollment. Prerequisite: instructor consent. Go to <http://comm.stanford.edu/faculty/rheingold/> for application instructions.

Same as: COMM 182.

**COMM 283. Social Media Literacies. 4-5 Units.**

Today's personal, social, political, economic worlds are all affected by digital media and networked publics. Viral videos, uprisings from Tahrir to #OWS, free search engines, abundant inaccuracy and sophisticated disinformation online, indelible and searchable digital footprints, laptops in lecture halls and BlackBerries at the dinner table, twenty-something social media billionaires, massive online university courses -- it's hard to find an aspect of daily life around the world that is not being transformed by the tweets, blogs, wikis, apps, movements, likes and pluses, tags, text messages, and comments two billion Internet users and six billion mobile phone users emit. New individual and collaborative skills are emerging. This course introduces students to both the literature about and direct experience of these new literacies: research foundations and practical methods to control attention, attitudes and tools necessary for critical consumption of information, best practices of individual digital participation and collective participatory culture, the use of collaborative media and methodologies, and the application of network know-how to life online. Contrasting perspectives are offered in the readings and explored through classroom and online discussion. In each three hour class, the instructor will lecture for approximately one half hour, student project teams will present and facilitate discussion about mindmaps and the lexicon for approximately one half hour, students will engage in group activities for about an hour, and instructor will facilitate full class discussion for about an hour. Students actively collaborate and cooperate in their learning during and between classes through small group discussions and face to face exercises, forums, blogs, mindmaps and wikis. Prerequisite: Instructor consent. Go to <http://socialmediaclassroom.com/host/vircom/lockedwiki/comm183> for application instructions

Same as: COMM 183.

**COMM 289. Journalism Master's Project. 2 Units.****COMM 289C. Projects for Publication. 2 Units.**

In-depth journalism projects are not products of happenstance. They require thorough planning and coordination at every stage of the process -- from refinement of ideas, to the creation of "back-out" schedules and precise outlines, to strategies for pitching the story and its author to skeptical editors. In this course, students will workshop and pitch MA journalism projects for placement and publication. Required for MA Journalism students; registration Comm 289 required.

**COMM 290. Media Studies M.A. Project. 1-2 Units.**

Individual research for coterminal Media Studies students.

**COMM 291. Graduate Journalism Seminar. 1 Unitss.**

Required of students in the graduate program in Journalism. Forum for current issues in the practice and performance of the press. The seminar frequently features Bay Area Journalists as guest speakers. May be repeated for credit.

**COMM 299. Individual Work. 1-4 Units.****COMM 301. Communication Research, Curriculum Development and Pedagogy. 1 Units.**

Designed to prepare students for teaching and research in the Department of Communication. Students will be trained in developing curriculum and in pedagogical practices, and will also be exposed to the research programs of various faculty members in the department. Required of all Ph.D. students.

**COMM 307. Summer Institute in Political Psychology. 3 Units.**

Lectures, discussion groups, and workshops addressing many applications of psychology to the analysis of political behavior. Public opinion, international relations, political decision-making, attitudes and beliefs, prejudice, social influence and persuasion, terrorism, news media influence, foreign policy, socialization, social justice.



**COMM 308. Graduate Seminar in Political Psychology. 1-3 Units.**

For students interested in research in political science, psychology, or communication. Methodological techniques for studying political attitudes and behaviors. May be repeated for credit.

Same as: POLISCI 324.

**COMM 310. Method of Analysis Program in the Social Sciences. 1 Units.**

Colloquium series. Creation and application of new methodological techniques for social science research. Presentations on methodologies of use for social scientists across departments at Stanford by guest speakers from Stanford and elsewhere. See <http://mapss.stanford.edu>.

Same as: ANTHRO 446A.

**COMM 311. Theory of Communication. 1-5 Units.**

Basic communication theory for first-year Ph.D. students in the Department of Communication. Introduction to basic writings and concepts in communication research. The goal is an introduction to issues in the field that are common in communication research. First half of the class will emphasize classic literature about field organization, history and theory. Second half will emphasize contemporary theory in areas that students select.

**COMM 312. Models of Democracy. 3-5 Units.**

Ancient and modern varieties of democracy; debates about their normative and practical strengths and the pathologies to which each is subject. Focus is on participation, deliberation, representation, and elite competition, as values and political processes. Formal institutions, political rhetoric, technological change, and philosophical critique. Models tested by reference to long-term historical natural experiments such as Athens and Rome, recent large-scale political experiments such as the British Columbia Citizens' Assembly, and controlled experiments.

Same as: COMM 212, POLISCI 237, POLISCI 337.

**COMM 314. Qualitative Social Science Research Methods. 1-5 Units.**

Part of the doctoral research methods sequence. Focus is on the logic of qualitative research methods and modes of inquiry relevant to the study of communication and meaning. Prerequisite: Communication Ph.D. student, or consent of instructor.

**COMM 317. The Philosophy of Social Science. 1-5 Units.**

Approaches to social science research and their theoretical presuppositions. Readings from the philosophy of the social sciences. Research design, the role of experiments, and quantitative and qualitative research. Cases from communication and related social sciences. Prerequisite: consent of instructor.

**COMM 318. Quantitative Social Science Research Methods. 1-5 Units.**

An introduction to a broad range of social science research methods that are widely used in PhD work. Prerequisite: consent of instructor.

**COMM 320G. Advanced Topics in New Media and American Culture. 1-5 Units.**

This course deals with advanced issues in computing and American cultural history since World War II. Primarily for Ph.D. students. Prerequisite: 220 or consent of instructor.

**COMM 326. Advanced Topics in Human Virtual Representation. 1-5 Units.**

Topics include the theoretical construct of person identity, the evolution of that construct given the advent of virtual environments, and methodological approaches to understanding virtual human representation. Prerequisite: PhD student or consent of instructor.

**COMM 331G. Communication and Media Ethics. 1-3 Units.**

Limited to Ph.D. students. Advanced topics in press ethics and responsibility. Prerequisite: 231 or consent of instructor.

**COMM 335. Deliberative Democracy and its Critics. 3-5 Units.**

This course examines the theory and practice of deliberative democracy and engages both in a dialogue with critics. Can a democracy which emphasizes people thinking and talking together on the basis of good information be made practical in the modern age? What kinds of distortions arise when people try to discuss politics or policy together? The course draws on ideas of deliberation from Madison and Mill to Rawls and Habermas as well as criticisms from the jury literature, from the psychology of group processes and from the most recent normative and empirical literature on deliberative forums. Deliberative Polling, its applications, defenders and critics, both normative and empirical, will provide a key case for discussion.

Same as: AMSTUD 135, COMM 135, COMM 235, POLISCI 234P, POLISCI 334P.

**COMM 339. Questionnaire Design for Surveys and Laboratory Experiments: Social and Cognitive Perspectives. 4 Units.**

The social and psychological processes involved in asking and answering questions via questionnaires for the social sciences; optimizing questionnaire design; open versus closed questions; rating versus ranking; rating scale length and point labeling; acquiescence response bias; don't-know response options; response choice order effects; question order effects; social desirability response bias; attitude and behavior recall; and introspective accounts of the causes of thoughts and actions.

Same as: POLISCI 421K, PSYCH 231.

**COMM 368. Experimental Research in Advanced User Interfaces. 1-5 Units.**

Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.

Same as: COMM 168, COMM 268, ME 468.

**COMM 372G. Seminar in Psychological Processing. 1-5 Units.**

Limited to Ph.D. students. Advanced topics. Prerequisite: 272 or consent of instructor.

**COMM 379. History of the Study of Communication. 1-5 Units.**

The origins of communication/media theory and research emphasizing the rise of communication as a separate field of study. The influence of schools of thought concerning the scope and purpose of the study of communication. Readings include foundational essays and studies. Prerequisite: Ph.D. student or consent of instructor.

**COMM 380. Curriculum Practical Training. 1-5 Units.**

Practical experience in the communication industries. Prerequisites: graduate standing in Communication, consent of instructor. Meets requirements for Curricular Practical Training for students on F-1 visas. 380 May be repeated four times for credit. (Staff).

**COMM 397. Minor Research Project. 1-6 Units.**

Individual research for Ph.D. candidates. Course may be repeated for credit.

**COMM 398. Major Research Project. 1-6 Units.**

Individual research for Ph.D. candidates.

**COMM 399. Advanced Individual Work. 1-9 Units.****COMM 801. TGR Project. 0 Unit.****COMM 802. TGR Dissertation. 0 Unit.**

## Comparative Literature Courses

### COMPLIT 10N. Shakespeare and Performance in a Global Context. 3 Units.

Preference to freshmen. The problem of performance including the performance of gender through the plays of Shakespeare. In-class performances by students of scenes from plays. The history of theatrical performance. Sources include filmed versions of plays, and readings on the history of gender, gender performance, and transvestite theater.

### COMPLIT 11Q. Shakespeare, Playing, Gender. 3 Units.

Preference to sophomores. Focus is on several of the best and lesser known plays of Shakespeare, on theatrical and other kinds of playing, and on ambiguities of both gender and playing gender.

### COMPLIT 11SC. Worlds (No Longer) Apart. 2 Units.

What (if anything) do supermall shoppers in the Philippines, a Filipino taxi driver in Paris, and television viewers in Nepal have to do with a legal case in Canada, two young Japanese on a pilgrimage to Graceland, and a South Asian lawyer/liquor store owner trying to reclaim his property in Uganda from where he lives, in Mississippi? This course uses literary narratives, films, and historical research to examine new textures of contemporary life, where "borders" seem hard-pressed to contain culture. Texts include Pico Iyer, *Video Night in Kathmandu*, Mira Nair's film *Mississippi Masala*, and M.G. Vassanji, *No New Land*. New forms of identity have emerged that reflect the cultural changes that have accompanied such movements. Nevertheless, we will not idealize such phenomena either; we will want also to carefully observe the binding power of nations. The result will be a finer-tuned sense of "globalization" and the "local" and the "global." The course emphasizes creative thinking and discussion. Students are expected to do the reading and be well prepared for every session with not only questions, but tentative answers. Each student will participate in one group presentation as their final project.

### COMPLIT 12SC. Ghost Stories: Why the Dead Return and What They Want From Us. 2 Units.

Ghost stories haunt our imagination. When the dead return they may scare us or warn us, they may pursue us with violence or burden us with sorrow. They shock us with the "boo" of surprise, just as they frustrate us by their elusiveness. Blood-chilling stories terrify us, but they also provide entertainment. The ghost story is one of the most enduring genres, from classical literature to popular film. Yet behind the door of the story lurk both anxiety and wisdom: anxiety about our own mortality and wisdom about the cultural place of the past, between memory and regret, mourning and forgetting. The undead point to what we have not accomplished, just as they direct us - since the ghost of Hamlet's father - toward deeds. In this seminar, we will explore some of these ghostly ambitions. During the summer, in preparation for the seminar, students will read selected stories and novels and post comments to the course website. When we convene in September, we will discuss the summer findings and proceed to examine a selection of novels that explore ghosts and hauntings. Texts will include Shirley Jackson's *The Haunting of Hill House*, Peter Straub's *Ghost Story*, and others. We will also spend some dark and stormy nights with ghost films and even follow the trail to some hauntings at Stanford and in the Bay Area. Students are expected to participate regularly in the CourseWork discussion forum and work in small groups with other course members to discuss and present readings.

### COMPLIT 31SI. What is Neoconservatism? The Movement's History and Ideas. 2 Units.

Its thinking from its communist roots, through the changes of the 60s, the rise of conservatism in the 80s, and the invasion of Iraq. Readings include Irving Kristol, Jeane Kirkpatrick, Daniel P. Moynihan, and David Brooks. Guest lecturers from supporters and critics.

### COMPLIT 40Q. Aesthetics of Dissent: the Case of Islamic Iran. 2 Units.

Censorship, Borges tells us, is the mother of metaphors. The Islamic regime in Iran censors all aesthetic production in the country. But Iranian dissident artists, from film-makers and fiction writers to composers in a thriving under-ground musical scene, have cleverly found ways to fight these draconian measures. They have developed an impressive body of work that is as sophisticated in style as it is rich in its discourse of democracy and dissent. The purpose of the seminar is to understand the aesthetic tropes of dissent in Iran, and the social and theological roots of rules of censorship. Masterpieces of post-revolutionary film, fiction, and music will be discussed in the context of tumultuous history of dissent in Islamic Iran. Same as: INTNLREL 71Q.

### COMPLIT 41N. Borderlands of Literature and Culture. 3-4 Units.

Rather than try to examine the whole of such an extensive body of work by artists of Mexican descent living in Mexico and the United States, the focus will be on the transnational themes of border thinking, memory, and identity (both personal and collective). Looking at the foundational poetry, auto-ethnographies, and narratives by Américo Paredes and Gloria Anzaldúa and how their literary and ethnographic work laid the groundwork for subsequent imaginings in the narratives, poetry, and theory of border thinking and writing. We will explore the trans-frontier cultural conditions under which imaginative literary texts are produced, disseminated, and received. We will consider not only the historical transnational experiences that inform these borderlands texts but the potential futures of Mexico and the United States they imagine.

### COMPLIT 49. What is Nobel Literature? Reading, Assessing, and Interpreting the Nobel Novels on the World Stage. 5 Units.

Recent Nobel laureates in literature: Gabriel García Márquez, Nadine Gordimer, Toni Morrison, Kenzaburo Oe, and V.S. Naipaul. These writers come from different locations, yet each participates in a global conversation about the human condition. The impact of their identities upon their thought and writing. How the Nobel prize is awarded. The role of literature in the world, and analytical skills for reading literary texts.

### COMPLIT 51N. Comparative Fictions of Ethnicity. 5 Units.

We may "know" "who" we "are," but we are, after all, social creatures. How does our sense of self interact with those around us? How does literature provide a particular medium for not only self expression, but also for meditations on what goes into the construction of "the Self"? After all, don't we tell stories in response to the question, "who are you"? Besides a list of nouns and names and attributes, we give our lives flesh and blood in telling how we process the world. Our course focuses in particular on this question--Does this universal issue ("who am I") become skewed differently when we add a qualifier before it, like "ethnic"? Satisfies PWR2. Same as: AMSTUD 51N, CSRE 51N.

### COMPLIT 101. What is Comparative Literature?. 5 Units.

How critics and authors from different eras and different parts of the globe have considered how literature, as a traditional cultural form, can or cannot, help to sustain societies faced with concrete historical crises such as war, revolution, and colonization. How the aesthetic work of verbal art has been seen to offer the possibility of continuity in the face of change. What, if anything, can be continued? How does art perhaps aid in accommodating change?.

**COMPLIT 110. Introduction to Comparative Queer Literary Studies. 3-5 Units.**

Introduction to the comparative literary study of important gay, lesbian, queer, bisexual, and transgender writers and their changing social, political, and cultural contexts from the 1890s to today: Wilde, Gide, Lucie Delarue-Mardrus, Radclyffe Hall, E.M. Forster, Thomas Mann, Georges Bataille, James Baldwin, Jean Genet, Jeanette Winterson, Sarah Waters, Audre Lorde, discussed in the context of 20th-century feminist and queer literary and social theories of gender and sexuality (Judith Butler, Eve Sedgwick, Julia Serano, and others).

Same as: COMPLIT 310, FEMST 110.

**COMPLIT 111. German Capstone: Reading Franz Kafka. 3-5 Units.**

This class will address major works by Franz Kafka and consider Kafka as a modernist writer whose work reflects on modernity. We will also examine the role of Kafka's themes and poetics in the work of contemporary writers. (Meets Writing-in-the-Major requirement)

Same as: COMPLIT 311C, GERMAN 190, GERMAN 390, JEWISHST 147, JEWISHST 349.

**COMPLIT 112. Oscar Wilde and the French Decadents. 3-5 Units.**

Close reading of Oscar Wilde's work together with major texts and authors of 19th-century French Decadence, including Symbolism, l'art pour l'art, and early Modernism. Points of contact between Wilde and avant-garde Paris salons; provocative, creative intersections between (homo)erotic and aesthetic styles, transgression; literary and cultural developments from Baudelaire to Mallarmé, Huysmans, Flaubert, Rachilde, Lorrain, and Proust compared with Wilde's *Salomé*, *Picture of Dorian Gray*, and critical writings; relevant historical and philosophical contexts. All readings in English; all student levels welcome.

Same as: COMPLIT 312, FRENCH 112, FRENCH 312.

**COMPLIT 121. Poems, Poetry, Worlds: The Origins, Evolution, and Migration of the Ghazal. 3-5 Units.**

An exploration of the origins, evolution, and migration of one of the world's great poetic genres, the ghazal (short lyric poem, usually on love). Starting with a discussion of the origins of the genre in the late pre-Islamic and early Islamic periods in Arabic and Persian, then moving to an examination of the evolution of the genre in the early medieval Islamic period in those languages, and the subsequent emergence of the ghazal in the related literatures of Hebrew, Ottoman Turkish and Urdu. Consideration of European translations of ghazals in the 18th and 19th centuries, the effect of these translations on contemporary European poetry, and the migration of the genre into English in the 19th and 20th centuries.

**COMPLIT 122. Literature as Performance. 3-5 Units.**

Theater as performance and as literature. The historical tension between performance and sexuality in the Western tradition since Greek antiquity. Non-European forms and conventions of performance and theatricality. The modern competition between theater and other forms of performance and media such as sports, film, and television. Sources include: classical Japanese theater; ancient Greek tragedy and comedy; medieval theater in interaction with Christian rituals and its countercultural horizons; the classical age of European theater including Shakespeare, Lope de Vega, and Molière.

**COMPLIT 123. The Novel, The World. 5 Units.**

Combining perspectives of the novels of the world as imaginary force with a sense of reality and as protean form that has reshaped the literary universe. Readings from: ancient Greece; early modern Spain, China, and continental Europe; theories of the novel; 19th-century realism; modernist and postmodern experiments; and the contemporary avant gardes of the world, including South Asia, and the hemispheric and transnational Americas.

**COMPLIT 125. Past Desire Made Present: The Traditions of Erotic Poetry in Medieval Iran and Europe. 3-5 Units.**

Aims to make present and accessible, to our early 21st-century experience, convergences and differences between medieval Persian and medieval European love poetry. Poetry will be dealt with as a discursive and institutional means through which it is possible to make present and tangible that which is absent -- both in space and time. If we accept that medieval Persian and European love poetry conjured up moods of homo- and heteroerotic desire for contemporary audiences, then this desire can also become present for us today through a close reading of those same texts.

**COMPLIT 125A. The Gothic Novel. 5 Units.**

The Gothic novel and its relatives from its invention by Walpole in *The Castle of Otranto* of 1764. Readings include: *Northanger Abbey*, *The Italian*, *The Monk*, *Frankenstein*, *Jane Eyre*, *Great Expectations*, and *Dracula*. What defines the Gothic as it evolves from one specific novel to a mode that makes its way into a range of fictional types?

Same as: ENGLISH 125A.

**COMPLIT 126B. Mind Games: Reading and Seeing the World. 3-5 Units.**

The world's increased fusion of images, visual arts and personal narratives challenges our minds and can make us feel utterly confused, excited, or even manipulated. Exploring these "mind games" can help us understand human needs, political acts, social realities as well as the workings of our own brain. Can images act as words? Can words act as images? Can photography tell stories? What is a modern tale? And why does it matter? This course studies visual and textual examples of how a particular fusion of elements can provoke particular emotions and actions. We will study examples of texts that cross language, logic and time and tell stories ranging from ecological tragedies to travels across continents, cities or extraordinary experiences. For example, this class will see how form intersects with autobiography, memory and reality. By studying these ways of "reading" and "seeing" the world in the texts for the class we will be asking ourselves if we can recognize the social question they pose and why we feel as we feel when we see them or read them. The texts for the course include novels, films, poems and visual texts by Angel Jovè, Anne Carson, Julio Llamazares, Yoko Tawada, Horacio Castellanos Moya, W.G. Sebald and Abdelkebir Khatibi, among others. We will access several historical contexts and cultures, primarily in 20th and 21st century with a focus on post-WWII and post-1980s globalization.

**COMPLIT 129A. Contemporary Persian Poetry: Encounter of a Thousand-Year-Old Classical Tradition with Modernity. 5 Units.**

The primacy of poetic expression in Persian culture in the transition from tradition to modernity. Major 20th-century poets in relation to historical events and social change. Authors include: Nima Yushij, Ahmad Shamlou, Sohrab Sepehri, Mehdi Akhavan Sales, Forough Farrokhzad, Nader Naderpour, Fereydown Moshiri, Esmā'il Kho'i, and Afghan and Tajik poets.

**COMPLIT 133. Gender and Modernism. 3-5 Units.**

Gender and sexuality in trans-Atlantic modernist literature and culture from the 1880s-1930s. Topics include the 19th-century culture wars and the figures of the dandy and the New Woman; modernist critiques of Enlightenment rationality; impact of World War I on gender roles; gender and the rise of modern consumer culture, fashion, design; the modernist metropolis and gender/sexuality; the avant-garde and gender; literary first-wave feminism; homoerotic modernism; modernism in the context of current theories of gender and sexuality.

Same as: COMPLIT 333.

**COMPLIT 135. Chinese Cultural Revolution: Performance, Politics, and Aesthetics. 4 Units.**

Events, arts, films, and operas of the Chinese Cultural Revolution. Analysis of political passion, aesthetics, and psychology of mass movements. Places the Cultural Revolution in the long-range context of art, social movements, and politics. Chinese language is not required.

Same as: CHINLIT 190, CHINLIT 290.

**COMPLIT 141A. The Meaning of Arabic Literature: a seminar investigation into the nebulous concept of adab. 3-5 Units.**

An investigation into the concept of literature in mediaeval Arabic. Was there a mediaeval Arabic way of thinking? We look to develop a translation for the word "adab," a concept that dominated mediaeval Arabic intellectual culture, and is related in some ways to what we mean today when we use the word literature. Our core text is a literary anthology from the 900s in Iraq and we try, together, to work out what literature meant for the author and his contemporaries. Readings, assignments and, class discussion all in English.

**COMPLIT 142. The Literature of the Americas. 5 Units.**

A wide-ranging overview of the literatures of the Americas in comparative perspective, emphasizing continuities and crises that are common to North American, Central American, and South American literatures as well as the distinctive national and cultural elements of a diverse array of primary works. Topics include the definitions of such concepts as empire and colonialism, the encounters between worldviews of European and indigenous peoples, the emergence of creole and racially mixed populations, slavery, the New World voice, myths of America as paradise or utopia, the coming of modernism, twentieth-century avant-gardes, and distinctive modern episodes--the Harlem Renaissance, the Beats, magic realism, Noigandres--in unaccustomed conversation with each other. Same as: AMSTUD 142, CSRE 142, ENGLISH 172E.

**COMPLIT 143A. Alla Turca Love: Tales of Romance in Turkish Literature. 3-5 Units.**

An introduction to the theme of romantic love in Turkish literature, with particular attention to key classical and contemporary works that influenced the development of the Turkish literary tradition. Topics include close reading and discussion of folk tales, poems, short stories, and plays with particular attention to the characters of lover/beloved, the theme of romantic love, and the cultural and historical background of these elements. We will begin with essential examples of ghazels from Ottoman court poetry to explore the notion of "courtly love" and move to the most influential texts of 19th and 20th centuries. All readings and discussions will be in English; all student levels welcome. Same as: COMPLIT 342.

**COMPLIT 144A. Istanbul the Muse: The City in Literature and Film. 3-5 Units.**

The multiple layers of culture and history in Istanbul, a city on two continents between East and West, have inspired great art and literature. The class focuses on the idea of "inbetweenness" through art, literature, music, and popular culture seen chronologically. In addition to discussing literary, historical, and academic texts we will explore visual genres such as advertising, architecture, caricature, documentary, film, and miniature painting. Readings and discussion in English.

**COMPLIT 145. Reflection on the Other: The Jew in Arabic Literature, the Arab in Hebrew Literature. 4 Units.**

How literary works outside the realm of western culture struggle with questions such as identity, minority, and the issue of the other. How the Arab is viewed in Hebrew literature and how the Jew is viewed in Arabic literature. Historical, political, and sociological forces that have contributed to the shaping of the writer's views. Arab and Jewish (Israeli) culture. Same as: AMELANG 126, JEWISHST 106.

**COMPLIT 146. Asian American Culture and Community. 3-5 Units.**

An examination of the history, art and culture of Vietnamese Americans, and their contemporary experiences in the South Bay. The course will combine in-class learning with a major conference featuring prominent artists and scholars on the Vietnamese Diasporic community. A service learning component requires community work at a service organization in San Jose. Service Learning Course (certified by Haas Center). Course can be repeated once.

Same as: AMSTUD 146, ASNAMST 146S, CSRE 146S.

**COMPLIT 146A. The Arab Spring in Arabic Literature. 3-5 Units.**

An examination of the events of 2011 in the Middle East through literature. We will read short stories, poetry, graphic novels, and blogs in order to try and work out whether the revolution could have been predicted, and how it took place. Prerequisite: two years of Arabic at Stanford, or equivalent. Same as: COMPLIT 347.

**COMPLIT 147B. From Greece to Tahrir Square: The Rhetoric of Democracy. 3-5 Units.**

Discussion and analysis of how the idea of democracy has been represented, communicated, debated, in Greece, France, the United States, China, and Egypt. Historical, philosophical, literary texts, films. Student research, presentations, debates a key part of course.

**COMPLIT 149A. Classical Arabic Poetry: An Introduction. 3-5 Units.**

The primary litmus test of proficiency in the Arabic language is, and has always been, a command of classical Arabic poetry. Study and memorize the great lines of Arabic poetry with a manual that has stood the pedagogical test of time from the eleventh century until today. Questions of literary merit, poetic technique, metaphor, and divine and human linguistic innovation are all raised by the text that we will read together. Readings in Arabic, assignments and discussion in English. Prerequisite: two years of Arabic at Stanford, or equivalent. Same as: COMPLIT 346.

**COMPLIT 151A. Philosophies, Literatures, and Alternatives. 3-5 Units.**

Aristotelian poetics and mediaeval Arabic literary theory. Nietzsche's irony and Philosophies and literatures, together and apart, dominate the last two millennia of human thought. How might they best be read? Are philosophy and literature two different ways of thinking, or are they just two separate institutional histories? This course starts with familiar Greeks, moves onto unfamiliar Arabs, confronts old Europe, and ends with contemporary Americans arguing. Same as: COMPLIT 351A.

**COMPLIT 154A. Film & Philosophy. 4 Units.**

Issues of freedom, morality, faith, knowledge, personal identity, and the value of truth explored through film; philosophical investigation of the filmic medium itself. Screenings to include Twelve Monkeys (Gilliam), Ordet (Dreyer), The Dark Knight (Nolan), Vicky Cristina Barcelona (Allen), and Eternal Sunshine of the Spotless Mind (Kaufman). Taught in English. Same as: FRENCH 154, ITALIAN 154, PHIL 193C, PHIL 293C.

**COMPLIT 160. The Literature of Dehumanization. 3-5 Units.**

An examination of a constellation in Western literature that specifically deals with a borderline state between humanity and animality, showing different approaches to the problem of humanity and non-humanity through some of the major works in the modern Western literary canon. The class explores the different ways in which dehumanization takes place in these texts, and how these texts also suggest a regaining of one's lost humanity. Readings include: Ovid, Marie de France, Shakespeare, Hobbes, Heine, Baudelaire, Tolstoy, Nietzsche, Lautreamont, Kafka, Rilke, Celan, and more.

**COMPLIT 181. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English. Same as: CLASSGEN 81, ENGLISH 81, FRENCH 181, GERMAN 181, ITALIAN 181, PHIL 81, SLAVIC 181.

**COMPLIT 194. Independent Research. 1-5 Units.**

(Staff).

**COMPLIT 199. Senior Seminar. 3-5 Units.**

Major terms of narratology; how different literary, cinematic, and popular culture narratives raise ethical issues, stir public debates and contribute to understanding human values. Readings include Biblical texts, Antigone, Kleist, Kafka, Coetzee, V for Vendetta, South Park, Kant, Arendt, Nussbaum, Rorty, and Levinas. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature.

Same as: COMPLIT 367, JEWISHST 149, JEWISHST 347.

**COMPLIT 213A. Martin Heidegger. 3-5 Units.**

Working through the most systematically important texts by Martin Heidegger and their historical moments and challenges, starting with *Being and Time* (1927), but emphasizing his philosophical production after World War II. The philological and historical understanding of the texts function as a condition for the laying open of their systematic provocations within our own (early 21st-century) situations. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature. Taught in English.

Same as: COMPLIT 313A, GERMAN 282, GERMAN 382.

**COMPLIT 218. The work of Luis Martín Santos in Mid-Twentieth Century Spain. 3-5 Units.**

First published in 1962, "Tiempo de Silencio" is the only book that the young psychiatrist Luis Martín Santos finished during his lifetime, and, although largely overlooked (even in Spain) until the present day, one of the great European novels of the 20th century. It brings to a complex convergence the evocation of Spain's decadent and run-down post-Civil War society with high-modernist literary procedures and (an implicit parody of) phenomenological analysis.

Same as: ILAC 229.

**COMPLIT 221A. Courtly Love: Deceit and Desire in the Middle Ages. 3-5 Units.**

A comparative seminar on medieval love books and their reception. We will examine and question the notion of "amour courtois," which arose in the lyrics and romances of medieval France and was codified in Romantic-era criticism. Primary readings will be enriched by thinking about this notion through the lens of modern theories of desire, such as those of Girard, Lacan, and Žižek. Conducted in English with readings in translation. Same as: FRENCH 234, ITALIAN 234.

**COMPLIT 222A. German Literature and Thought from 1900 to the Present: Wrestling with Modernity. 3-5 Units.**

Masters of German 20th and 21st Century literature and philosophy as they present aesthetic innovation and confront the challenges of modern technology, social alienation, manmade catastrophes, and imagine the future. Readings include Nietzsche, Freud, Rilke, Musil, Brecht, Kafka, Doebelin, Benjamin, Juenger, Arendt, Musil, Mann, Adorno, Celan, Grass, Bachmann, Bernhardt, Wolf, and Kluge. Taught in English.

Same as: GERMAN 222, GERMAN 322.

**COMPLIT 223. Literary Diaries of Classic Modernity. 3-5 Units.**

Focus is on self-analysis in works of key modern writers. Since Montaigne's *Essais* and Rousseau's *Confessions*, analysis of the self has been a central topic for modern literature. Texts include Baudelaire's *Intimate Journals*, Kafka's *Diaries*, Gide's *Journals*, Woolf's *Moments of Being*, Benjamin's *Berlin Childhood*, and Pavese's *Diaries*. Analysis of the self as polarizing between the imagination of a utopian childhood and self-deprivation.

Same as: GERLIT 223.

**COMPLIT 230A. The Novel in Europe: The Age of Compromise, 1800-1848. 5 Units.**

The novel after the French revolution and the industrial take-off. Novelistic form and historical processes: nation-building and the marriage market, political conservatism and the advent of fashion, aristocracy and bourgeoisie and proletariat... focusing on how stylistic choices and plot structures offer imaginary resolutions to social and ideological conflicts. Authors will include Austen, Scott, Shelley, Stendhal, Puskin, Balzac, Bronte.

Same as: ENGLISH 230A.

**COMPLIT 233. Baroque and Neobaroque. 5 Units.**

The literary, cultural, and political implications of the 17th-century phenomenon formed in response to the conditions of the 16th century including humanism, absolutism, and early capitalism, and dispersed through Europe, the Americas, and Asia. If the Baroque is a universal code of this period, how do its vehicles, such as tragic drama, Ciceronian prose, and metaphysical poetry, converse with one another? The neobaroque as a complex reaction to the remains of the baroque in Latin American cultures, with attention to the mode in recent Brazilian literary theory and Mexican poetry.

Same as: ENGLISH 233, SPANLIT 293E.

**COMPLIT 240A. Introduction to Hebrew Literature. 3-5 Units.**

The influence of biblical poetry, piyut, and medieval Hebrew poetry on the development of Modern Hebrew poetry. With focus on voice, space, lyrical Subjectivity, Intertextuality, and Poetic Forms. Guest Speakers include Tamar Zwi, Susan Einbinder, Berry Saharoff, and Raymond Scheindlin. Same as: COMPLIT 140, JEWISHST 140.

**COMPLIT 241B. Earthly and Heavenly Intoxication: Wine Imagery in Medieval Persian Poetry and Prose. 3-5 Units.**

Through a close reading of pre-modern Persian poetic and prose texts, there will be an examination of the centrality of wine imagery in both profane and mystical Persian literature. Students will be exposed to a wide range of texts dating from 900-1400 CE. Intermediate command of Persian is required.

**COMPLIT 242A. Short Stories from South Asia. 3-5 Units.**

This course will explore how cultural identities of the nations in South Asia were re-defined after the Partition of India in 1947, the independence of Sri Lanka in 1948 and the formation of Bangladesh in 1971. Comparative/cross-cultural study of stories will be taken up for in-depth analysis based on certain themes like partition and violence, myth and narrative, gender and narrative, music and narratology, familial patterns, etc.

**COMPLIT 245. Introductory Ottoman Turkish. 1-3 Units.**

Course is open to undergraduate and graduate students. Aims to familiarize students with Ottoman Turkish script and develop competence in reading Ottoman Turkish texts in print. Selected readings will range from poetry to prose, from newspaper and journal articles to reference works.

**COMPLIT 248A. Reading Turkish I. 3-5 Units.**

Designed to develop reading competence in Turkish for graduate students (undergraduates should consult the instructor). An introduction to the structures of Turkish language necessary for reading. Essential grammar, syntax points, vocabulary, and reading skills will be emphasized. The goal is to enable you to read Turkish at an advanced level in a relatively short period of time. It is not a traditional language course that takes an integrated four-skill approach; it focuses only on reading, and as a result we will be able to cover advanced material in a short amount of time.

**COMPLIT 248B. Reading Turkish II. 3-5 Units.**

Continuation of language and reading development from Reading Turkish I. Open with consent of the instructor to undergraduates who have already taken Reading Turkish I.

**COMPLIT 248C. Advanced Turkish for Research. 3-5 Units.**

Refining advanced reading skills in modern Turkish through intensive reading and translation. Emphasis on Turkish cultural, historical, literary, and political texts depending on students' academic interests. Prior knowledge of Turkish and/or consultation with the instructor is necessary.

**COMPLIT 249A. The Iranian Cinema: Image and Meaning. 1-3 Units.**

This course will focus on the analysis of ten Iranian films with the view of conducting a discourse on the semiotics of Iranian art and culture. Each session will be designated to the viewing of a film by a prominent Iranian film-maker. Students are expected to prepare for class by having previously examined other available films by the film-maker under consideration.

**COMPLIT 249B. Iranian Cinema in Diaspora. 1-3 Units.**

Despite enormous obstacles, immigrant Iranian filmmakers, within a few decades (after the Iranian revolution), have created a slow but steady stream of films outside Iran. They were originally started by individual spontaneous attempts from different corners of the world and by now we can identify common lines of interest amongst them. There are also major differences between them. These films have never been allowed to be screened inside Iran, and without any support from the global system of production and distribution, as independent and individual attempts, they have enjoyed little attention. Despite all this, Iranian cinema in exile is in no sense any less important than Iranian cinema inside Iran. In this course we will view one such film, made outside Iran, in each class meeting and expect to reach a common consensus in identifying the general patterns within these works and this movement. Questions such as the ones listed below will be addressed in our meetings each week: What changes in aesthetics and point of view of the filmmaker are caused by the change in his or her work environment? Though unwantedly these films are made outside Iran, how related are they to the known (recognized) cinema within Iran? And in fact, to what extent do these films express things that are left unsaid by the cinema within Iran?

**COMPLIT 249C. Contemporary Iranian Theater. 1-3 Units.**

Today Iranian plays, both in traditional and contemporary styles, are staged in theater festivals throughout the world play their role in forming a universal language of theater which combine the heritages from countries in all five continents. Despite many obstacles, some Iranian plays have been translated into English and some prominent Iranian figures are successful stage directors outside Iran. Forty six years ago when "Theater in Iran" (a monograph on the history of Iranian plays) by Bahram Beyzaie was first published, it put the then contemporary Iranian theater movement--which was altogether westernizing itself blindly--face to face with a new kind of self-awareness. Hence in today's generation of playwrights and stage directors in Iran, all know something of their theatrical heritage. In this course we will spend some class sessions on the history of theater in Iran and some class meetings will be concentrating on contemporary movements and present day playwrights. Given the dearth of visual documents, an attempt will be made to present a picture of Iranian theater to the student. Students are expected to read the recommended available translated plays of the contemporary Iranian playwrights and participate in classroom discussions.

**COMPLIT 250. Literature, History and Memory. 3-5 Units.**

Analysis of literary works as historical narratives. Focus on the relationship history, fiction, and memory as reflected in Francophone literary texts that envision new ways of reconstructing or representing ancient or immediate past. Among questions to be raised: individual memory and collective history, master narratives and alternatives histories, the role of reconstructing history in the shaping or consolidating national or gender identities. Readings include fiction by Glissant, Kane, Condé, Schwarz-Bart, Djébar, Perec, as well as theoretical texts by Ricoeur, de Certeau, Nora, Halbwachs, White, Echevarría. Taught in English. Same as: FRENCH 248.

**COMPLIT 254. Modern Chinese Novel: Theory, Aesthetics, History. 4 Units.**

From the May Fourth movement to the 40s. Themes include enlightenment, democracy, women's liberation, revolution, war, urban culture, and love. Prerequisite: advanced Chinese. Same as: CHINLIT 174, CHINLIT 274.

**COMPLIT 256A. Dionysus - Mythology and Poetry of a Nietzschean Inspiration. 3-5 Units.**

The Greek god Dionysus became, like Apollo, the symbol of poetic imagination. In the modern era he substituted the Apolline tradition, while Apollo assumed the characteristics of Dionysus. We will examine this central poctological motif in texts by authors including Euripides, Keats, Nietzsche, Pound, and Eliot. Open to advanced undergraduates. Taught in English. Same as: COMPLIT 356A, GERMAN 210, GERMAN 310.

**COMPLIT 275. Humanities Education in the Changing University. 3 Units.**

Advanced study in the humanities faces changes within fields, the university and the wider culture. Considers the debate over the status of the humanities with regard to historical genealogies and current innovations. Particular attention on changes in doctoral education. Topics include: origins of the research university; disciplines and specialization; liberal education in conflict with professionalization; literature and literacy education; interdisciplinarity as a challenge to departments; education policy; digital humanities; accountability in education, assessment and student-centered pedagogies. Same as: DLCL 320, GERMAN 250.

**COMPLIT 281. Visions of the Future in Literature. 4 Units.**

Emphasis on personal and collective future as perceived and described in works translated from Hebrew or written originally in English. Focus on novels, short stories, poems and movies that deal both with the future of Israel and the Middle East and the future of individuals in the area. Guest speaker on Science Fiction and the Graphic Novel. The course is part of "The Future of Storytelling" activities organized by Taube Center for Jewish Studies. Same as: JEWISHST 241.

**COMPLIT 303D. Thinking in Fiction. 5 Units.**

Narrative and cognition in 18th-century fictional, philosophical, scientific, and cultural texts. Probable readings: Hobbes, Locke, Newton, Swift, Defoe, Hume, Lennox, Sterne, Adam Smith, Wollstonecraft, and Bentham. Same as: ENGLISH 303D.

**COMPLIT 310. Introduction to Comparative Queer Literary Studies. 3-5 Units.**

Introduction to the comparative literary study of important gay, lesbian, queer, bisexual, and transgender writers and their changing social, political, and cultural contexts from the 1890s to today: Wilde, Gide, Lucie Delarue-Mardrus, Radclyffe Hall, E.M. Forster, Thomas Mann, Georges Bataille, James Baldwin, Jean Genet, Jeanette Winterson, Sarah Waters, Audre Lorde, discussed in the context of 20th-century feminist and queer literary and social theories of gender and sexuality (Judith Butler, Eve Sedgwick, Julia Serano, and others).

Same as: COMPLIT 110, FEMST 110.

**COMPLIT 311. Shakespeare, Islam, and Others. 5 Units.**

Shakespeare and other early modern writers in relation to new work on Islam and the Ottoman Turk in early modern studies. *Othello*, *Twelfth Night*, *Titus Andronicus*, *The Merchant of Venice*, and other Shakespeare plays. Kyd's *Solyman and Perseda*, Daborne's *A Christian Turned Turk*, Massinger's *The Renegado*, Marlowe's *The Jew of Malta*, and literary and historical materials.

Same as: ENGLISH 373D.

**COMPLIT 311C. German Capstone: Reading Franz Kafka. 3-5 Units.**

This class will address major works by Franz Kafka and consider Kafka as a modernist writer whose work reflects on modernity. We will also examine the role of Kafka's themes and poetics in the work of contemporary writers. (Meets Writing-in-the-Major requirement)

Same as: COMPLIT 111, GERMAN 190, GERMAN 390, JEWISHST 147, JEWISHST 349.

**COMPLIT 312. Oscar Wilde and the French Decadents. 3-5 Units.**

Close reading of Oscar Wilde's work together with major texts and authors of 19th-century French Decadence, including Symbolism, l'art pour l'art, and early Modernism. Points of contact between Wilde and avant-garde Paris salons; provocative, creative intersections between (homo)erotic and aesthetic styles, transgression; literary and cultural developments from Baudelaire to Mallarmé, Huysmans, Flaubert, Rachilde, Lorrain, and Proust compared with Wilde's Salomé, *Picture of Dorian Gray*, and critical writings; relevant historical and philosophical contexts. All readings in English; all student levels welcome.

Same as: COMPLIT 112, FRENCH 112, FRENCH 312.

**COMPLIT 313A. Martin Heidegger. 3-5 Units.**

Working through the most systematically important texts by Martin Heidegger and their historical moments and challenges, starting with *Being and Time* (1927), but emphasizing his philosophical production after World War II. The philological and historical understanding of the texts function as a condition for the laying open of their systematic provocations within our own (early 21st-century) situations. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature. Taught in English.

Same as: COMPLIT 213A, GERMAN 282, GERMAN 382.

**COMPLIT 320A. Epic and Empire. 5 Units.**

Focus is on Virgil's *Aeneid* and its influence, tracing the European epic tradition (Ariosto, Tasso, Camoes, Spenser, and Milton) to New World discovery and mercantile expansion in the early modern period.

Same as: ENGLISH 314.

**COMPLIT 327. Genres of the Novel. 5 Units.**

Provides students with an overview of major genres in the history of the modern novel. Novels might include works by Cervantes, Defoe, Lafayette, Radcliffe, Goethe, Balzac, Woolf, and Marquez, coupled with theory by Lukacs, Bahktin, Jameson and Barthes.

Same as: FRENCH 327.

**COMPLIT 330. The Bourgeois. 5 Units.**

Goal is to define the ruling class of modern times. Social history (Weber, Hirschmann, Marx); literary texts (Defoe, Goethe, Gaskell); and Henrik Ibsen who produced an intransigent criticism of the bourgeois ethos.

Same as: ENGLISH 363.

**COMPLIT 333. Gender and Modernism. 3-5 Units.**

Gender and sexuality in trans-Atlantic modernist literature and culture from the 1880s-1930s. Topics include the 19th-century culture wars and the figures of the dandy and the New Woman; modernist critiques of Enlightenment rationality; impact of World War I on gender roles; gender and the rise of modern consumer culture, fashion, design; the modernist metropolis and gender/sexuality; the avant-garde and gender; literary first-wave feminism; homoerotic modernism; modernism in the context of current theories of gender and sexuality.

Same as: COMPLIT 133.

**COMPLIT 334B. Concepts of Modernity 2: The Study of Culture in the Age of Globalization. 5 Units.**

A survey of 20th-century theory with focus on the concept of culture and methods of studying it from diverse disciplines including, anthropology, historical sociology, literary and cultural studies. Discussions will emphasize modernization, transmodernization and globalization processes in their relations to culture broadly understood, cultures in their regional, national and diasporic manifestations, and cultures as internally differentiated (high and low culture, subcultures, media cultures).

Same as: ENGLISH 334B, MTL 334B.

**COMPLIT 342. Alla Turca Love: Tales of Romance in Turkish Literature. 3-5 Units.**

An introduction to the theme of romantic love in Turkish literature, with particular attention to key classical and contemporary works that influenced the development of the Turkish literary tradition. Topics include close reading and discussion of folk tales, poems, short stories, and plays with particular attention to the characters of lover/beloved, the theme of romantic love, and the cultural and historical background of these elements. We will begin with essential examples of ghazels from Ottoman court poetry to explore the notion of "courtly love" and move to the most influential texts of 19th and 20th centuries. All readings and discussions will be in English; all student levels welcome.

Same as: COMPLIT 143A.

**COMPLIT 346. Classical Arabic Poetry: An Introduction. 3-5 Units.**

The primary litmus test of proficiency in the Arabic language is, and has always been, a command of classical Arabic poetry. Study and memorize the great lines of Arabic poetry with a manual that has stood the pedagogical test of time from the eleventh century until today. Questions of literary merit, poetic technique, metaphor, and divine and human linguistic innovation are all raised by the text that we will read together. Readings in Arabic, assignments and discussion in English. Prerequisite: two years of Arabic at Stanford, or equivalent.

Same as: COMPLIT 149A.

**COMPLIT 347. The Arab Spring in Arabic Literature. 3-5 Units.**

An examination of the events of 2011 in the Middle East through literature. We will read short stories, poetry, graphic novels, and blogs in order to try and work out whether the revolution could have been predicted, and how it took place. Prerequisite: two years of Arabic at Stanford, or equivalent.

Same as: COMPLIT 146A.

**COMPLIT 351A. Philosophies, Literatures, and Alternatives. 3-5 Units.**

Aristotelian poetics and mediaeval Arabic literary theory. Nietzsche's irony and Philosophies and literatures, together and apart, dominate the last two millennia of human thought. How might they best be read? Are philosophy and literature two different ways of thinking, or are they just two separate institutional histories? This course starts with familiar Greeks, moves onto unfamiliar Arabs, confronts old Europe, and ends with contemporary Americans arguing.

Same as: COMPLIT 151A.

**COMPLIT 353A. Experiment and the Novel. 5 Units.**

A double exploration of experiment in the novel from 1750 into the 19th century. Taking off from Zola's "The Experimental Novel," consideration of the novel's aspect as scientific instrument. Taking the idea of experimental fiction in the usual sense of departures from standard practice, consideration of works that seem to break away from techniques of "realism" devised prior to 1750. Possible texts by: Lennox, Sterne, Walpole, Goldsmith, Godwin, Lewis, Shelley, Hogg, Emily Bronte, and Diderot.

Same as: ENGLISH 303.

**COMPLIT 356A. Dionysus - Mythology and Poetry of a Nietzschean Inspiration. 3-5 Units.**

The Greek god Dionysus became, like Apollo, the symbol of poetic imagination. In the modern era he substituted the Apolline tradition, while Apollo assumed the characteristics of Dionysus. We will examine this central poctological motif in texts by authors including Euripides, Keats, Nietzsche, Pound, and Eliot. Open to advanced undergraduates. Taught in English.

Same as: COMPLIT 256A, GERMAN 210, GERMAN 310.

**COMPLIT 359A. Philosophical Reading Group. 1 Unit.**

Discussion of one contemporary or historical text from the Western philosophical tradition per quarter in a group of faculty and graduate students. For admission of new participants, a conversation with H. U. Gumbrecht is required. May be repeated for credit. Taught in English.

Same as: FRENCH 395, ITALIAN 395.

**COMPLIT 364. Style. 5 Units.**

The return of a term that was central in 20th-century criticism, and has all but disappeared in recent decades. Focus is on looking at concepts of style from various branches of linguistic and literary theory, and examination of some revealing examples in novels and films. Team taught with D.A. Miller from U.C. Berkeley.

Same as: ENGLISH 364.

**COMPLIT 367. Senior Seminar. 3-5 Units.**

Major terms of narratology; how different literary, cinematic, and popular culture narratives raise ethical issues, stir public debates and contribute to understanding human values. Readings include Biblical texts, Antigone, Kleist, Kafka, Coetzee, V for Vendetta, South Park, Kant, Arendt, Nussbaum, Rorty, and Levinas. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature.

Same as: COMPLIT 199, JEWISHST 149, JEWISHST 347.

**COMPLIT 368. Imagining the Oceans. 5 Units.**

How has Western culture constructed the world's oceans since the beginning of global ocean exploration? How have imaginative visions of the ocean been shaped by marine science, technology, exploration, commerce and leisure? Readings might include voyage accounts by Cook and Darwin, sailors' narratives by Equiano and Dana, poetry by Coleridge, Bishop and Walcott, novels by Melville, Verne, Conrad and Woolf. Visual culture might include paintings by Turner and Redon, and films by Jean Painlevé, Kathryn Bigelow, Jerry Bruckheimer and James Cameron. Critical texts will be drawn from interdisciplinary theorists of modernity and mobility, such as Schmitt, Wallerstein, Corbin, Latour, Deleuze + Guattari, and Cresswell.

Same as: FRENCH 368.

**COMPLIT 369. Introduction to Graduate Studies: Criticism as Profession. 5 Units.**

A number of faculty will present published work and discuss their research and composition process. We will read critical, theoretical, and literary texts that address, in different ways, "What is a World?" Taught in English.

Same as: DLCL 369, FRENCH 369, GERMAN 369, ITALIAN 369.

**COMPLIT 371. Aesthetics, Politics, and Literary Criticism: East and West. 2-5 Units.**

How aesthetics and politics intertwine and break apart in Western and Eastern traditions. Aesthetics for understanding culture, morality, and power in crosscultural contexts. Readings include Hegel, Kant, Marcuse, Lukacs, and Adorno; and Chinese thinkers Wang Guowei, Lu Xun, Li Zehou, and Mao. Prerequisite: CHINLIT 127/207 or consent of instructor.

Same as: CHINLIT 371.

**COMPLIT 396L. Pedagogy Seminar I. 2 Units.**

Required for first-year Ph.D students in English, Modern Thought and Literature, and Comparative Literature. Preparation for surviving as teaching assistants in undergraduate literature courses. Focus is on leading discussions and grading papers.

Same as: ENGLISH 396L.

**COMPLIT 399. Individual Work. 1-15 Units.****COMPLIT 802. TGR Dissertation. 0 Unit.**

## Comparative Medicine Courses

**COMP MED 10SC. Comparative Anatomy and Physiology of Mammals. 2 Units.**

Introduction to common laboratory, domestic, and exotic mammals. Investigation of the unique adaptations of species in terms of their morphological, anatomical, and behavioral characteristics. How these species interact with their own and other species, including humans; basic evolution and the impact of habitat destruction on wild animals; diversity of the mammalian orders, along with the fundamentals of comparative anatomy, physiology and basic dissection techniques. Lectures, dissection labs, student presentations, field trip to local zoo.

**COMP MED 80Q. Introduction to Animal Behavior. 3 Units.**

Preference to freshmen. Behavior is what makes animals special (thirsty plants don't walk to water), but why do animals behave the way they do? What does their behavior tell us about their inner lives, and about ourselves? What do lipstick and cuckoos and fireflies have in common? Why would nobody want to be a penguin? What do mice say to each other in their pee-mail? Learning how to think about questions like these gives us a unique perspective on the natural world. Format: Discussion and criticism of video examples, documentaries, and research papers. Topics: History and approaches to animal behavior; development of behavior, from genetics to learning; mechanisms of behavior, from neurons to motivation; function of behavior, from honest signals to selfish genes; the phylogeny of behavior, from domestication to speciation; and modern applications of behavior, from abnormal behavior, to conservation, to animal welfare, and animal consciousness.

**COMP MED 81N. Comparative Anatomy and Physiology of Mammals. 3 Units.**

Preference to freshmen. Emphasis is on a comparative approach to anatomy and physiology of a wide range of mammals, the unique adaptations of each species in terms of its anatomical, and behavioral characteristics, and how these species interact with human beings and other animals. Dissection required. Class size is limited to 16.



**COMPMED 83N. Horse Medicine. 3 Units.**

Preference to freshmen. The most common equine diseases, ranging from colic to lameness are reviewed using problem-oriented approach. Topics include: equine infectious diseases, care of the newborn foal, medical emergencies, and neurological disorders. A lab on the physical and neurological examination of the horse at the Red Barn.

**COMPMED 84Q. Globally Emerging Zoonotic Diseases. 3 Units.**

Preference to sophomores. Infectious diseases impacting veterinary and human health around the world today. Mechanisms of disease, epidemiology, and underlying diagnostic, treatment and control principles associated with these pathogens.

**COMPMED 85N. Animal Use in Biomedical Research. 3 Units.**

Preference to freshmen. How and why animals are used in biomedical science. Addresses human and animal disease entities and how animal research has contributed to the treatment and cure of disease. Significant portions of this course are devoted to documenting the humane care and treatment of laboratory animals in research, including, but not limited to such topics as laws and ethics, animal behavior, animal modeling, and the animal activist movement. Course topics will also include: What advances have been made as a result of the use of animals in research? Who conducts animal research? Predominant animal species used in biomedical research, facts and myths; the regulation of biomedical research; housing and care of laboratory animals; why new drugs must be tested; animal use in stem cell research, cancer research and genetically engineered mice; career choices in biomedical research.

**COMPMED 87Q. Introduction to the Mouse in Biomedical Research. 3 Units.**

Preference to sophomores. Focus is on the laboratory mouse, a widely used and important research model. Topics include the ethics of animal use in research; the natural history, origin and husbandry of the mouse; characteristics of key mouse strains; its anatomy and physiology; common diseases and their effects on research; coat color genetics relative to human diseases; immunodeficient mouse models; and genetic engineering of mice. The laboratory includes necropsy, handling, anesthesia, identification methods, and common research techniques using live and dead mice. Enrollment limited to 14 students.

**COMPMED 88N. Comparative Hematology. 3 Units.**

Preference to sophomores. The essential and constant production of new blood cells by the bone marrow. Focus is on fundamentals of the three blood cell types along with white blood cell subtypes. Topics include the microscopic appearance of blood cells in mammalian and non-mammalian species, common morphologic abnormalities of blood cells, and shifts in blood cells that occur in several major diseases of humans and animals. Ideally suited for premed, prevet and Bio-X students, but no biology specialty background required.

**COMPMED 89Q. Ouch it Hurts! The Comparative Neurobiology of Pain. 3 Units.**

Preference to sophomores. Focus is on understanding the basic neurobiology of pain pathways. Topics include the physiology, pharmacology, and clinical aspects of effective pain management. In both humans and animals pain is part of the protective mechanisms that prevent further injury to the body. However, if the pain process continues unchecked, it can become extremely detrimental.

**COMPMED 107. Comparative Neuroanatomy. 4 Units.**

Functional organization and evolution of the vertebrate nervous system. Topics include paleoneurology, cladistic analysis, allometry, mosaic versus concerted evolution, and evolution of brain region structure, connectivity, and neurons. Comparisons between structure and function of vertebrate forebrains including hippocampi. Evolution of the primate visual and sensorimotor central nervous system as related to vocalization, socialization, and intelligence.  
Same as: COMPMED 207.

**COMPMED 110. Pre-Vet Advisory. 1 Unit.**

For students interested in a career in veterinary medicine. How to meet the academic and practical experience prerequisites for admission to veterinary school. Networking with other pre-vet students. Periodic group meetings with guest speakers presenting career options in veterinary medicine. Prerequisite: consent of instructor.

**COMPMED 198. Undergraduate Directed Reading in Comparative Medicine. 1-3 Units.**

May be taken as a prelude to research and may also involve participation in a lab or research group seminar and/or library research.

**COMPMED 199. Undergraduate Research. 1-3 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**COMPMED 207. Comparative Neuroanatomy. 4 Units.**

Functional organization and evolution of the vertebrate nervous system. Topics include paleoneurology, cladistic analysis, allometry, mosaic versus concerted evolution, and evolution of brain region structure, connectivity, and neurons. Comparisons between structure and function of vertebrate forebrains including hippocampi. Evolution of the primate visual and sensorimotor central nervous system as related to vocalization, socialization, and intelligence.  
Same as: COMPMED 107.

**COMPMED 215. Synaptic Properties and Neuronal Circuits. 2-3 Units.**

Focus is on synapses and circuits in the central nervous system. Objective is to demonstrate how the specific properties of different synapses play a role in the function of neuronal circuits. The main types of synapses are covered, including both ionotropic and metabotropic-receptor-dependent synapses and their related circuits in the CNS. Lectures and student presentations. If taken for 3 units qualifies as a Core Course satisfying requirements in Cellular, Molecular & Developmental Neuroscience in the Neurosciences Graduate Program. Students enrolling for 3 units write an NIH-style proposal on a selected synapse, proposing a study of its properties and related function and presenting the proposal to the class for critique and discussion.

**COMPMED 299. Directed Reading in Comparative Medicine. 1-18 Units.**

Prerequisite: consent of instructor. (Staff).

**COMPMED 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**COMPMED 399. Graduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Opportunities are available in comparative medicine and pathology, immuno-histochemistry, electron microscopy, molecular genetics, quantitative morphometry, neuroanatomy and neurophysiology of the hippocampus, pathogenesis of intestinal infections, immunopathology, biology of laboratory rodents, anesthesiology of laboratory animals, gene therapy of animal models of neurodegenerative diseases, and development and characterization of transgenic animal models. Prerequisite: consent of instructor.

# Comparative Studies in Race Ethnicity Courses

## **CSRE 11W. Service-Learning Workshop on Issues of Education Equity. 1 Unitss.**

Introduces students to a variety of issues at stake in the public education of at-risk high school youth in California. Participants will hear from some of the leading faculty in the School of Education as well as the Departments of Psychology, Sociology, and others, who will share perspectives on the problems and challenges of educating a diverse student body in the state's public school system. The service-learning component of the workshop is a mentoring project (Stanford Students for Educational Equity) with junior class history students from East Palo Alto Academy High School, a Stanford charter school.

Same as: HISTORY 11W.

## **CSRE 14N. Growing Up Bilingual. 3 Units.**

This course is a Freshman Introductory Seminar that has as its purpose introducing students to the sociolinguistic study of bilingualism by focusing on bilingual communities in this country and on bilingual individuals who use two languages in their everyday lives. Much attention is given to the history, significance, and consequences of language contact in the United States. The course focuses on the experiences of long-term US minority populations as well as that of recent immigrants.

Same as: CHILATST 14N, EDUC 114N.

## **CSRE 16N. African Americans and Social Movements. 3 Units.**

Theory and research on African Americans' roles in post-Civil Rights, US social movements. Topics include women's right, LGBT rights, environmental movement, and contemporary political conservatism.

Same as: AFRICAAM 16N, SOC 16N.

## **CSRE 32. Theories in Race and Ethnicity: A Comparative Perspective. 5 Units.**

This undergraduate course employs an anthropological and historical perspective to introduce students to ideas and concepts of race and ethnicity that emerged primarily in Europe and the United States in the eighteenth and nineteenth centuries and that continue to shape contemporary racial attitudes, interactions, and inequalities. Ideas about race and ethnicity forged outside the U.S. and case studies from other nations are presented to broaden students' understanding and to overcome the limitations of an exclusive focus on the U.S. This course is geared to sophomores and juniors who have already taken at least one course on race and ethnicity, anthropology, African American Studies, Asian American Studies, Chicana/o Studies, Jewish Studies or Native American Studies.

Same as: ANTHRO 32.

## **CSRE 45Q. Understanding Race and Ethnicity in American Society. 5 Units.**

Preference to sophomores. Historical overview of race in America, race and violence, race and socioeconomic well-being, and the future of race relations in America. Enrollment limited to 16.

Same as: SOC 45Q.

## **CSRE 51K. Election 2012. 1 Unitss.**

Focuses on the November 2012 election. Serial examinations of major topics at stake: foreign policy, the economy, the Supreme Court, and campaign strategy. One session will be devoted to California. Distinguished guests will participate in sessions moderated by the instructors with participation by students. Students enrolling for credit must attend regularly and contribute to a course blog. Sign up for the waitlist through PoliSci 51K. In order for a student to be enrolled in the course via the waitlist process, the student must not exceed the maximum unit enrollment for the quarter OR have a time schedule conflict with another course on his/her study list. If the student will either exceed the maximum units or has a class time conflict, the waitlist will bypass this student for enrollment, and will enroll the next eligible student into this course.

Same as: HISTORY 51K, POLISCI 51K.

## **CSRE 51N. Comparative Fictions of Ethnicity. 5 Units.**

We may "know" "who" we "are," but we are, after all, social creatures. How does our sense of self interact with those around us? How does literature provide a particular medium for not only self expression, but also for meditations on what goes into the construction of "the Self"? After all, don't we tell stories in response to the question, "who are you"? Besides a list of nouns and names and attributes, we give our lives flesh and blood in telling how we process the world. Our course focuses in particular on this question--Does this universal issue ("who am I") become skewed differently when we add a qualifier before it, like "ethnic"? Satisfies PWR2.

Same as: AMSTUD 51N, COMPLIT 51N.

## **CSRE 54I. The Other Forms of Capital: Human, Cultural, and Social. 3 Units.**

This course aims to develop a nuanced understanding of human, cultural, and social capital. In particular, we will address the origins of each term, differing schools of thought concerning their meaning(s) and significance, and extensions of the three terms beyond their original usage. Furthermore, students will critically analyze instances of the three terms using examples from contemporary popular culture. All students will present findings from a self-directed term project in lieu of a final exam.

## **CSRE 54S. Twice-Told Tales: Race, Revision and the Politics of Redress. 3 Units.**

Our culture is obsessed with retelling old stories in new ways. This course will focus on the art of adaptation as it relates to representations of race and ethnicity. We will center our study on contemporary literary adaptations including works by Jean Rhys, Suzan-Lori Parks, William Styron and Alice Randall. We will also read critical theories of redress and reparations that draw attention to both the stakes and challenges of revision.

## **CSRE 55M. MMUF Seminar. 1 Unitss.**

This seminar is designed to help MMUF honor students in the following ways: (1) developing and refining research paper topics, (2) learning about the various approaches to research and writing, and (3) connecting to Stanford University resources such as the library and faculty.

## **CSRE 55R. Race and Upward Mobility in U.S. Cultural Production. 3 Units.**

Ever since The Autobiography of Benjamin Franklin (1791), there has been an established tradition of upward mobility narratives in the U.S. Franklin's story is that of an individual's class ascension through hard work and thrift, virtues echoed by writers ever since. While the adoption of new values is still at the heart of many upward mobility narratives, in this seminar we will examine how those written by racial minorities may differ, while exploring issues such as inter and intra-group tensions, assimilation, and the makings of a minority middle class.

**CSRE 65N. Nation in Motion: Film, Race and Immigration in Contemporary French Cinema. 3 Units.**

An examination of the current debates in France regarding national identity, secularism, and the integration of immigrants, notably from the former colonies. Confronts films' and other media's visual and discursive rhetorical strategies used to represent ethnic or religious minorities, discrimination, citizens' resistance to government policies, inter-racial marriages, or women's rights within immigrant communities. By embodying such themes in stories of love, hardships, or solidarity, the motion pictures make the movements and emotions inherent to immigration tangible: to what effect? Taught in French. Films in French with English subtitles.

Same as: FRENCH 65N.

**CSRE 99A. Art in Our Time: Ethics and Aesthetics of Crisis. 4 Units.**

This course explores the ethical and aesthetic questions artists engage when facing, in their own time and place, social crises such as arise from the physical and psychic effects of war or political instability arising from disasters manmade and natural, the drug war in Mexico, the earthquakes in Haiti and Japan, the Arab Spring, the Great Recession. Readings will include both critical and creative texts that look at historical and contemporary examples of artists representing such experiences. In addition, students will be called upon to create their own artistic productions writing, music, theatrical or multimedia (including online) in a workshop setting. By definition, the course considers the current historical moment to be one of crisis, in which students across the world are alternately, or simultaneously, its victims and engaged witnesses. Note: Course location is Harmony House for Autumn 2012.

**CSRE 103B. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices. 3-5 Units.**

Focus is on classrooms with students from diverse racial, ethnic and linguistic backgrounds. Studies, writing, and media representation of urban and diverse school settings; implications for transforming teaching and learning. Issues related to developing teachers with attitudes, dispositions, and skills necessary to teach diverse students.

Same as: AFRICAAM 106, EDUC 103B, EDUC 337.

**CSRE 104F. The Modern Tradition of Non-Violent Resistance. 5 Units.**

During the twentieth century, peasants and menial laborers who comprised the majority of humanity launched liberation movements to secure citizenship rights. Mohandas K. Gandhi, Martin Luther King, Jr., and Nelson Mandela are among the leaders whose ideas continue to influence contemporary movements for global peace with social justice in a sustainable environment.

Same as: AFRICAAM 204F, HISTORY 204F.

**CSRE 107. The Black Mediterranean: Greece, Rome and Antiquity. 4-5 Units.**

Explore problems of race and ethnicity as viable criteria in studying ancient societies and consider the question, What is the Mediterranean?, in relation to premodern evidence. Investigate the role of blackness as a marker of ethnicity; the demography of slavery and its roles in forming social identities; and environmental determinism as a factor in ethnic and racial thinking. Consider Greek and Roman perspectives and behavior, and their impact on later theories of race and ethnicity as well as the Mediterranean as a whole.

Same as: AFRICAAM 107C, CLASSGEN 107.

**CSRE 108. Introduction to Feminist Studies. 4-5 Units.**

Introduction to interdisciplinary feminist scholarship, which seeks to understand the creation, perpetuation, and critiques of gender inequalities. Topics include the historical emergence of feminist politics and contemporary analyses of work and family, health and sexuality, creativity, and politics. Close attention to the intersections of race, gender, ethnicity, and sexuality and to international, as well as U.S., perspectives. Students learn to think critically about gender in the past, present, and future.

Same as: AMSTUD 107, FEMST 101.

**CSRE 109A. Federal Indian Law. 5 Units.**

Cases, legislation, comparative justice models, and historical and cultural material. The interlocking relationships of tribal, federal, and state governments. Emphasis is on economic development, religious freedom, and environmental justice issues in Indian country.

Same as: NATIVEAM 109A.

**CSRE 109B. Indian Country Economic Development. 5 Units.**

The history of competing tribal and Western economic models, and the legal, political, social, and cultural implications for tribal economic development. Case studies include mineral resource extraction, gaming, and cultural tourism. 21st-century strategies for sustainable economic development and protection of political and cultural sovereignty.

Same as: NATIVEAM 109B.

**CSRE 117N. Film, Nation, Latinidad. 3-4 Units.**

Examination of films from Spain, Mexico, and Latina/o USA that expand, trouble, contest, parody, or otherwise interrogate notions of national identity. Filmmakers may include Lourdes Portillo, Alejandro González Iñárritu, John Sayles, Maria Novaro, Pedro Almodóvar, and Gregory Nava.

Same as: CHILATST 117N, ILAC 117N.

**CSRE 117S. History of California Indians. 5 Units.**

Demographic, political, and economic history of California Indians, 1700s-1950s. Processes and events leading to the destruction of California tribes, and their effects on the groups who survived. Geographic and cultural diversity. Spanish, Mexican, and Anglo-American periods. The mission system.

Same as: HISTORY 250A, NATIVEAM 117S.

**CSRE 121X. Hip Hop, Youth Identities, and the Politics of Language. 3-4 Units.**

Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

Same as: AFRICAAM 121X, AMSTUD 121X, ANTHRO 121A, EDUC 121X, LINGUIST 155.

**CSRE 122E. Art in the Streets: Identity in Murals, Site-specific works, and Interventions in Public Spaces. 4 Units.**

This class will introduce students to both historical and contemporary public art practices and the expression of race and identity through murals, graffiti, site-specific works and performative interventions in public spaces. Involving lectures, guest speakers, field trips, and hands-on art practice, students will be expected to produce both an individual and group piece as a final project.

Same as: ARTSTUDI 122E.

**CSRE 127A. Can't Stop Won't Stop: A History Of The Hip-Hop Arts. 4 Units.**

This course explores the history and development of the hip-hop arts movement, from its precursor movements in music, dance, visual arts, literature, and folk and street cultures to its rise as a neighborhood subculture in the Bronx in the early 1970s through its local, regional and global expansion and development. Hip-hop aesthetics, structures, and politics will be explored within the context of the movement's rise as a post-multicultural form in an era of neoliberal globalization.

Same as: AFRICAAM 127A.

**CSRE 127B. The Pleasure Principle: A Post-Hip Hop Search for a Black Feminist Politics of Pleasure. 3 Units.**

This course explores the various articulations of a politics of pleasure in black feminist thought. We will examine classic black feminist texts on respectability politics, the erotic, hip-hop feminism and dancehall culture, geared toward helping students develop a critical lens for interrogating depictions of black female sexuality and articulations of pleasure in popular culture. Examples include *The Cosby Show*, *Sex in the City*, *Girlfriends*, *Basketball Wives*, *Real Housewives of Atlanta*, *Pariah*, as well as the works of Beyoncé, Rihanna, Nicki Minaj, Tanya Stephens, and Lady Saw. The course will culminate with multimedia student-produced texts that represent their own articulations of a politics of pleasure. Students will discuss their ideas as part of a campus wide symposium that will include a panel of black feminist scholars/thinkers who are also deeply invested in theorizing a politics of pleasure and creating safe erotic spaces for black and brown bodies.

**CSRE 135H. Conversations in CSRE: Case Studies in the Stanford Community. 1-2 Units.**

Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.  
Same as: ANTHRO 135H.

**CSRE 135I. CSRE House Seminar: Race and Ethnicity at Stanford. 1-2 Units.**

Race, ethnicity, gender, and religion using the tools, analytical skills and concepts developed by anthropologists.  
Same as: ANTHRO 135I.

**CSRE 142. The Literature of the Americas. 5 Units.**

A wide-ranging overview of the literatures of the Americas in comparative perspective, emphasizing continuities and crises that are common to North American, Central American, and South American literatures as well as the distinctive national and cultural elements of a diverse array of primary works. Topics include the definitions of such concepts as empire and colonialism, the encounters between worldviews of European and indigenous peoples, the emergence of creole and racially mixed populations, slavery, the New World voice, myths of America as paradise or utopia, the coming of modernism, twentieth-century avant-gardes, and distinctive modern episodes--the Harlem Renaissance, the Beats, magic realism, Noigandres--in unaccustomed conversation with each other.  
Same as: AMSTUD 142, COMPLIT 142, ENGLISH 172E.

**CSRE 142A. What is Hemispheric Studies?. 5 Units.**

Will attempt to open up "America," beyond the United States. Have we reached the end of an era in our national literary imaginations? What is the utility and durability of the idea of the nation in a global era? New developments in hemispheric, Black Atlantic, and trans-american studies have raised questions about the very viability of US literary studies. Should we, as Franco Moretti suggests, map, count, and graph the relationships in our close (rhetorical) and "distant" readings of texts in the Americas? Topics include the definitions of concepts such as coloniality, modernity, time and the colonial difference, the encounters between world views of Europeans and indigenous Native American peoples, and the inventions of America, Latinamericanism, and Americanness.  
Same as: COMPLIT 142A.

**CSRE 145. Race and Ethnic Relations in the USA. 5 Units.**

(Graduate students register for 245.) Race and ethnic relations in the U.S. and elsewhere. The processes that render ethnic and racial boundary markers, such as skin color, language, and culture, salient in interaction situations. Why only some groups become targets of ethnic attacks. The social dynamics of ethnic hostility and ethnic/racial protest movements.  
Same as: SOC 145, SOC 245.

**CSRE 146. Community Matters: Research and Service with Community Organizations. 2 Units.**

Methods and principles for academic research in community settings for students preparing to enter summer experiences with community organizations. Case studies and tools to help students conceptualize a research strategy. Students develop a memorandum of understanding in collaboration with the community agency to define the work, relationship, and mutual benefit of the research partnership.

**CSRE 146S. Asian American Culture and Community. 3-5 Units.**

An examination of the history, art and culture of Vietnamese Americans, and their contemporary experiences in the South Bay. The course will combine in-class learning with a major conference featuring prominent artists and scholars on the Vietnamese Diasporic community. A service learning component requires community work at a service organization in San Jose. Service Learning Course (certified by Haas Center). Course can be repeated once.

Same as: AMSTUD 146, ASNAMST 146S, COMPLIT 146.

**CSRE 148. Comparative Ethnic Conflict. 5 Units.**

Causes and consequences of racial and ethnic conflict, including nationalist movements, ethnic genocide, civil war, ethnic separatism, politics, indigenous peoples' movements, and minority rights movements around the world.

Same as: SOC 148, SOC 248.

**CSRE 162. Women in Modern America. 4-5 Units.**

The transformation from the New Woman of the 1890s to the New Woman of the 1990s; attention to immigrant, black, and white women, both historical analyses and personal accounts. Topics include: workforce participation; family and reproductive labor; educational and professional opportunities; the impact of wars, economic depression, and popular culture; and recurrent feminist movements.

Same as: AMSTUD 161, HISTORY 161.

**CSRE 166B. Immigration Debates in America, Past and Present. 3-5 Units.**

Examines the ways in which the immigration of people from around the world and migration within the United States shaped American nation-building and ideas about national identity in the twentieth century. Focuses on how conflicting ideas about race, gender, ethnicity, and citizenship with respect to particular groups led to policies both of exclusion and integration. Part One begins with the ways in which the American views of race and citizenship in the colonial period through the post-Reconstruction Era led to the passage of the Chinese Exclusion Act in 1882 and subsequently to broader exclusions of immigrants from other parts of Asia, Southern and Eastern Europe, and Mexico. Explores how World War II and the Cold War challenged racial ideologies and led to policies of increasing liberalization culminating in the passage of the 1965 Immigration Act, which eliminated quotas based on national origins and opened the door for new waves of immigrants, especially from Asia and Latin America. Part Two considers new immigration patterns after 1965, including those of refugees, and investigates the contemporary debate over immigration and immigration policy in the post 9/11 era as well as inequalities within the system and the impact of foreign policy on exclusions and inclusions.

Same as: HISTORY 166B, HISTORY 366B.

**CSRE 174S. When Half is Whole: Developing Synergistic Identities and Mestiza Consciousness. 5 Units.**

This is an exploration of the ways in which individuals construct whole selves in societies that fragment, label, and bind us in categories and boxes. We examine identities that overcome the destructive dichotomies of *us* and *them*, *crossing* borders of race, ethnicity, culture, nation, sex, and gender. Our focus is on the development of hybrid and synergistic forms of identity and mestiza consciousness in which the whole is greater than the sum of its parts.

Same as: ASNAMST 174S.

**CSRE 177. Writing for Performance: The Fundamentals. 5 Units.**

Course introduces students to the basic elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis and others. Table readings of one-act length work required by quarter's end.

Same as: TAPS 177, TAPS 277.

**CSRE 177B. Introduction to Dance on the Global Stage. 4 Units.**

The course will examine and engage with dance cultures from around the world. Through historical and theoretical readings, film screenings, and viewing performances, this course aims to introduce students to a number of theoretical issues central to the study of dance across various disciplines. As a class we set out to explore how dance is more than a set of organized bodily movements, pleasurable to both do and watch. We will consider what cultural work dance performance accomplishes in the world.

Same as: DANCE 177.

**CSRE 179. Asian American Experiences and Documentary Practice. 5 Units.**

Focus is on documentary cinema as a technology for understanding Asian Americans in the U.S. The social and historical context of the formation of the Asian American filmmaker, an authorial position that emerges in the 60s and 70s as part of the civil rights movement. Works include films by Loni Ding, Bob Nakamura and Curtis Choy; readings about the establishment of Asian American media industries and Asian American film criticism as a multi-genre. Social issue documentaries that represent new ethnographies of social experience including transnational adoption (Daughter From Danang), refugee experience (AKA Don Bonus), and sex tourism (The Women Outside). Readings include analyses of the implications of these works for cinema studies, ethnic studies, and the politics of film in everyday life. Experimental documentaries and their interrogation of the limits of the documentary form in representing identities and social problems. How does representation matter within and for Asian America in framing the complexities of race and racial identity? Screenings include works by Marlon Fuentes, Rea Tajiri and Trinh T. Minh-ha.

Same as: ASNAMST 179, FILMSTUD 279.

**CSRE 179C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop. 3-5 Units.**

This course emphasizes the study and practice of personal memoir writing and literary journalism. The class will explore those writings that contain a public and private story, navigating an intimate and institutional world. Student writers will serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what the facts can offer.

Same as: CSRE 279C, TAPS 179C, TAPS 279C.

**CSRE 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America. 3-5 Units.**

This "gateway" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

Same as: CSRE 279G, TAPS 179G, TAPS 279G.

**CSRE 183. Border Crossings and American Identities. 5 Units.**

How novelists, filmmakers, and poets perceive racial, ethnic, gender, sexual preference, and class borders in the context of a national discussion about the place of Americans in the world. How Anna Deavere Smith, Sherman Alexie, or Michael Moore consider redrawing such lines so that center and margin, or self and other, do not remain fixed and divided. How linguistic borderlines within multilingual literature by Caribbean, Arab, and Asian Americans function. Can Anzaldúa's conception of borderlands be constructed through the matrix of language, dreams, music, and cultural memories in these American narratives? Course includes examining one's own identity.

Same as: AMSTUD 183.

**CSRE 189W. Language and Minority Rights. 3 Units.**

Language as it is implicated in migration and globalization. The effects of globalization processes on languages, the complexity of language use in migrant and indigenous minority contexts, the connectedness of today's societies brought about by the development of communication technologies. Individual and societal multilingualism; preservation and revival of endangered languages.

Same as: CHILATST 189W, EDUC 189X.

**CSRE 192E. Topics in the History of Sexuality: Sexual Violence. 4-5 Units.**

Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.

Same as: AMSTUD 258, FEMST 258, FEMST 358, HISTORY 258, HISTORY 358.

**CSRE 196C. Introduction to Comparative Studies in Race and Ethnicity. 5 Units.**

How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows.

Same as: ANTHRO 33, ENGLISH 172D, PSYCH 155, SOC 146.

**CSRE 198. Internship for Public Service. 1-5 Units.**

Restricted to CSRE comparative studies majors with a concentration in public service. Students consult with the CSRE undergraduate program director and CSRE affiliated faculty to develop an internship. Group meetings. May be repeated for credit. Service Learning Course (certified by Haas Center).

**CSRE 199. Pre-Honors Seminar. 1-2 Units.**

For students interested in writing a senior honors thesis. Conceptualizing and defining a manageable honors project, conducting interdisciplinary research, the parameters of a literature review essay, and how to identify a faculty adviser.

**CSRE 200. Latin@ Literature. 3-5 Units.**

Examines a diverse set of narratives by U.S. Latin@s of Mexican, Puerto Rican, Cuban, Guatemalan, and Dominican heritage through the lens of *latinidad*. All share the historical experience of Spanish colonization and U.S. imperialism, yet their im/migration patterns differ, affecting social, cultural, and political trajectories in the US and relationships to "home" and "homeland," nation, diaspora, history, and memory. Explores how racialization informs genders as well as sexualities. Emphasis on textual analysis. Taught in English.

Same as: CHILATST 200, ILAC 280, ILAC 382.

**CSRE 200R. Directed Research. 1-5 Units.****CSRE 200W. Directed Reading. 1-5 Units.**

**CSRE 200X. CSRE Senior Seminar. 5 Units.**

Required for CSRE-related students, including those who opt to write honors theses in other departments and programs. Research and the writing of the senior honors thesis or senior paper under the supervision of a faculty project adviser. The process of research including conceptualization, development of prospectus, development of theses, research, analysis, and writing.

**CSRE 200Y. CSRE Senior Honors Research. 1-10 Units.****CSRE 200Z. CSRE Senior Honors Research. 1-10 Units.****CSRE 201B. From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era. 5 Units.**

How creative projects build and strengthen communities of common concern. Projects focus on cultural reclamation, multiculturalism, cultural equity and contemporary cultural wars, media literacy, independent film, and community-based art. Guest artists and organizers, films, and case studies.

Same as: CHILATST 201B.

**CSRE 201C. Critical Concepts in Chican@ Literature. 3-5 Units.**

Combines primary texts of Chican@ literature with a metacritical interrogation of key concepts informing Chican@ literary criticism, the construction of Chican@ literary history, and a Chican@ literary canon. Interrogates the resistance paradigm and the "proper" subject of this literature, and critiques established genealogies and foundational authors and texts, as well as issues of periodization, including the notion of "emergence" (e.g. of feminist voices or dissident sexualities). Considers texts, authors and subjects that present alternatives to the resistance paradigm.

Same as: CHILATST 201C, ILAC 380E.

**CSRE 203A. The Changing Face of America: Civil Rights and Education Strategies for the 21st Century. 5 Units.**

For students with leadership potential who have studied these topics in lecture format. Race discrimination strategies, their relation to education reform initiatives, and the role of media in shaping racial attitudes in the U.S.

**CSRE 216X. Education, Race, and Inequality in African American History, 1880-1990. 3-5 Units.**

Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis.

Same as: EDUC 216X, HISTORY 255E.

**CSRE 220. Public Policy Institute. 3-5 Units.**

Public Policy Institute serves to: provide students with information and perspectives on important public policy issues that have particular relevancy to matters of race and ethnicity in American society, past and present; expose students to faculty and other professionals working on public policy-related issues; and provide insight into the legislative process of public policy making at the state and local levels. Students are expected to conduct research necessary to write a policy brief on a particular issue, and make a presentation based on the policy brief. A field trip to Sacramento introduces students to policymakers and current policy matters of importance to marginalized communities in California.

**CSRE 226. Race and Racism in American Politics. 5 Units.**

Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.

Same as: AMSTUD 226, POLISCI 226, POLISCI 326.

**CSRE 233A. Counseling Theories and Interventions from a Multicultural Perspective. 3-5 Units.**

In an era of globalization characterized by widespread migration and cultural contacts, professionals face a unique challenge: How does one practice successfully when working with clients/students from so many different backgrounds? This course focuses upon the need to examine, conceptualize, and work with individuals according to the multiple ways in which they identify themselves. It will systematically examine multicultural counseling concepts, issues, and research. Literature on counselor and client characteristics such as social status or race/ethnicity and their effects on the counseling process and outcome will be reviewed. Issues in consultation with culturally and linguistically diverse parents and students and work with migrant children and their families are but a few of the topics covered in this course.

Same as: AFRICAAM 233A, EDUC 233A.

**CSRE 235. Nation in Motion: Film, Race, and Immigration in Contemporary French Cinema. 3-5 Units.**

An examination of the current debates in France regarding national identity, secularism, and the integration of immigrants, notably from the former colonies. Course confronts films' and other media's visual and discursive rhetorical strategies used to represent ethnic or religious minorities, discrimination, citizens' resistance to government policies, inter-racial marriages, or women's rights within immigrant communities. By embodying such themes in stories of love, hardships, or solidarity, the motion pictures make the movements and emotions inherent to immigration tangible: to what effect? Taught in English. Films in French with English subtitles. Consent of instructor for undergraduates.

Same as: FRENCH 235, FRENCH 335.

**CSRE 245. Understanding Racial and Ethnic Identity Development. 3-5 Units.**

African American, Native American, Mexican American, and Asian American racial and ethnic identity development; the influence of social, political and psychological forces in shaping the experience of people of color in the U.S. The importance of race in relationship to social identity variables including gender, class, and occupational, generational, and regional identifications. Bi- and multiracial identity status, and types of white racial consciousness.

Same as: AFRICAAM 245, EDUC 245.

**CSRE 255D. Racial Identity in the American Imagination. 4-5 Units.**

Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music.

Same as: AFRICAAM 255, AMSTUD 255D, HISTORY 255D, HISTORY 355D.

**CSRE 260. California's Minority-Majority Cities. 4-5 Units.**

Historical development and the social, cultural, and political issues that characterize large cities and suburbs where communities of color make up majority populations. Case studies include cities in Los Angeles, Santa Clara, and Monterey counties. Comparisons to minority-majority cities elsewhere in the U.S. Service Learning Course (certified by Haas Center).

Same as: HISTORY 260.

**CSRE 279C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop. 3-5 Units.**

This course emphasizes the study and practice of personal memoir writing and literary journalism. The class will explore those writings that contain a public and private story, navigating an intimate and institutional world. Student writers will serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what the facts can offer.

Same as: CSRE 179C, TAPS 179C, TAPS 279C.

**CSRE 279G. Indigenous Identity in Diaspora: People of Color Art Practice in North America. 3-5 Units.**

This "gateway" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

Same as: CSRE 179G, TAPS 179G, TAPS 279G.

**CSRE 289E. Queer of Color Critique: Race, Sex, Gender in Cultural Representations. 3-5 Units.**

Examines major questions and issues that arise in considering race, sex, and gender together. Focus on critical and theoretical texts queering ethnic and diaspora studies and bringing race and ethnicity into queer studies. Close reading of texts in a variety of media negotiating racialized sexualities and sexualized identities. How is desire racialized? How is racial difference produced through sex acts? How to reconcile pleasure and desire with histories of imperialism and (neo)colonialism and structures of power?

Same as: FEMST 389E, ILAC 389E.

## Computational Mathematical Engineering Courses

**CME 100. Vector Calculus for Engineers. 5 Units.**

Computation and visualization using MATLAB. Differential vector calculus: analytic geometry in space, functions of several variables, partial derivatives, gradient, unconstrained maxima and minima, Lagrange multipliers. Integral vector calculus: multiple integrals in Cartesian, cylindrical, and spherical coordinates, line integrals, scalar potential, surface integrals, Green's, divergence, and Stokes' theorems. Examples and applications drawn from various engineering fields. Prerequisites: MATH 41 and 42, or 10 units AP credit.

Same as: ENGR 154.

**CME 100A. Vector Calculus for Engineers, ACE. 6 Units.**

Students attend CME100/ENGR154 lectures with additional recitation sessions; two to four hours per week, emphasizing engineering mathematical applications and collaboration methods. Enrollment by department permission only. Prerequisite: application at: [http://soe.stanford.edu/current\\_students/edp/programs/ace.html](http://soe.stanford.edu/current_students/edp/programs/ace.html).

**CME 102. Ordinary Differential Equations for Engineers. 5 Units.**

Analytical and numerical methods for solving ordinary differential equations arising in engineering applications: Solution of initial and boundary value problems, series solutions, Laplace transforms, and non-linear equations; numerical methods for solving ordinary differential equations, accuracy of numerical methods, linear stability theory, finite differences. Introduction to MATLAB programming as a basic tool kit for computations. Problems from various engineering fields. Prerequisite: CME 100/ENGR 154 or MATH 51.

Same as: ENGR 155A.

**CME 102A. Ordinary Differential Equations for Engineers, ACE. 6 Units.**

Students attend CME102/ENGR155A lectures with additional recitation sessions; two to four hours per week, emphasizing engineering mathematical applications and collaboration methods. Prerequisite: application at: [http://soe.stanford.edu/current\\_students/edp/programs/ace.html](http://soe.stanford.edu/current_students/edp/programs/ace.html).

**CME 104. Linear Algebra and Partial Differential Equations for Engineers. 5 Units.**

Linear algebra: matrix operations, systems of algebraic equations, Gaussian elimination, undetermined and overdetermined systems, coupled systems of ordinary differential equations, eigensystem analysis, normal modes. Fourier series with applications, partial differential equations arising in science and engineering, analytical solutions of partial differential equations. Numerical methods for solution of partial differential equations: iterative techniques, stability and convergence, time advancement, implicit methods, von Neumann stability analysis. Examples and applications from various engineering fields. Prerequisite: CME 102/ENGR 155A.

Same as: ENGR 155B.

**CME 104A. Linear Algebra and Partial Differential Equations for Engineers, ACE. 6 Units.**

Students attend CME104/ENGR155B lectures with additional recitation sessions; two to four hours per week, emphasizing engineering mathematical applications and collaboration methods. Prerequisite: application at: [http://soe.stanford.edu/current\\_students/edp/programs/ace.html](http://soe.stanford.edu/current_students/edp/programs/ace.html).

**CME 106. Introduction to Probability and Statistics for Engineers. 3-4 Units.**

Probability: random variables, independence, and conditional probability; discrete and continuous distributions, moments, distributions of several random variables. Topics in mathematical statistics: random sampling, point estimation, confidence intervals, hypothesis testing, non-parametric tests, regression and correlation analyses; applications in engineering, industrial manufacturing, medicine, biology, and other fields. Prerequisite: CME 100/ENGR154 or MATH 51.

Same as: ENGR 155C.

**CME 108. Introduction to Scientific Computing. 3-4 Units.**

Introduction to Scientific Computing Numerical computation for mathematical, computational, physical sciences and engineering: error analysis, floating-point arithmetic, nonlinear equations, numerical solution of systems of algebraic equations, banded matrices, least squares, unconstrained optimization, polynomial interpolation, numerical differentiation and integration, numerical solution of ordinary differential equations, truncation error, numerical stability for time dependent problems and stiffness. Implementation of numerical methods in MATLAB programming assignments. Prerequisites: MATH 51, 52, 53; prior programming experience (MATLAB or other language at level of CS 106A or higher).

**CME 192. Introduction to MATLAB. 1 Unit.**

This short course runs for the first three weeks of the quarter and is offered each quarter during the academic year. It is highly recommended for students with no prior programming experience who are expected to use MATLAB in math, science, or engineering courses. It will consist of interactive lectures and application-based assignments. The goal of the short course is to make students fluent in MATLAB and to provide familiarity with its wide array of features. The course covers an introduction of basic programming concepts, data structures, and control/flow; and an introduction to scientific computing in MATLAB, scripts, functions, visualization, simulation, efficient algorithm implementation, toolboxes, and more.

**CME 200. Linear Algebra with Application to Engineering Computations. 3 Units.**

Computer based solution of systems of algebraic equations obtained from engineering problems and eigen-system analysis, Gaussian elimination, effect of round-off error, operation counts, banded matrices arising from discretization of differential equations, ill-conditioned matrices, matrix theory, least square solution of unsolvable systems, solution of non-linear algebraic equations, eigenvalues and eigenvectors, similar matrices, unitary and Hermitian matrices, positive definiteness, Cayley-Hamilton theory and function of a matrix and iterative methods. Prerequisite: familiarity with computer programming, and MATH104, 113, or equivalent. Same as: ME 300A.

**CME 204. Partial Differential Equations in Engineering. 3 Units.**

Geometric interpretation of partial differential equation (PDE) characteristics; solution of first order PDEs and classification of second-order PDEs; self-similarity; separation of variables as applied to parabolic, hyperbolic, and elliptic PDEs; special functions; eigenfunction expansions; the method of characteristics. If time permits, Fourier integrals and transforms, Laplace transforms. Prerequisite: CME 200/ME 300A, equivalent, or consent of instructor. Same as: ME 300B.

**CME 206. Introduction to Numerical Methods for Engineering. 3 Units.**

Numerical methods from a user's point of view. Lagrange interpolation, splines. Integration: trapezoid, Romberg, Gauss, adaptive quadrature; numerical solution of ordinary differential equations: explicit and implicit methods, multistep methods, Runge-Kutta and predictor-corrector methods, boundary value problems, eigenvalue problems; systems of differential equations, stiffness. Emphasis is on analysis of numerical methods for accuracy, stability, and convergence. Introduction to numerical solutions of partial differential equations; Von Neumann stability analysis; alternating direction implicit methods and nonlinear equations. Prerequisites: CME 200/ME 300A, CME 204/ME 300B. Same as: AA 214A, ME 300C.

**CME 211. Introduction to Programming for Scientists and Engineers. 3 Units.**

Basic usage of the Python and C/C++ programming languages are introduced and used to solve representative computational problems from various science and engineering disciplines. Software design principles including time and space complexity analysis, data structures, object-oriented design, decomposition, encapsulation, and modularity are emphasized. Usage of ICME and campus wide Linux compute resources: login, file system navigation, editing files, compiling and linking, file transfer, etc. Versioning and revision control, software build utilities, and the LaTeX typesetting software are introduced and used to help complete individual programming assignments and a group project. Same as: EARTHSCI 211.

**CME 212. Advanced Programming for Scientists and Engineers. 3 Units.**

Advanced topics in software programming, debugging, and performance optimization are covered. The capabilities and usage of common libraries and frameworks such as BLAS, LAPACK, FFT, PETSc, and MKL/ACML are reviewed. Computer representation of integer and floating point numbers, and interoperability between C/C++ and Fortran is described. More advanced software engineering topics including: representing data in files, application checkpoint/restart, signals, unit and regression testing, and build automation. The use of debugging tools including static analysis, gdb, and Valgrind are introduced. An introduction to computer architecture covering processors, memory hierarchy, storage, and networking provides a foundation for understanding software performance. Profiles generated using gprof and OProfile, are used to help guide the performance optimization process. Computational problems from various science and engineering disciplines will be used in individual and group assignments. Prerequisites: CME 200/ME 300A; and CME 211 or CS 106X or equivalent level of programming proficiency in C/C++. Relevant courses: CS140, CS143, CS240 and EE282. Same as: ENERGY 212.

**CME 213. Introduction to parallel computing using MPI, openMP, and CUDA. 3 Units.**

This class will give hands on experience with programming multicore processors, graphics processing units (GPU), and parallel computers. Focus will be on the message passing interface (MPI, parallel clusters) and the compute unified device architecture (CUDA, GPU). Topics will include: network topologies, modeling communication times, collective communication operations, parallel efficiency, MPI, dense linear algebra using MPI. Symmetric multiprocessing (SMP), pthreads, openMP. CUDA, combining MPI and CUDA, dense linear algebra using CUDA, sort, reduce and scan using CUDA. Pre-requisites include: C programming language and numerical algorithms (solution of differential equations, linear algebra, Fourier transforms). Same as: ME 339.

**CME 213B. Parallel Computing Group Projects. 1 Unitss.**

Students in groups of up to four will discuss, devise and implement a cluster/GPU parallel application for a discipline of mutual interest. Instructors will help guide students to relevant literature and resources. Prerequisites: Current or previous enrollment in CME 213 or equivalent background.

**CME 215A. Advanced Computational Fluid Dynamics. 3 Units.**

High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent. Same as: AA 215A.

**CME 215B. Advanced Computational Fluid Dynamics. 3 Units.**

High resolution schemes for capturing shock waves and contact discontinuities; upwinding and artificial diffusion; LED and TVD concepts; alternative flow splittings; numerical shock structure. Discretization of Euler and Navier Stokes equations on unstructured meshes; the relationship between finite volume and finite element methods. Time discretization; explicit and implicit schemes; acceleration of steady state calculations; residual averaging; math grid preconditioning. Automatic design; inverse problems and aerodynamic shape optimization via adjoint methods. Pre- or corequisite: 214B or equivalent. Same as: AA 215B.



**CME 263. Introduction to Linear Dynamical Systems. 3 Units.**

Applied linear algebra and linear dynamical systems with application to circuits, signal processing, communications, and control systems. Topics: least-squares approximations of over-determined equations and least-norm solutions of underdetermined equations. Symmetric matrices, matrix norm, and singular value decomposition. Eigenvalues, left and right eigenvectors, with dynamical interpretation. Matrix exponential, stability, and asymptotic behavior. Multi-input/multi-output systems, impulse and step matrices; convolution and transfer matrix descriptions. Control, reachability, and state transfer; observability and least-squares state estimation. Prerequisites: linear algebra and matrices as in MATH 103; differential equations and Laplace transforms as in EE 102A. Same as: EE 263.

**CME 291. Master's Research. 1-5 Units.**

Students require faculty sponsor. (Staff).

**CME 300. Departmental Seminar Series. 1 Unitss.**

Required for first-year ICME Ph.D. students; recommended for first-year ICME M.S. students. Presentations about research at Stanford by faculty and researchers from Engineering, H&S, and organizations external to Stanford. May be repeated for credit.

**CME 302. Numerical Linear Algebra. 3 Units.**

First in a three quarter graduate sequence. Solution of systems of linear equations: direct methods, error analysis, structured matrices; iterative methods and least squares. Parallel techniques. Prerequisites: CME 108, MATH 103 or 113.

**CME 303. Partial Differential Equations of Applied Mathematics. 3 Units.**

First-order partial differential equations; method of characteristics; weak solutions; elliptic, parabolic, and hyperbolic equations; Fourier transform; Fourier series; and eigenvalue problems. Prerequisite: foundation in multivariable calculus and ordinary differential equations. Same as: MATH 220.

**CME 304. Numerical Optimization. 3 Units.**

Solution of nonlinear equations; unconstrained optimization; linear programming; quadratic programming; global optimization; general linearly and nonlinearly constrained optimization. Theory and algorithms to solve these problems. Prerequisite: background in analysis and numerical linear algebra. Same as: MSE 315.

**CME 305. Discrete Mathematics and Algorithms. 3 Units.**

Topics: enumeration such as Cayley's theorem and Prufer codes, SDR, flows and cuts (deterministic and randomized algorithms), probabilistic methods and random graphs, asymptotics (NP-hardness and approximation algorithms). Topics illustrated with EE, CS, and bioinformatics applications. Prerequisites: MATH 51 or 103 or equivalents. Same as: MSE 316.

**CME 306. Numerical Solution of Partial Differential Equations. 3 Units.**

Hyperbolic partial differential equations: stability, convergence and qualitative properties; nonlinear hyperbolic equations and systems; combined solution methods from elliptic, parabolic, and hyperbolic problems. Examples include: Burger's equation, Euler equations for compressible flow, Navier-Stokes equations for incompressible flow. Prerequisites: MATH 220A or CME 302. Same as: MATH 226.

**CME 308. Stochastic Methods in Engineering. 3 Units.**

Review of basic probability; Monte Carlo simulation; state space models and time series; parameter estimation, prediction, and filtering; Markov chains and processes; stochastic control; and stochastic differential equations. Examples from various engineering disciplines. Prerequisites: exposure to probability; background in real variables and analysis. Same as: MATH 228.

**CME 309. Randomized Algorithms. 3 Units.**

Design and analysis of algorithms that use randomness to guide their computations. Topics include: basic tools, from probability theory and probabilistic analysis that are recurrent in algorithmic applications; randomized complexity theory and game-theoretic techniques; algebraic techniques, probability amplification and derandomization. Applications: sorting and searching, data structures, combinatorial optimization and graph algorithms, geometric algorithms and linear programming, approximation and counting problems, similarity search and metric embeddings, online algorithms. Prerequisites: CS 161 and STAT 116, or equivalents and instructor consent. Same as: CS 365.

**CME 321A. Mathematical Methods of Imaging. 3 Units.**

Image denoising and deblurring with optimization and partial differential equations methods. Imaging functionals based on total variation and l-1 minimization. Fast algorithms and their implementation. Same as: MATH 221A.

**CME 321B. Mathematical Methods of Imaging. 3 Units.**

Array imaging using Kirchhoff migration and beamforming, resolution theory for broad and narrow band array imaging in homogeneous media, topics in high-frequency, variable background imaging with velocity estimation, interferometric imaging methods, the role of noise and inhomogeneities, and variational problems that arise in optimizing the performance of array imaging algorithms. Same as: MATH 221B.

**CME 322. Spectral Methods in Computational Physics. 3 Units.**

Data analysis, spectra and correlations, sampling theorem, nonperiodic data, and windowing; spectral methods for numerical solution of partial differential equations; accuracy and computational cost; fast Fourier transform, Galerkin, collocation, and Tau methods; spectral and pseudospectral methods based on Fourier series and eigenfunctions of singular Sturm-Liouville problems; Chebyshev, Legendre, and Laguerre representations; convergence of eigenfunction expansions; discontinuities and Gibbs phenomenon; aliasing errors and control; efficient implementation of spectral methods; spectral methods for complicated domains; time differencing and numerical stability. Same as: ME 408.

**CME 325. Numerical Approximations of Partial Differential Equations in Theory and Practice. 1-2 Units.**

Finite volume and finite difference methods for initial boundary value problems in multiple space dimensions. Emphasis is on formulation of boundary conditions for the continuous and the discrete problems. Analysis of numerical methods with respect to stability, accuracy, and error behavior. Techniques of treating non-rectangular domains, and effects of non-regular grids.

**CME 326. Numerical Methods for Initial Boundary Value Problems. 3 Units.**

Initial boundary value problems model many phenomena in engineering and science such as, fluid flow problems, wave propagation, fluid-structure interaction, conjugate heat transfer and financial mathematics. We discuss numerical techniques for such simulations and focus on the underlying principles and theoretical understanding. Emphasis is on stability, convergence and efficiency for methods applied to hyperbolic and parabolic initial boundary value problems.

**CME 327. Numerical Methods for Stiff Problems. 3 Units.**

Focus is on analysis of numerical techniques for stiff ordinary differential equations, including those resulting from spatial discretization of partial differential equations. Topics include stiffness, convergence, stability, adaptive time stepping, implicit time-stepping methods (SDIRK, Rosenbrock), linear and nonlinear system solvers (Fixed Point, Newton, Multigrid, Krylov subspace methods) and preconditioning. Pre-requisites: CME200/ME300A or equivalent; or consent of instructor.

**CME 328. Advanced Topics in Partial Differential Equations. 3 Units.**

Contents change each time and is taught as a topics course, most likely by a faculty member visiting from another institution. May be repeated for credit. Topic in 2012-13: numerical solution of time-dependent partial differential equations is a fundamental tool for modeling and prediction in many areas of science and engineering. In this course we explore the stability, accuracy, efficiency, and appropriateness of specialized temporal integration strategies for different classes of partial differential equations including stiff problems and fully implicit methods, operator splitting and semi-implicit methods, extrapolation methods, multirate time integration, multi-physics problems, symplectic integration, and temporal parallelism. Prerequisites: recommended CME303 and 306 or with instructor's consent.

**CME 330. Applied Mathematics in the Chemical and Biological Sciences. 3 Units.**

Mathematical solution methods via applied problems including chemical reaction sequences, mass and heat transfer in chemical reactors, quantum mechanics, fluid mechanics of reacting systems, and chromatography. Topics include generalized vector space theory, linear operator theory with eigenvalue methods, phase plane methods, perturbation theory (regular and singular), solution of parabolic and elliptic partial differential equations, and transform methods (Laplace and Fourier). Prerequisites: CME 102/ENGR 155A and CME 104/ENGR 155B, or equivalents. Same as: CHEMENG 300.

**CME 334. Advanced Methods in Numerical Optimization. 3 Units.**

Topics include interior-point methods, relaxation methods for nonlinear discrete optimization, sequential quadratic programming methods, optimal control and decomposition methods. Topic chosen in first class; different topics for individuals or groups possible. Individual or team projects. May be repeated for credit. Same as: MSE 312.

**CME 336. Linear and Conic Optimization with Applications. 3 Units.**

Linear, semidefinite, conic, and convex nonlinear optimization problems as generalizations of classical linear programming. Algorithms include the interior-point, barrier function, and cutting plane methods. Related convex analysis, including the separating hyperplane theorem, Farkas lemma, dual cones, optimality conditions, and conic inequalities. Complexity and/or computation efficiency analysis. Applications to combinatorial optimization, sensor network localization, support vector machine, and graph realization. Prerequisite: MS&E 211 or equivalent. Same as: MSE 314.

**CME 338. Large-Scale Numerical Optimization. 3 Units.**

The main algorithms and software for constrained optimization emphasizing the sparse-matrix methods needed for their implementation. Iterative methods for linear equations and least squares. The simplex method. Basic factorization and updates. Interior methods. The reduced-gradient method, augmented Lagrangian methods, and SQP methods. Prerequisites: Basic numerical linear algebra, including LU, QR, and SVD factorizations, and an interest in MATLAB, sparse-matrix methods, and gradient-based algorithms for constrained optimization. Recommended: MS&E 310, 311, 312, 314, or 315; CME 108, 200, 302, 304, 334, or 335. Same as: MSE 318.

**CME 342. Parallel Methods in Numerical Analysis. 3 Units.**

Emphasis is on techniques for obtaining maximum parallelism in numerical algorithms, especially those occurring when solving matrix problems, partial differential equations, and the subsequent mapping onto the computer. Implementation issues on parallel computers. Topics: parallel architecture, programming models (MPI, GPU Computing with CUDA  $\zeta$  quick review), matrix computations, FFT, fast multiple methods, domain decomposition, graph partitioning, discrete algorithms. Prerequisites: 302 or 200 (ME 300A), 213 or equivalent, or consent of instructor. Recommended: differential equations and knowledge of a high-level programming language such as C or C++ (F90/95 also allowable).

**CME 345. Model Reduction. 3 Units.**

Model reduction is an indispensable tool for computational-based design and optimization, statistical analysis, embedded computing and real-time optimal control. This course presents the basic mathematical theory for projection-based model reduction. Topics include: notions of linear dynamical systems and projection; projection-based model reduction; error analysis; proper orthogonal decomposition; Hankel operator and balancing of a linear dynamical system; balanced truncation method: modal truncation and other reduction methods for linear oscillators; model reduction via moment matching methods based on Krylov subspaces; introduction to model reduction of parametric systems and notions of nonlinear model reduction. Course material is complemented by a balanced set of theoretical, algorithmic and Matlab computer programming assignments. Pre-requisites: CME200 or equivalent, CME 263 or equivalent and basic numerical methods for ODEs.

**CME 356. Engineering Functional Analysis and Finite Elements. 3 Units.**

Concepts in functional analysis to understand models and methods used in simulation and design. Topology, measure, and integration theory to introduce Sobolev spaces. Convergence analysis of finite elements for the generalized Poisson problem. Extensions to convection-diffusion-reaction equations and elasticity. Upwinding. Mixed methods and LBB conditions. Analysis of nonlinear and evolution problems. Prerequisites: 335A,B, CME 200, CME 204, or consent of instructor. Recommended: 333, MATH 171. Same as: ME 412.

**CME 358. Finite Element Method for Fluid Mechanics. 3 Units.**

Mathematical theory of the finite element method for incompressible flows; related computational algorithms and implementation details. Poisson equation; finite element method for simple elliptic problems; notions of mathematical analysis of non-coercive partial differential equations; the inf-sup or Babushka-Brezzi condition and its applications to the Stokes and Darcy problems; presentation of stable mixed finite element methods and corresponding algebraic solvers; stabilization approaches in the context of advection-diffusion equation; numerical solution of the incompressible Navier-Stokes equations by finite element method. Theoretical, computational, and MATLAB computer programming assignments. Prerequisites: foundation in multivariate calculus and ME 335A or equivalent.

**CME 362. An Introduction to Compressed Sensing. 3 Units.**

Compressed sensing is a new data acquisition theory asserting that one can design nonadaptive sampling techniques that condense the information in a compressible signal into a small amount of data. This revelation may change the way engineers think about signal acquisition. Course covers fundamental theoretical ideas, numerical methods in large-scale convex optimization, hardware implementations, connections with statistical estimation in high dimensions, and extensions such as recovery of data matrices from few entries (famous Netflix Prize). Same as: STATS 330.

**CME 364A. Convex Optimization I. 3 Units.**

Convex sets, functions, and optimization problems. The basics of convex analysis and theory of convex programming: optimality conditions, duality theory, theorems of alternative, and applications. Least-squares, linear and quadratic programs, semidefinite programming, and geometric programming. Numerical algorithms for smooth and equality constrained problems; interior-point methods for inequality constrained problems. Applications to signal processing, communications, control, analog and digital circuit design, computational geometry, statistics, machine learning, and mechanical engineering. Prerequisite: linear algebra such as EE263, EE178/278A.

Same as: CS 334A, EE 364A.

**CME 364B. Convex Optimization II. 3 Units.**

Continuation of 364. Subgradient, cutting-plane, and ellipsoid methods. Decentralized convex optimization via primal and dual decomposition. Exploiting problem structure in implementation. Convex relaxations of hard problems. Global optimization via branch and bound. Robust and stochastic optimization. Applications in areas such as control, circuit design, signal processing, and communications. Substantial project. Prerequisite: 364A. Same as: EE 364B.

**CME 390. Curricular Practical Training. 1 Unitss.**

May be repeated three times for credit.

**CME 399. Special Research Topics in Computational and Mathematical Engineering. 1-15 Units.**

Graduate-level research work not related to report, thesis, or dissertation. May be repeated for credit.

**CME 400. Ph.D. Research. 1-15 Units.****CME 444. Computational Consulting. 1-3 Units.**

Advice by graduate students under supervision of ICME faculty. Weekly briefings with faculty adviser and associated faculty to discuss ongoing consultancy projects and evaluate solutions. May be repeated for credit.

**CME 500. Numerical Analysis and Computational and Mathematical Engineering Seminar. 1 Unitss.**

Weekly research lectures by experts from academia, national laboratories, industry, and doctoral students. May be repeated for credit.

**CME 510. Linear Algebra and Optimization Seminar. 1 Unitss.**

Recent developments in numerical linear algebra and numerical optimization. Guest speakers from other institutions and local industry. Goal is to bring together scientists from different theoretical and application fields to solve complex scientific computing problems. May be repeated for credit.

**CME 801. TGR Project. 0 Unit.****CME 802. TGR Dissertation. 0 Unit.**

## Computer Science Courses

**CS 1C. Introduction to Computing at Stanford. 1 Unitss.**

For those with limited experience with computers or who want to learn more about Stanford's computing environment. Topics include: computer maintenance and security, computing resources, Internet privacy, and copyright law. One-hour lecture/demonstration in dormitory clusters prepared and administered weekly by the Resident Computer Consultant (RCC). Final project. Not a programming course.

**CS 1U. Practical Unix. 1 Unitss.**

A practical introduction to using the Unix operating system with a focus on Linux command line skills. Class will consist of video tutorials and weekly hands-on lab sections. The time listed on AXESS is for the first week's logistical meeting only. Topics include: grep and regular expressions, ZSH, Vim and Emacs, basic and advanced GDB features, permissions, working with the file system, revision control, Unix utilities, environment customization, and using Python for shell scripts. Topics may be added, given sufficient interest. Course website: <http://cs1u.stanford.edu>.

**CS 2C. Multimedia Production. 1-2 Units.**

Sound, image and video editing techniques and applications, including understanding file formats and publishing multimedia online. Topics: GarageBand, Photoshop, iMovie, Final Cut Pro, and iDVD. Weekly lecture followed by lab section. Second unit for additional creative production assignments completed outside of class time and Final Project with group. Not a programming course, but will use computer multimedia applications heavily for editing.

**CS 21N. Can Machines Know? Can Machines Feel?. 3 Units.**

Preference to freshmen. Can mental attitudes attributed to people and sometimes to animals, including knowledge, belief, desire, and intention, also be ascribed to machines? Can light sensors have a belief? Can a pool cleaning robot or tax-preparation software have an intention? If not, why not? If yes, what are the rules of such ascription, and do they vary between human beings and machines? Sources include philosophy, neuroscience, computer science, and artificial intelligence. Topics: logic, probability theory, and elements of computation. Students present a paper.

**CS 47N. Computers and the Open Society. 3 Units.**

How online technologies change our lives and the social structure that we live in. Course emphasizes critical analyses of current trends i.e. blogging, social networks, and instant mobile communication. Readings include case studies and analyses of basic principles i.e. privacy, equity and sustainability. Guest speakers who have participated in development of computers and the net will share their experiences and enter into debates on current issues. Students work individually and in small groups to research issues, develop the capacity for critical thinking about them, and use the results as the basis for writing and discussions both in class and on-line.

**CS 73N. The Business of the Internet. 3 Units.**

Preference to freshmen. Issues in Internet history, technology, and public policy are discussed as well as the Internet's impact on commerce, education, government, and health care. Writing for the web. Participants develop a substantial website.

**CS 75N. Cell Phones, Sensors, and You. 3 Units.**

Focuses on the role of cell phones as the first prevalent wearable sensors that gather information about you that can be both useful and potentially harmful. Topics include the state of technology, sociological and privacy implications, potential governmental regulation, etc. Addresses omniscient "big brother" technology including radar guns and the recording devices that led to the Watergate scandal. Students will gather and compile information on topics and come to class ready to discuss and debate with formulated opinions.

**CS 76N. Elections and Technology. 3 Units.**

Freshmen Seminar. Since the disastrous Presidential election in Florida in 2000, problems with and worries about technology in elections have gained increasing attention. Are electronic voting machines secure? Are paper ballots secure? Why can't we just vote over our cell phones or the internet? Should voters have to show identification? How do legislators decide these things? How can technologists be heard? We'll look into these questions as we watch others struggle with them in the 2012 Presidential election.

**CS 77. Interaction Design Basics. 2 Units.**

Reduced version of CS 147, focusing on interaction, not implementation. As an introduction to the methods and principles of designing user interfaces, the course will cover topics such as needfinding, rapid prototyping, visual design, and interface evaluation. In addition to weekly lectures and quizzes, assignments culminate in a final design project consisting of an interactive prototype of a web application. Prerequisites: none.

**CS 101. Introduction to Computing Principles. 3-5 Units.**

Introduces the essential ideas of computing: data representation, algorithms, programming "code", computer hardware, networking, security, and social issues. Students learn how computers work and what they can do through hands-on exercises. In particular, students will see the capabilities and weaknesses of computer systems so they are not mysterious or intimidating. Course features many small programming exercises, although no prior programming experience is assumed or required. CS101 is not a complete programming course such as CS106A. CS101 is effectively an alternative to CS105. A laptop computer is required for the in-class exercises. Limited enrollment.

**CS 103. Mathematical Foundations of Computing. 3-5 Units.**

Mathematical foundations required for computer science, including propositional predicate logic, induction, sets, functions, and relations. Formal language theory, including regular expressions, grammars, finite automata, Turing machines, and NP-completeness. Mathematical rigor, proof techniques, and applications. May not be taken by students who have completed 103A,B or 103X. Prerequisite: 106A or equivalent.

**CS 105. Introduction to Computers. 3-5 Units.**

For non-technical majors. What computers are and how they work. Practical experience in programming. Construction of computer programs and basic design techniques. A survey of Internet technology and the basics of computer hardware. Students in technical fields and students looking to acquire programming skills should take 106A or 106X. Students with prior computer science experience at the level of 106 or above require consent of instructor. Prerequisite: minimal math skills.

**CS 106A. Programming Methodology. 3-5 Units.**

Introduction to the engineering of computer applications emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and testing. Uses the Java programming language. Emphasis is on good programming style and the built-in facilities of the Java language. No prior programming experience required. Same as: ENGR 70A.

**CS 106B. Programming Abstractions. 3-5 Units.**

Abstraction and its relation to programming. Software engineering principles of data abstraction and modularity. Object-oriented programming, fundamental data structures (such as stacks, queues, sets) and data-directed design. Recursion and recursive data structures (linked lists, trees, graphs). Introduction to time and space complexity analysis. Uses the programming language C++ covering its basic facilities. Prerequisite: 106A or equivalent. Same as: ENGR 70B.

**CS 106X. Programming Abstractions (Accelerated). 3-5 Units.**

Intensive version of 106B for students with a strong programming background interested in a rigorous treatment of the topics at an accelerated pace. Additional advanced material and more challenging projects. Prerequisite: excellence in 106A or equivalent, or consent of instructor. Same as: ENGR 70X.

**CS 107. Computer Organization and Systems. 3-5 Units.**

Introduction to the fundamental concepts of computer systems. Explores how computer systems execute programs and manipulate data, working from the C programming language down to the microprocessor. Topics covered include: the C programming language, data representation, machine-level code, computer arithmetic, elements of code compilation, memory organization and management, and performance evaluation and optimization. Prerequisites: 106B or X, or consent of instructor.

**CS 108. Object-Oriented Systems Design. 3-4 Units.**

Software design and construction in the context of large OOP libraries. Taught in Java. Topics: OOP design, design patterns, testing, graphical user interface (GUI) OOP libraries, software engineering strategies, approaches to programming in teams. Prerequisite: 107.

**CS 109. Introduction to Probability for Computer Scientists. 3-5 Units.**

Topics include: counting and combinatorics, random variables, conditional probability, independence, distributions, expectation, point estimation, and limit theorems. Applications of probability in computer science including machine learning and the use of probability in the analysis of algorithms. Prerequisites: 103, 106B or X, MATH 51 or equivalent.

**CS 109L. Statistical Computing with R Laboratory. 1 Unit.**

Supplemental lab to CS109. Introduces the R programming language for statistical computing. Topics include basic facilities of R including mathematical, graphical, and probability functions, building simulations, introductory data fitting and machine learning. Provides exposure to the functional programming paradigm. Corequisite: CS109.

**CS 110. Principles of Computer Systems. 3-5 Units.**

Principles and practice of engineering of computer software and hardware systems. Topics include: techniques for controlling complexity; strong modularity using client-server design, virtual memory, and threads; networks; atomicity and coordination of parallel activities; security, and encryption; and performance optimizations. Prerequisite: 107.

**CS 124. From Languages to Information. 3-4 Units.**

Automated processing of less structured information: human language text and speech, web pages, social networks, genome sequences, with goal of automatically extracting meaning and structure. Methods include: string algorithms, automata and transducers, hidden Markov models, graph algorithms, XML processing. Applications such as information retrieval, text classification, social network models, machine translation, genomic sequence alignment, word meaning extraction, and speech recognition. Prerequisite: CS103, CS107, CS109. Same as: LINGUIST 180, LINGUIST 280.

**CS 140. Operating Systems and Systems Programming. 3-4 Units.**

Operating systems design and implementation. Basic structure; synchronization and communication mechanisms; implementation of processes, process management, scheduling, and protection; memory organization and management, including virtual memory; I/O device management, secondary storage, and file systems. Prerequisite: CS 110.

**CS 142. Web Applications. 3 Units.**

Concepts and techniques used in constructing interactive web applications. Browser-side web facilities such as HTML, cascading stylesheets, javascript, and the document object model. Server-side technologies such as sessions, templates, relational databases, and object-relational mapping. Issues in web security and application scalability. New models of web application deployment. Prerequisites: CS 107 and CS 108.

**CS 143. Compilers. 3-4 Units.**

Principles and practices for design and implementation of compilers and interpreters. Topics: lexical analysis; parsing theory; symbol tables; type systems; scope; semantic analysis; intermediate representations; runtime environments; code generation; and basic program analysis and optimization. Students construct a compiler for a simple object-oriented language during course programming projects. Prerequisites: 103 or 103B, and 107.

**CS 144. Introduction to Computer Networking. 3-4 Units.**

Principles and practice. Structure and components of computer networks, packet switching, layered architectures. Applications: web/http, voice-over-IP, p2p file sharing and socket programming. Reliable transport: TCP/IP, reliable transfer, flow control, and congestion control. The network layer: names and addresses, routing. Local area networks: ethernet and switches. Wireless networks and network security. Prerequisite: CS 110.

**CS 145. Introduction to Databases. 3-4 Units.**

Database design and use of database management systems for applications. The relational model, relational algebra, and SQL, the standard language for creating, querying, and modifying relational databases. XML data including DTDs and XML Schema for validation, and the query and transformation languages XPath, XQuery and XSLT. UML database design, and relational design principles based on functional dependencies and normal forms. Indexes, views, transactions, authorization, integrity constraints, and triggers, and on-line analytical processing (OLAP). Guest speakers from industry and additional advanced topics as time and class interest permits. Prerequisites: 103 and 107 (or equivalent).

**CS 147. Introduction to Human-Computer Interaction Design. 3-4 Units.**

Introduces fundamental methods and principles for designing, implementing, and evaluating user interfaces. Topics: user-centered design, rapid prototyping, experimentation, direct manipulation, cognitive principles, visual design, social software, software tools. Learn by doing: work with a team on a quarter-long design project, supported by lectures, readings, and studios. Prerequisite: 106B or X or equivalent programming experience.

**CS 148. Introduction to Computer Graphics and Imaging. 3-4 Units.**

Topics: Image input and output devices such as cameras and displays, graphics hardware and software, input technologies and interactive techniques, typography and page layout, light and color representations, exposure and tone reproduction, image composition and imaging models, digital signal processing, sampling, aliasing and antialiasing, compression, two- and three-dimensional geometry and formations, modeling techniques including curves and surfaces, reflection models and illumination algorithms, and basic methods of animation. Programming assignments using C++ and OpenGL. Prerequisites: CS 107, MATH 51.

**CS 149. Parallel Computing. 3-4 Units.**

This course is an introduction to parallelism and parallel programming. Most new computer architectures are parallel; programming these machines requires knowledge of the basic issues of and techniques for writing parallel software. Topics: varieties of parallelism in current hardware (e.g., fast networks, multicore, accelerators such as GPUs, vector instruction sets), importance of locality, implicit vs. explicit parallelism, shared vs. non-shared memory, synchronization mechanisms (locking, atomicity, transactions, barriers), and parallel programming models (threads, data parallel/streaming, futures, SPMD, message passing, SIMT, transactions, and nested parallelism). Significant parallel programming assignments will be given as homework. The course is open to students who have completed the introductory CS course sequence through 110 and have taken CS 143.

**CS 154. Introduction to Automata and Complexity Theory. 3-4 Units.**

Regular sets: finite automata, regular expressions, equivalences among notations, methods of proving a language not to be regular. Context-free languages: grammars, pushdown automata, normal forms for grammars, proving languages non-context-free. Turing machines: equivalent forms, undecidability. Nondeterministic Turing machines: properties, the class NP, complete problems for NP, Cook's theorem, reducibilities among problems. Prerequisites: 103 or 103B.

**CS 155. Computer and Network Security. 3 Units.**

For seniors and first-year graduate students. Principles of computer systems security. Attack techniques and how to defend against them. Topics include: network attacks and defenses, operating system holes, application security (web, email, databases), viruses, social engineering attacks, privacy, and digital rights management. Course projects focus on building reliable code. Prerequisite: 140. Recommended: basic Unix.

**CS 157. Logic and Automated Reasoning. 3 Units.**

An elementary exposition from a computational point of view of propositional and predicate logic, axiomatic theories, and theories with equality and induction. Interpretations, models, validity, proof, strategies, and applications. Automated deduction: polarity, skolemization, unification, resolution, equality. Prerequisite: 103 or 103B.

**CS 161. Design and Analysis of Algorithms. 3-5 Units.**

Worst and average case analysis. Recurrences and asymptotics. Efficient algorithms for sorting, searching, and selection. Data structures: binary search trees, heaps, hash tables. Algorithm design techniques: divide-and-conquer, dynamic programming, greedy algorithms, amortized analysis, randomization. Algorithms for fundamental graph problems: minimum-cost spanning tree, connected components, topological sort, and shortest paths. Possible additional topics: network flow, string searching. Prerequisite: 103 or 103B; 109 or STATS 116.

**CS 164. Computing with Physical Objects: Algorithms for Shape and Motion. 3 Units.**

Algorithms and data structures dealing with the representation and manipulation of physical objects and entities in the computer. Computational structures for shape and motion, shape fitting and matching, triangulations and other spatial subdivisions, and low-dimensional search and optimization. Examples relevant to computer graphics, computer vision, robotics and geometric computation emphasizing algorithmic paradigms applicable to multidimensional data. Prerequisites: CS 103 or 103B, and CS 109 or STATS 116, and CS 106B/X or consent of instructor.

**CS 170. Stanford Laptop Orchestra: Composition, Coding, and Performance. 1-5 Units.**

Classroom instantiation of the Stanford Laptop Orchestra (SLOrk) which includes public performances. An ensemble of more than 20 humans, laptops, controllers, and special speaker arrays designed to provide each computer-mediated instrument with its sonic identity and presence. Topics and activities include issues of composing for laptop orchestras, instrument design, sound synthesis, programming, and live performance. May be repeated four times for credit. Same as: MUSIC 128.

**CS 173. A Computational Tour of the Human Genome. 3 Units.**

(Only one of 173 or 273A counts toward any CS degree program.) Introduction to computational biology through an informatic exploration of the human genome. Topics include: genome sequencing; functional landscape of the human genome (genes, gene regulation, repeats, RNA genes, epigenetics); genome evolution (comparative genomics, ultraconservation, co-option). Additional topics may include population genetics, personalized genomics, and ancient DNA. Course includes primers on molecular biology, the UCSC Genome Browser, and text processing languages. Guest lectures on current genomic research topics. Class will be similar in spirit to CS273A, which will not be offered this year. Prerequisites: CS107 or equivalent background in programming.

**CS 178. Digital Photography. 3-5 Units.**

Scientific, artistic, and computing aspects of digital photography. Topics: lenses and optics, light and sensors, optical effects in nature, perspective and depth of field, sampling and noise, the camera as a computing platform, image processing and editing, history of photography, computational photography. Counts as a CS elective in the Graphics track. Prerequisites: introductory calculus; students must have a digital camera with manual control over shutter speed and aperture. Loaner cameras may be available. No programming experience required. GER:DB-EngrAppSci.

**CS 181. Computers, Ethics, and Public Policy. 4 Units.**

(Formerly 201.) Primarily for majors entering computer-related fields. Ethical and social issues related to the development and use of computer technology. Ethical theory, and social, political, and legal considerations. Scenarios in problem areas: privacy, reliability and risks of complex systems, and responsibility of professionals for applications and consequences of their work. Prerequisite: 106B or X.

**CS 181W. Computers, Ethics and Public Policy. 4 Units.**

Writing-intensive version of CS181. Satisfies the WIM requirement for Computer Science and Computer Systems Engineering undergraduates. Same as: WIM.

**CS 191. Senior Project. 1-6 Units.**

Restricted to Computer Science and Computer Systems Engineering students. Group or individual projects under faculty direction. Register using instructor's section number. A project can be either a significant software application or publishable research. Software application projects include substantial programming and modern user-interface technologies and are comparable in scale to shareware programs or commercial applications. Research projects may result in a paper publishable in an academic journal or presentable at a conference. Required public presentation of final application or research results.

**CS 191W. Writing Intensive Senior Project. 3-6 Units.**

Restricted to Computer Science and Computer Systems Engineering students. Writing-intensive version of CS191. Register using the section number of an Academic Council member.

**CS 192. Programming Service Project. 1-4 Units.**

Restricted to Computer Science students. Appropriate academic credit (without financial support) is given for volunteer computer programming work of public benefit and educational value.

**CS 193C. Client-Side Internet Technologies. 3 Units.**

Client-side technologies used to create web sites such as sophisticated Web 2.0 interfaces similar to Google maps. XHTML, CSS, JavaScript, document object model (DOM), AJAX, and Flash. Prerequisite: programming experience at the level of 106A.

**CS 193P. iPhone and iPad Application Programming. 3 Units.**

Tools and APIs required to build applications for the iPhone and iPad platform using the iOS SDK. User interface designs for mobile devices and unique user interactions using multi-touch technologies. Object-oriented design using model-view-controller paradigm, memory management, Objective-C programming language. Other topics include: object-oriented database API, animation, mobile device power management, multi-threading and performance considerations. Prerequisites: C language and object-oriented programming experience at 106B or X level. Recommended: CS107, UNIX, graphics, databases.

**CS 194. Software Project. 3 Units.**

Design, specification, coding, and testing of a significant team programming project under faculty supervision. Documentation includes a detailed proposal. Public demonstration of the project at the end of the quarter. Prerequisites: CS 110 and CS 161.

**CS 194W. Software Project. 3 Units.**

Restricted to Computer Science, Computer Systems Engineering, and Electrical Engineering undergraduates. Writing-intensive version of CS194. Same as: WIM.

**CS 196. Computer Consulting. 2 Units.**

Focus is on Macintosh and Windows operating system maintenance and troubleshooting through hardware and software foundation and concepts. Topics include operating systems, networking, security, troubleshooting methodology with emphasis on Stanford's computing environment. Not a programming course. Prerequisite: 1C or equivalent.

**CS 198. Teaching Computer Science. 3-4 Units.**

Students lead a discussion section of 106A while learning how to teach a programming language at the introductory level. Focus is on teaching skills, techniques, and course specifics. Application and interview required; see <http://cs198.stanford.edu>.

**CS 199. Independent Work. 1-6 Units.**

Special study under faculty direction, usually leading to a written report. Letter grade; if not appropriate, enroll in 199P.

**CS 199P. Independent Work. 1-6 Units.**

(Staff).

**CS 202. Law for Computer Science Professionals. 1 Unitss.**

Intellectual property law as it relates to computer science including copyright registration, patents, and trade secrets; contract issues such as non-disclosure/non-compete agreements, license agreements, and works-made-for-hire; dispute resolution; and principles of business formation and ownership. Emphasis is on topics of current interest such as open source and the free software movement, peer-to-peer sharing, encryption, data mining, and spam.

**CS 204. Computational Law. 3 Units.**

Legal informatics based on representation of regulations in computable form. Encoding regulations facilitate creation of legal information systems with significant practical value. Convergence of technological trends, growth of the Internet, advent of semantic web technology, and progress in computational logic make computational law prospects better. Topics: current state of computational law, prospects and problems, philosophical and legal implications. Prerequisite: basic concepts of programming.

**CS 205A. Mathematical Methods for Robotics, Vision, and Graphics. 3 Units.**

Continuous mathematics background necessary for research in robotics, vision, and graphics. Possible topics: linear algebra; the conjugate gradient method; ordinary and partial differential equations; vector and tensor calculus. Prerequisites: 106B or X; MATH 51 and 113; or equivalents.

**CS 205B. Mathematical Methods for Fluids, Solids, and Interfaces. 3 Units.**

Numerical methods for simulation of problems involving solid mechanics and fluid dynamics. Focus is on practical tools needed for simulation, and continuous mathematics involving nonlinear hyperbolic partial differential equations. Possible topics: finite element method, highly deformable elastic bodies, plasticity, fracture, level set method, Burgers' equation, compressible and incompressible Navier-Stokes equations, smoke, water, fire, and solid-fluid coupling. Prerequisite: 205A or equivalent.

**CS 207. The Economics of Software. 1 Unitss.**

How software products are moved into the marketplace and how the resulting intellectual property is exploited. Concepts that are outside of the common knowledge of computer scientists such as business terms and spreadsheet computations to quantitatively compare alternatives. Goal is to contribute to informed decision making in high-tech product design, acquisition, production, marketing, selection of business structures, outsourcing, and impact of taxation policies. No specific background required.

**CS 208. Canon of Computer Science. 3-4 Units.**

Analysis and discussion of seminal works in computer science. Emphasis on works that changed the course of computing and continue to this day to provoke and stimulate. Course will study foundational ideas that are at the core of personal computing, artificial intelligence, computer systems, computer networks, and more. Through immersion in original literature, we can more deeply comprehend the present state of computing, its origins, its underlying assumptions, and its major open questions. In connecting students with the ideas that shaped computer science, course aims to instill lasting inspiration and a deep understanding of major trends in the field.

**CS 210A. Software Project Experience with Corporate Partners. 3-4 Units.**

Two-quarter project course. Focus is on real-world software development. Corporate partners seed projects with loosely defined challenges from their R&D labs; students innovate to build their own compelling software solutions. Student teams are treated as start-up companies with a budget and a technical advisory board comprised of instructional staff and corporate liaisons. Teams will typically travel to the corporate headquarters of their collaborating partner, meaning some teams will travel internationally. Open loft classroom format such as found in Silicon Valley software companies. Exposure to: current practices in software engineering; techniques for stimulating innovation; significant development experience with creative freedoms; working in groups; real-world software engineering challenges; public presentation of technical work; creating written descriptions of technical work. Prerequisites: 109 or 110.

**CS 210B. Software Project Experience with Corporate Partners. 3-4 Units.**

Continuation of CS210A. Focus is on real-world software development. Corporate partners seed projects with loosely defined challenges from their R&D labs; students innovate to build their own compelling software solutions. Student teams are treated as start-up companies with a budget and a technical advisory board comprised of the instructional staff and corporate liaisons. Teams will typically travel to the corporate headquarters of their collaborating partner, meaning some teams will travel internationally. Open loft classroom format such as found in Silicon Valley software companies. Exposure to: current practices in software engineering; techniques for stimulating innovation; significant development experience with creative freedoms; working in groups; real world software engineering challenges; public presentation of technical work; creating written descriptions of technical work. Prerequisites: 109 or 210A.

**CS 221. Artificial Intelligence: Principles and Techniques. 3-4 Units.**

(Only one of 121 or 221 counts toward any CS degree program.) Topics: search, constraint satisfaction, knowledge representation, probabilistic models, Bayesian networks, machine learning, neural networks, vision, robotics, and natural language processing. Prerequisites: 103 or 103B/X; 106B or 106X; and exposure to probability. Recommended: 107 and facility with basic differential calculus.

**CS 222. Rational Agency and Intelligent Interaction. 3 Units.**

For advanced undergraduates, and M.S. and beginning Ph.D. students. Logic-based methods for knowledge representation, information change, and games in artificial intelligence and philosophy. Topics: knowledge, certainty, and belief; time and action; belief dynamics; preference and social choice; games; and desire and intention. Prerequisite: propositional and first-order logic. Same as: PHIL 358.

**CS 223A. Introduction to Robotics. 3 Units.**

Robotics foundations in modeling, design, planning, and control. Class covers relevant results from geometry, kinematics, statics, dynamics, motion planning, and control, providing the basic methodologies and tools in robotics research and applications. Concepts and models are illustrated through physical robot platforms, interactive robot simulations, and video segments relevant to historical research developments or to emerging application areas in the field. Recommended: matrix algebra. Same as: ME 320.

**CS 224M. Multi-Agent Systems. 3 Units.**

For advanced undergraduates, and M.S. and beginning Ph.D. students. Topics: logics of knowledge and belief, other logics of mental state, theories of belief change, multi-agent probabilities, essentials of game theory, social choice and mechanism design, multi-agent learning, communication. Applications discussed as appropriate; emphasis is on conceptual matters and theoretical foundations. Prerequisites: basic probability theory and first-order logic.

**CS 224N. Natural Language Processing. 3-4 Units.**

Methods for processing human language information and the underlying computational properties of natural languages. Syntactic and semantic processing from linguistic and algorithmic perspectives. Focus is on modern quantitative techniques in NLP: using large corpora, statistical models for acquisition, translation, and interpretation; and representative systems. Prerequisites: CS124 or CS121/221. Same as: LINGUIST 284.

**CS 224S. Speech Recognition and Synthesis. 2-4 Units.**

Automatic speech recognition, speech synthesis, and dialogue systems. Focus is on key algorithms including noisy channel model, hidden Markov models (HMMs), Viterbi decoding, N-gram language modeling, unit selection synthesis, and roles of linguistic knowledge. Prerequisite: programming experience. Recommended: CS 221 or 229. Same as: LINGUIST 285.

**CS 224U. Natural Language Understanding. 3-4 Units.**

Machine understanding of human language. Computational semantics (determination of word sense and synonymy, event structure and thematic roles, time, aspect, causation, compositional semantics, scopal operators), and computational pragmatics and discourse (coherence, coreference resolution, information packaging, dialogue structure). Theoretical issues, online resources, and relevance to applications including question answering and summarization. Prerequisites: one of LINGUIST 180 / CS 124 / CS 224N,S; and logic such as LINGUIST 130A or B, CS 157, or PHIL150). Same as: LINGUIST 188, LINGUIST 288.

**CS 224W. Social and Information Network Analysis. 3-4 Units.**

(Formerly 322) How do rumors and information spread? Who are the influencers? Can we predict friendships on Facebook? Networks are the core of the WWW, blogs, Twitter and Facebook. They can be characterized by the complex interplay between information content, millions of individuals and organizations that create it, and the technology that supports it. Course will focus on how to analyze the structure and dynamics of large networks, how to model links, and how design algorithms that work with such large networks. Topics: statistical properties of large networks, models of social network structure and evolution, link prediction, network community detection, diffusion of innovation, information propagation, six-degrees of separation, finding influential nodes in networks, disease outbreak detection, networks with positive and negative ties, and connections with work in the social sciences and economics.

**CS 225A. Experimental Robotics. 3 Units.**

Hands-on laboratory course experience in robotic manipulation. Topics include robot kinematics, dynamics, control, compliance, sensor-based collision avoidance, and human-robot interfaces. Second half of class is devoted to final projects using various robotic platforms to build and demonstrate new robot task capabilities. Previous projects include the development of autonomous robot behaviors of drawing, painting, playing air hockey, yoyo, basketball, ping-pong or xylophone. Prerequisites: 223A or equivalent.

**CS 225B. Robot Programming Laboratory. 3-4 Units.**

For robotics and non-robotics students. Students program mobile robots to exhibit increasingly complex behavior (simple dead reckoning and reactivity, goal-directed motion, localization, complex tasks). Topics: motor control and sensor characteristics; sensor fusion, model construction, and robust estimation; control regimes (subsumption, potential fields); probabilistic methods, including Markov localization and particle filters. Student programmed robot contest. Programming is in C++ on Unix machines, done in teams. Prerequisite: programming at the level of 106B, 106X, 205, or equivalent.

**CS 226. Statistical Techniques in Robotics. 3 Units.**

Theory and practice of statistical techniques used in robotics and large-scale sensor-based systems. Probabilistic state estimation, Bayes, Kalman, information and particle filters. Simultaneous localization and mapping techniques, and multi-robot sensor fusion. Markov techniques for making decisions under uncertainty, and probabilistic control algorithms and exploration.

**CS 227. Knowledge Representation and Reasoning. 3 Units.**

Representing knowledge symbolically in a form suitable for automated reasoning, and associated reasoning methods. Combines formal algorithmic analysis with a description of recent applications. Topics: object-oriented knowledge representation, description logics, inheritance networks, logic programming, propositional satisfiability, constraint satisfaction, planning and scheduling, abductive explanation, tractable reasoning. Prerequisites: familiarity with basic notions in data structures and with techniques in algorithm design and analysis. Computational logic (CS157 or equivalent). Recommended: previous or concurrent course in AI. Knowledge of Lisp or Prolog programming.

**CS 227B. General Game Playing. 3 Units.**

A general game playing system accepts a formal description of a game to play it without human intervention or algorithms designed for specific games. Hands-on introduction to these systems and artificial intelligence techniques such as knowledge representation, reasoning, learning, and rational behavior. Students create GGP systems to compete with each other and in external competitions. Prerequisite: programming experience. Recommended: 103 or equivalent.

**CS 228. Probabilistic Graphical Models: Principles and Techniques. 3-4 Units.**

Probabilistic graphical modeling languages for representing complex domains, algorithms for reasoning using these representations, and learning these representations from data. Topics include: Bayesian and Markov networks, extensions to temporal modeling such as hidden Markov models and dynamic Bayesian networks, exact and approximate probabilistic inference algorithms, and methods for learning models from data. Also included are sample applications to various domains including speech recognition, biological modeling and discovery, medical diagnosis, message encoding, vision, and robot motion planning. Prerequisites: basic probability theory and algorithm design and analysis.

**CS 229. Machine Learning. 3-4 Units.**

Topics: statistical pattern recognition, linear and non-linear regression, non-parametric methods, exponential family, GLMs, support vector machines, kernel methods, model/feature selection, learning theory, VC dimension, clustering, density estimation, EM, dimensionality reduction, ICA, PCA, reinforcement learning and adaptive control, Markov decision processes, approximate dynamic programming, and policy search. Prerequisites: linear algebra, and basic probability and statistics.

**CS 229A. Applied Machine Learning. 3-4 Units.**

Covers algorithms that allow computers to learn from data. Emphasis on practical skills and methods for applying learning techniques and building practical AI/Learning systems. Course covers commonly used learning techniques (classification, regression, clustering, dimensionality reduction), specific applications (anomaly detection, recommender systems, search), as well as working with big data. Online, self-paced course. Enrollment limited. Consent of instructor required. Prerequisites: Programming at the level of CS106B or 106X, and basic linear algebra such as Math 51.

**CS 229T. Statistical Learning Theory. 3 Units.**

(Same as STATS 231) For a given learning problem, what methods should be employed, and under what assumptions can we expect them to work? This course focuses on developing algorithms for various scenarios (e.g., high-dimensional, online, unsupervised) as well as theoretical analyses of these algorithms. Topics include kernel methods, generalization bounds, spectral methods, online learning, and nonparametric Bayes. Prerequisites: A solid background in linear algebra and probability theory. Basic exposure to statistics and machine learning (STAT 315A or CS 229), and graphical models (CS 228) is helpful but not essential. Same as: STATS 231.

**CS 231A. Introduction to Computer Vision. 3-4 Units.**

(Formerly 223B) An introduction to the concepts and applications in computer vision. Topics include: cameras and projection models, low-level image processing methods such as filtering and edge detection; mid-level vision topics such as segmentation and clustering; shape reconstruction from stereo, as well as high-level vision tasks such as object recognition, scene recognition, face detection and human motion categorization. Prerequisites: linear algebra, basic probability and statistics.

**CS 231B. The Cutting Edge of Computer Vision. 3 Units.**

(Formerly 223C) More than one-third of the brain is engaged in visual processing, the most sophisticated human sensory system. Yet visual recognition technology has fundamentally influenced our lives on the same scale and scope as text-based technology has, thanks to Google, Twitter, Facebook, etc. This course is designed for those students who are interested in cutting edge computer vision research, and/or are aspiring to be an entrepreneur using vision technology. Course will guide students through the design and implementation of three core vision technologies: segmentation, detection and classification on three highly practical, real-world problems. Course will focus on teaching the fundamental theory, detailed algorithms, practical engineering insights, and guide them to develop state-of-the-art systems evaluated based on the most modern and standard benchmark datasets. Prerequisites: CS2223B or equivalent and a good machine learning background (i.e. CS221, CS228, CS229). Fluency in Matlab and C/C++.

**CS 232. Digital Image Processing. 3 Units.**

Image sampling and quantization color, point operations, segmentation, morphological image processing, linear image filtering and correlation, image transforms, eigenimages, multiresolution image processing, wavelets, noise reduction and restoration, feature extraction and recognition tasks, image registration. Emphasis is on the general principles of image processing. Students write and investigate image processing algorithms in Matlab. Term project. Prerequisites: EE261, EE278B. Same as: EE 368.



**CS 235. Applied Robot Design for Non-Robot-Designers: How to Fix, Modify, Design, and Build. 3-4 Units.**

Students will learn how to design and build the mechanical hardware of robots. The goal is to take people with no mechanical experience and teach them to build professional-quality robots. The course will consist of weekly labs and a final project, each of which will entail building an interesting robotic device. For example, students will build a pantilt camera turret in the belts lab. Topics will include: Electric motors, unusual actuators, sensors, mechanical transmissions, rotary and linear motion, counterbalancing, and standard mechanisms. Required graduate or PhD status; undergraduate students may enroll with instructor's permission.

**CS 240. Advanced Topics in Operating Systems. 3 Units.**

Recent research. Classic and new papers. Topics: virtual memory management, synchronization and communication, file systems, protection and security, operating system extension techniques, fault tolerance, and the history and experience of systems programming. Prerequisite: 140 or equivalent.

**CS 241. Secure Web Programming. 3 Units.**

Building secure Web applications is key to the continued success of the Web. Course will cover the key components and available tools for securing web applications. Discussions on browser security policy and how to properly use it, server-side abstractions for building secure applications, and common errors found in existing applications. Course will include student presentations on course projects.

**CS 242. Programming Languages. 3 Units.**

Central concepts in modern programming languages, impact on software development, language design trade-offs, and implementation considerations. Functional, imperative, and object-oriented paradigms. Formal semantic methods and program analysis. Modern type systems, higher order functions and closures, exceptions and continuations. Modularity, object-oriented languages, and concurrency. Runtime support for language features, interoperability, and security issues. Prerequisite: 107, or experience with Lisp, C, and an object-oriented language.

**CS 243. Program Analysis and Optimizations. 3-4 Units.**

Program analysis techniques used in compilers and software development tools to improve productivity, reliability, and security. The methodology of applying mathematical abstractions such as graphs, fixpoint computations, binary decision diagrams in writing complex software, using compilers as an example. Topics include data flow analysis, instruction scheduling, register allocation, parallelism, data locality, interprocedural analysis, and garbage collection. Prerequisites: 103 or 103B, and 107.

**CS 244. Advanced Topics in Networking. 3-4 Units.**

Classic papers, new ideas, and research papers in networking. Architectural principles: naming, addressing, routing; congestion control, traffic management, QoS; wireless and mobility; overlay networks and virtualization; network security; switching and routing; content distribution; and proposals for future Internet structures. Prerequisite: 144 or equivalent.

**CS 244B. Distributed Systems. 3 Units.**

Distributed operating systems and applications issues, emphasizing high-level protocols and distributed state sharing as the key technologies. Topics: distributed shared memory, object-oriented distributed system design, distributed directory services, atomic transactions and time synchronization, application-sufficient consistency, file access, process scheduling, process migration, and storage/communication abstractions on distribution, scale, robustness in the face of failure, and security. Prerequisites: CS 144 and CS 249A.

**CS 244C. Readings and Projects in Distributed Systems. 3-6 Units.**

Companion project option for 244B. Corequisite: 244B.

**CS 244E. Networked Wireless Systems. 3 Units.**

Design and implementation of wireless networks and mobile systems. The course will commence with a short retrospective of wireless communication and initially touch on some of the fundamental physical layer properties of various wireless communication technologies. The focus will then shift to design of media access control and routing layers for various wireless systems. The course will also examine adaptations necessary at transport and higher layers to cope with node mobility and error-prone nature of the wireless medium. Finally, it will conclude with a brief overview of other related issues including emerging wireless/mobile applications.

Prerequisites: EE 284

Same as: EE 384E.

**CS 245. Database Systems Principles. 3 Units.**

File organization and access, buffer management, performance analysis, and storage management. Database system architecture, query optimization, transaction management, recovery, concurrency control. Reliability, protection, and integrity. Design and management issues. Prerequisites: 145, 161.

**CS 246. Mining Massive Data Sets. 3-4 Units.**

Distributed file systems: Hadoop, map-reduce; PageRank, topic-sensitive PageRank, spam detection, hubs-and-authorities; similarity search; shingling, minhashing, random hyperplanes, locality-sensitive hashing; analysis of social-network graphs; association rules; dimensionality reduction: UV, SVD, and CUR decompositions; algorithms for very-large-scale mining: clustering, nearest-neighbor search, gradient descent, support-vector machines, classification, and regression; submodular function optimization. Prerequisites: At least one of CS107 or CS145; at least one of CS109 or STAT116, or equivalent.

**CS 247. Human-Computer Interaction Design Studio. 3-4 Units.**

Project-based. Methods used in interaction design including needs analysis, user observation, idea sketching, concept generation, scenario building, storyboards, user character stereotypes, usability analysis, and market strategies. Prerequisites: 147 and 106A or equivalent background in programming.

**CS 247L. Human Computer Interaction Technology Laboratory. 1 Unit.**

Hands-on introduction to contemporary HCI technologies. Interaction design with Adobe Flash, mobile development, physical computing, and web applications. Corequisite: 247.

**CS 248. Interactive Computer Graphics. 3-4 Units.**

Rendering and animation for interactive computer graphics. Topics in rendering include: the graphics pipeline, rasterization, lighting and surface shading, texture mapping and its applications, graphics hardware, and rendering optimization. Topics in animation include: keyframing and interpolation, physics-based simulation, and character animation. Prerequisite: CS148.

**CS 249A. Object-Oriented Programming from a Modeling and Simulation Perspective. 3 Units.**

Topics: large-scale software development approaches for complex applications, class libraries and frameworks; encapsulation, use of inheritance and dynamic dispatch, design of interfaces and interface/implementation separation, exception handling, smart pointers and reference management, minimizing dependencies and value-oriented programming. Inheritance: when and why multiple inheritance naming, directories, manager, and disciplined use of design patterns including functors, event notification and iterators. Prerequisites: C, C++, and programming methodology as developed in 106B or X, and 107 (107 may be taken concurrently). Recommended: 193D.

**CS 249B. Large-scale Software Development. 3 Units.**

Software engineering of high quality large-scale complex software with a focus on evolvability, performance and cost. Software development processes, people and practice; audit: integrating invariant checks with production software; concurrency with modular object-oriented programming; collection implementation; generic programming and templates; design of value types; named descriptions for large value types; memory management; controlling placement, locality and consumption; run-time vs. static type checking and identification.

**CS 254. Computational Complexity. 3 Units.**

An introduction to computational complexity theory. The P versus NP problem; diagonalization and relativization; space complexity, Savitch's algorithm, NL=coNL, Reingold's algorithm; counting problem and #P-completeness; circuit complexity; pseudorandomness, derandomization, and the Natural Proofs barrier; complexity of approximation; quantum computing. Prerequisites: 154 or equivalent; mathematical maturity.

**CS 255. Introduction to Cryptography. 3 Units.**

For advanced undergraduates and graduate students. Theory and practice of cryptographic techniques used in computer security. Topics: encryption (single and double key), digital signatures, pseudo-random bit generation, authentication, electronic commerce (anonymous cash, micropayments), key management, PKI, zero-knowledge protocols. Prerequisite: basic probability theory.

**CS 259. Security Analysis of Network Protocols. 3 Units.**

General methods for security modeling and analysis, illustrated using network protocol security. Common security protocols and their properties including secrecy, authentication, key establishment, and fairness. Fully automated, finite-state, model-checking techniques. Constraint solving, process algebras, protocol logics, probabilistic model checking, and game theory. Students select a protocol, web component, hardware architecture, or other system to analyze, specify it in a chosen model, use an analysis tool or method to find vulnerabilities and verify properties, and present findings.

**CS 259Q. Quantum Computing. 3 Units.**

The course introduces the basics of quantum algorithms, quantum computational complexity, quantum information theory, and quantum cryptography, including the models of quantum circuits and quantum Turing machines, Shor's factoring algorithms, Grover's search algorithm, the adiabatic algorithms, quantum error-correction, impossibility results for quantum algorithms, Bell's inequality, quantum information transmission, and quantum coin flipping. Prerequisites: knowledge of linear algebra, discrete probability and algorithms.

**CS 261. Optimization and Algorithmic Paradigms. 3 Units.**

Algorithms for network optimization: max-flow, min-cost flow, matching, assignment, and min-cut problems. Introduction to linear programming. Use of LP duality for design and analysis of algorithms. Approximation algorithms for NP-complete problems such as Steiner Trees, Traveling Salesman, and scheduling problems. Randomized algorithms. Introduction to online algorithms. Prerequisite: 161 or equivalent.

**CS 262. Computational Genomics. 3 Units.**

Applications of computer science to genomics, and concepts in genomics from a computer science point of view. Topics: dynamic programming, sequence alignments, hidden Markov models, Gibbs sampling, and probabilistic context-free grammars. Applications of these tools to sequence analysis: comparative genomics, DNA sequencing and assembly, genomic annotation of repeats, genes, and regulatory sequences, microarrays and gene expression, phylogeny and molecular evolution, and RNA structure. Prerequisites: 161 or familiarity with basic algorithmic concepts. Recommended: basic knowledge of genetics. Same as: BIOMEDIN 262.

**CS 266. Parameterized Algorithms and Complexity. 3 Units.**

An introduction to the area of parameterized algorithms and complexity, which explores multidimensional methods for measuring the difficulty and feasibility of solving computational problems. Topics include: fixed-parameter tractability (FPT) and its characterizations, FPT algorithms for hard problems, the W-hierarchy (W[1], W[2], W[P], and complete problems for these classes), and the relationships between parameterized questions and classical theory questions. Prerequisites: CS 154 and 161 or the equivalent mathematical maturity.

**CS 268. Geometric Algorithms. 3 Units.**

Techniques for design and analysis of efficient geometric algorithms for objects in 2-, 3-, and higher dimensions. Topics: convexity, triangulations and simplicial complexes, sweeping, partitioning, and point location. Voronoi/Delaunay diagrams and their properties. Arrangements of curves and surfaces. Intersection and visibility problems. Geometric searching and optimization. Random sampling methods. Impact of numerical issues in geometric computation. Example applications to robotic motion planning, visibility preprocessing and rendering in graphics, model-based recognition in computer vision, and structural molecular biology. Prerequisite: discrete algorithms at the level of 161. Recommended: 164.

**CS 270. Modeling Biomedical Systems: Ontology, Terminology, Problem Solving. 3 Units.**

Methods for modeling biomedical systems and for making those models explicit in the context of building software systems. Emphasis is on intelligent systems for decision support and Semantic Web applications. Topics: knowledge representation, controlled terminologies, ontologies, reusable problem solvers, and knowledge acquisition. Recommended: exposure to object-oriented systems, basic biology. Same as: BIOMEDIN 210.

**CS 272. Introduction to Biomedical Informatics Research Methodology. 3 Units.**

Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor. Same as: BIOE 212, BIOMEDIN 212, GENE 212.

**CS 273A. A Computational Tour of the Human Genome. 3 Units.**

Introduction to computational biology through an informatic exploration of the human genome. Topics include: genome sequencing (technologies, assembly, personalized sequencing); functional landscape (genes, gene regulation, repeats, RNA genes, epigenetics); genome evolution (comparative genomics, ultraconservation, co-option). Additional topics may include population genetics, personalized genomics, and ancient DNA. Course includes primers on molecular biology, the UCSC Genome Browser, and text processing languages. Guest lectures from genomic researchers. No prerequisites. See <http://cs273a.stanford.edu/>. Same as: BIOMEDIN 273A, DBIO 273A.

**CS 274. Representations and Algorithms for Computational Molecular Biology. 3-4 Units.**

Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units. Same as: BIOE 214, BIOMEDIN 214, GENE 214.

**CS 275. Translational Bioinformatics. 4 Units.**

Analytic, storage, and interpretive methods to optimize the transformation of genetic, genomic, and biological data into diagnostics and therapeutics for medicine. Topics: access and utility of publicly available data sources; types of genome-scale measurements in molecular biology and genomic medicine; analysis of microarray data; analysis of polymorphisms, proteomics, and protein interactions; linking genome-scale data to clinical data and phenotypes; and new questions in biomedicine using bioinformatics. Case studies. Prerequisites: programming ability at the level of CS 106A and familiarity with statistics and biology. Same as: BIOMEDIN 217.

**CS 275A. Symbolic Musical Information. 2-4 Units.**

Focus on symbolic data for music applications including advanced notation systems, optical music recognition, musical data conversion, and internal structure of MIDI files. Same as: MUSIC 253.

**CS 275B. Music Query, Analysis, and Style Simulation. 2-4 Units.**

Leveraging off three synchronized sets of symbolic data resources for notation and analysis, the lab portion introduces students to the open-source Humdrum Toolkit for music representation and analysis. Issues of data content and quality as well as methods of information retrieval, visualization, and summarization are considered in class. Grading based primarily on student projects. Prerequisite: 253 or consent of instructor. Same as: MUSIC 254.

**CS 276. Information Retrieval and Web Search. 3 Units.**

Text information retrieval systems; efficient text indexing; Boolean, vector space, and probabilistic retrieval models; ranking and rank aggregation; evaluating IR systems. Text clustering and classification: classification algorithms, latent semantic indexing, taxonomy induction; Web search engines including crawling and indexing, link-based algorithms, and web metadata. Prerequisites: CS 107, CS 109, CS 161. Same as: LINGUIST 286.

**CS 277. Experimental Haptics. 3 Units.**

Haptics as it relates to creating touch feedback in simulated or virtualized environments. Goal is to develop virtual reality haptic simulators and applications. Theoretical topics: psychophysical issues, performance and design of haptic interfaces, haptic rendering methods for 3-D virtual environments, and haptic simulation and rendering of rigid and deformable solids. Applied topics: the CHAI haptic library; implementation of haptic rendering algorithms; collision detection in 3-D environments; design of real-time models for deformable objects. Guest speakers. Lab/programming exercises; a more open-ended final project. Enrollment limited to 20. Prerequisite: experience with C++. Recommended: 148 or 248, 223A.

**CS 279. Computational Methods for Analysis and Reconstruction of Biological Networks. 3 Units.**

Types of interactions, including: regulatory such as transcriptional, signaling, and chromatin modification; protein-protein interactions; and genetic. Biological network structure at scales such as single interaction, small subgraphs, and global organization. Methods for analyzing properties of biological networks. Techniques for reconstructing networks from biological data, including: DNA/protein sequence motifs and sequence conservation; gene expression data; and physical binding data such as protein-DNA, protein-RNA, and protein-protein. Network dynamics and evolution. Prerequisites: biology at the level of BIOSCI 41; computer science and data structures at the level of CS 103 and 106; and probability and statistics at the level of STATS 116 or CS 109.

**CS 294. Research Project in Computer Science. 3 Units.**

Student teams work under faculty supervision on research and implementation of a large project in some major sub-discipline in computer science. Lectures on state-of-the-art methods related to the particular problem domain. Prerequisites: consent of instructor.

**CS 294A. Research Project in Artificial Intelligence. 3 Units.**

Student teams under faculty supervision work on research and implementation of a large project in AI. State-of-the-art methods related to the problem domain. Prerequisites: AI course from 220 series, and consent of instructor.

**CS 294H. Research Project in Human-Computer Interaction. 3 Units.**

Student teams under faculty supervision work on research and implementation of a large project in HCI. State-of-the-art methods related to the problem domain. Prerequisites CS 377, 147, 247, or permission from instructor.

**CS 294S. Research Project in Software Systems and Security. 3 Units.**

Topics vary. Focus is on emerging research themes such as programmable open mobile Internet that spans multiple system topics such as human-computer interaction, programming systems, operating systems, networking, and security. May be repeated for credit. Prerequisites: CS 103 and 107.

**CS 295. Software Engineering. 2-3 Units.**

Software specification, testing, and verification. Emphasis is on current best practices and technology for developing reliable software at reasonable cost. Assignments focus on applying these techniques to realistic software systems. Prerequisites: 108. Recommended a project course such as 140, 143, or 145.

**CS 298. Seminar on Teaching Introductory Computer Science. 1-3 Units.**

Faculty, undergraduates, and graduate students interested in teaching discuss topics raised by teaching computer science at the introductory level. Prerequisite: consent of instructor.

**CS 300. Departmental Lecture Series. 1 Unit.**

Priority given to first-year Computer Science Ph.D. students. CS Masters students admitted if space is available. Presentations by members of the department faculty, each describing informally his or her current research interests and views of computer science as a whole.

**CS 303. Designing Computer Science Experiments. 3 Units.**

Introduction to empirical research in computer science. Learn how to design, execute, interpret, and report on computer science experiments. Conducting empirical work and using experiments to build theory is one of the major ways to move computer science forward, but these issues are often omitted from computer science curricula. Course features case studies drawn from artificial intelligence, systems, and human-computer interaction. Emphasizes the decision-making aspects of research and the logic behind research procedures.

**CS 309. Industrial Lectureships in Computer Science. 1 Unit.**

Guest computer scientist. By arrangement. May be repeated for credit. (Staff).

**CS 309A. Cloud Computing. 1 Unit.**

For technology and business students. The shift from traditional software model of disconnected development and CD-ROM deployment to engineering and delivery on the Internet as a service. Guest industry experts are typically CEOs of public companies who are delivering applications, platform or compute and storage cloud based services.

**CS 315A. Parallel Computer Architecture and Programming. 3 Units.**

The principles and tradeoffs in the design of parallel architectures. Emphasis is on naming, latency, bandwidth, and synchronization in parallel machines. Case studies on shared memory, message passing, data flow, and data parallel machines illustrate techniques. Architectural studies and lectures on techniques for programming parallel computers. Programming assignments on one or more commercial multiprocessors. Prerequisites: EE 282, and reasonable programming experience.

**CS 315B. Parallel Computing Research Project. 3 Units.**

Advanced topics and new paradigms in parallel computing including parallel algorithms, programming languages, runtime environments, library debugging/tuning tools, and scalable architectures. Research project. Prerequisite: consent of instructor.

**CS 316. Advanced Multi-Core Systems. 3 Units.**

In-depth coverage of the architectural techniques used in modern, multi-core chips for mobile and server systems. Advanced processor design techniques (superscalar cores, VLIW cores, multi-threaded cores, energy-efficient cores), cache coherence, memory consistency, vector processors, graphics processors, heterogeneous processors, and hardware support for security and parallel programming. Students will become familiar with complex trade-offs between performance-power-complexity and hardware-software interactions. A central part of CS316 is a project on an open research question on multi-core technologies. Prerequisites: EE 108B. Recommended: CS 149, EE 282.

Same as: EE 382E.

**CS 319. Topics in Digital Systems. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 321. Information Processing for Sensor Networks. 3-4 Units.**

Design and implementation of algorithms and protocols for performing information processing tasks in sensor networks, including routing, data dissemination and aggregation, information discovery and brokerage, service establishment (localization, time synchronization), sensor tasking and control, and distributed data storage. Techniques from signal processing, networking, energy-aware computing, distributed databases and algorithms, and embedded systems and platforms. Physical, networking, and application layers and design trade-offs across the layers. Prerequisites: linear algebra and elementary probability, networking background at the level of 144A or EE 284.

**CS 324. Robot Perception. 3 Units.**

Advanced instruction and project work on robot perception, primarily focused on perception for manipulating objects, but this can include perception of people and other moving objects. Tools such as the Robot Operating System (ROS), the Open Source Computer Vision Library (Open CV), the Point Cloud Processing Library (PCL), and the Navigation, Planning, and Manipulation stacks on the PR2 robot. Review of the principles and code behind these tools so that the student has the basics to do state-of-the-art, publishable work in mobile robotic manipulation. Work is done on real robots. Limited enrollment. Recommended: CS 223A, CS 223B.

**CS 326A. Motion Planning. 3 Units.**

Computing object motions in computer graphics, geometrical computing, robotics, or artificial intelligence for applications such as design, manufacturing, robotics, animated graphics, surgical planning, drug design, assembly planning, graphic animation of human figures, humanoid robots, inspection and surveillance, simulation of crowds, and biology. Path planning methods to generate collision-free paths among static obstacles. Extensions include uncertainty, mobile obstacles, manipulating moveable objects, maneuvering with kinematic constraints, and making and breaking contacts. Configuration space, geometric arrangements, and random sampling. Theoretical methods.

**CS 327A. Advanced Robotic Manipulation. 3 Units.**

Advanced control methodologies and novel design techniques for complex human-like robotic and bio mechanical systems. Class covers the fundamentals in operational space dynamics and control, elastic planning, human motion synthesis. Topics include redundancy, inertial properties, haptics, simulation, robot cooperation, mobile manipulation, human-friendly robot design, humanoids and whole-body control. Additional topics in emerging areas are presented by groups of students at the end-of-quarter mini-symposium. Prerequisites: 223A or equivalent.

**CS 328. Topics in Computer Vision. 3 Units.**

Fundamental issues of, and mathematical models for, computer vision. Sample topics: camera calibration, texture, stereo, motion, shape representation, image retrieval, experimental techniques. May be repeated for credit. Prerequisites: 205, 223B, or equivalents.

**CS 329. Topics in Artificial Intelligence. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 331. Advanced Reading in Computer Vision. 3 Units.**

(Formerly CS323) The field of computer vision has seen an explosive growth in past decade. Much of recent effort in vision research is towards developing algorithms that can perform high-level visual recognition tasks on real-world images and videos. With development of Internet, this task becomes particularly challenging and interesting given the heterogeneous data on the web. Course will focus on reading recent research papers that are focused on solving high-level visual recognition problems, such as object recognition and categorization, scene understanding, human motion understanding, etc. Project required. Prerequisite: some experience in research with one of the following fields: computer vision, image processing, computer graphics, machine learning.

**CS 334A. Convex Optimization I. 3 Units.**

Convex sets, functions, and optimization problems. The basics of convex analysis and theory of convex programming: optimality conditions, duality theory, theorems of alternative, and applications. Least-squares, linear and quadratic programs, semidefinite programming, and geometric programming. Numerical algorithms for smooth and equality constrained problems; interior-point methods for inequality constrained problems. Applications to signal processing, communications, control, analog and digital circuit design, computational geometry, statistics, machine learning, and mechanical engineering. Prerequisite: linear algebra such as EE263, EE178/278A.

Same as: CME 364A, EE 364A.

**CS 340. Topics in Computer Systems. 3-4 Units.**

Topics vary every quarter, and may include advanced material being taught for the first time. May be repeated for credit.

**CS 340V. Networked Systems for Virtual Worlds. 3-4 Units.**

Open to graduate students and advanced undergraduates. Systems and networking aspects of building large, distributed virtual 3D environments, with a focus on scalability, consistency, security, fairness, and federation. Topics include existing architectures, naming, routing, caching, migration, interoperability, and attribution. Open-ended research project. Prerequisite: some systems and networking background. May be repeated for credit.

**CS 341. Project in Mining Massive Data Sets. 3 Units.**

Team project in data-mining of very large-scale data, including the problem statement and implementation and evaluation of a solution; some lectures on relevant materials will be given: Hadoop, Hive, Amazon EC2; other topics of possible relevance to some projects: computational advertising and the adwords problem; graph partitioning and community detection; extracting relations from the Web; stream data processing.

**CS 342. Programming Language Design. 3 Units.**

Tools for analysis and optimization of iterative coding systems. LDPC codes, Turbo codes, RA codes, optimized ensembles, message passing algorithms, density evolution, analytic techniques. Prerequisite: 376A.

**CS 343. Advanced Topics in Compilers. 3 Units.**

Topics change every year. May be repeated for credit. Prerequisite: 243.

**CS 344. Topics in Computer Networks. 3 Units.**

High-performance embedded system design. Student teams of two software engineers (C experience required) and one hardware engineer (Verilog experience required) build a fully functioning Internet router. Work in teams of three. How router interoperates with others in class. Open-ended design challenge judged by panel of industry experts. Prerequisites: CS 144, 244, or network programming experience.

**CS 344B. Advanced Topics in Distributed Systems. 2 Units.**

Continuation of 244B. The use of distributed systems research in practical systems. New applications due to the growth in high-bandwidth connections. Distributed systems knowledge and techniques from research and system implementations, and active research topics. Readings include research publications.

**CS 344E. Advanced Wireless Networks. 3 Units.**

Networking research in wireless systems. Topics include: multi-channel/multi-radio systems, routing, coding, physical layer hints, low power, mesh networking, interference cancellation, technological trends, and protocol design. Students implement and test research ideas on SWAN, a WiFi testbed.

**CS 345. Advanced Topics in Database Systems. 3 Units.**

Content varies. May be repeated for credit with instructor consent. Prerequisite: 145. Recommended: 245.

**CS 347. Parallel and Distributed Data Management. 3 Units.**

The principles and system organization of distributed and parallel databases. Data fragmentation and distribution, distributed database design, query processing and optimization, distributed concurrency control, reliability and commit protocols, and replicated data management. Data management in peer-to-peer systems. Data management in the "cloud" using map-reduce and other massive parallelism techniques.

**CS 348A. Computer Graphics: Geometric Modeling. 3-4 Units.**

The mathematical tools needed for the geometrical aspects of computer graphics and especially for modeling smooth shapes. Fundamentals: homogeneous coordinates, transformations, and perspective. Theory of parametric and implicit curve and surface models: polar forms, Bezier arcs and de Casteljau subdivision, continuity constraints, B-splines, tensor product, and triangular patch surfaces. Subdivision surfaces and multiresolution representations of geometry. Representations of solids and conversions among them. Surface reconstruction from scattered data points. Geometry processing on meshes, including simplification. Prerequisite: linear algebra. Recommended: 164, 248.

**CS 348B. Computer Graphics: Image Synthesis Techniques. 3-4 Units.**

Intermediate level, emphasizing the sampling, shading, and display aspects of computer graphics. Topics: local and global illumination methods including radiosity and distributed ray tracing, texture generation and rendering, volume rendering, strategies for anti-aliasing and photo-realism, human vision and color science as they relate to computer displays, and high-performance architectures for graphics. Written assignments and programming projects. Prerequisite: 248 or equivalent. Recommended: Fourier analysis or digital signal processing.

**CS 349. Topics in Programming Systems. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 349C. Topics in Programming Systems: Readings in Distributed Systems. 1-3 Units.**

Discussion of research publications that are of current interest in distributed systems. Students are expected to read all papers, and sign up for presentation of one paper. The course itself is 1 unit. Those interested in working on a project along with the readings should enroll for 3 units.

**CS 354. Topics in Circuit Complexity. 3 Units.**

An overview of circuit complexity, focusing on limitations of solving computational problems with circuits. Classical methods: diagonalization; the gate elimination method; the method of random restrictions; approximating circuits with polynomials. Connections between circuit-analysis algorithms and circuit complexity: learning circuits via queries; pseudorandomness and derandomization; satisfiability algorithms. Prerequisite: CS254 or the equivalent mathematical maturity.

**CS 355. Advanced Topics in Cryptography. 3 Units.**

Topics: pseudo-random generation, zero knowledge protocols, elliptic curve systems, threshold cryptography, security analysis using random oracles, lower and upper bounds on factoring and discrete log. May be repeated for credit. Prerequisite: 255.

**CS 357. Advanced Topics in Formal Methods. 3 Units.**

Topics vary annually. Possible topics include automata on infinite words, static analysis methods, runtime analysis methods, verification of real-time and hybrid systems, and formalization of middleware services. May be repeated for credit. Prerequisite: 256.

**CS 358. Topics in Programming Language Theory. 3 Units.**

Topics of current research interest in the mathematical analysis of programming languages, structured operational semantics, domain theory, semantics of concurrency, rich type disciplines, problems of representation independence, and full abstraction. See Time Schedule or Axxess for current topics. May be repeated for credit. Prerequisites: 154, 157, 258, or equivalents. (Staff).

**CS 359. Topics in the Theory of Computation. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 359G. Graph Partitioning and Expanders. 3 Units.**

Three topics related to the mathematics of expander graphs: (1) Approximation algorithms for finding a sparse balanced cut in a graph (spectral partitioning, Leighton-Rao algorithm, and Arora-Rao-Vazirani algorithm); (2) Explicit construction of expander graphs (combinatorial and algebraic); and (3) Analysis of Markov-Chain Monte-Carlo algorithm via the estimation of the convergence of certain random walks. Recommended: a basic course in linear algebra and a course on algorithms.

**CS 361A. Advanced Algorithms. 3 Units.**

Advanced data structures: union-find, self-adjusting data structures and amortized analysis, dynamic trees, Fibonacci heaps, universal hash function and sparse hash tables, persistent data structures. Advanced combinatorial algorithms: algebraic (matrix and polynomial) algorithms, number theoretic algorithms, group theoretic algorithms and graph isomorphism, online algorithms and competitive analysis, strings and pattern matching, heuristic and probabilistic analysis (TSP, satisfiability, cliques, colorings), local search algorithms. May be repeated for credit. Prerequisite: 161 or 261, or equivalent.

**CS 364A. Algorithmic Game Theory. 3 Units.**

Topics at the interface of theoretical computer science and game theory such as: algorithmic mechanism design; combinatorial and competitive auctions; congestion and potential games; cost sharing; existence, computation, and learning of equilibria; game theory and the Internet; network games; price of anarchy; and selfish routing. Prerequisites: 154N and 161, or equivalents.

**CS 364B. Topics in Algorithmic Game Theory. 3 Units.**

Topics on the interface of theoretical computer science and game theory. May be taken prior to 364A; may be repeated for credit. Prerequisites: 154N and 161, or equivalents.

**CS 365. Randomized Algorithms. 3 Units.**

Design and analysis of algorithms that use randomness to guide their computations. Topics include: basic tools, from probability theory and probabilistic analysis that are recurrent in algorithmic applications; randomized complexity theory and game-theoretic techniques; algebraic techniques, probability amplification and derandomization. Applications: sorting and searching, data structures, combinatorial optimization and graph algorithms, geometric algorithms and linear programming, approximation and counting problems, similarity search and metric embeddings, online algorithms. Prerequisites: CS 161 and STAT 116, or equivalents and instructor consent. Same as: CME 309.

**CS 366. Graph Partitioning and Expanders. 3 Units.**

Three topics related to the mathematics of expander graphs: 1) Approximation algorithms for finding a sparse balanced cut in a graph (spectral partitioning, Leighton-Rao algorithm, and Arora-Rao-Vazirani algorithm); 2) Explicit construction of expander graphs (combinatorial and algebraic); and 3) Analysis of Markov-Chain Monte-Carlo algorithm via the estimation of the convergence of certain random walks. Prerequisites: Basic course in linear algebra and a course on algorithms, preferably; also a basic understanding of linear programming and of duality.

**CS 369. Topics in Analysis of Algorithms. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 369N. Beyond Worst-Case Analysis. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 374. Algorithms in Biology. 2-3 Units.**

Algorithms and computational models applied to molecular biology and genetics. Topics vary annually. Possible topics include biological sequence comparison, annotation of genes and other functional elements, molecular evolution, genome rearrangements, microarrays and gene regulation, protein folding and classification, molecular docking, RNA secondary structure, DNA computing, and self-assembly. May be repeated for credit. Prerequisites: 161, 262 or 274, or BIOCHEM 218, or equivalents. Same as: BIOMEDIN 374.

**CS 376. Research Topics in Human-Computer Interaction. 3-4 Units.**

Prepares students to conduct original HCI research by reading and discussing seminal and cutting-edge research papers. This broad introduction covers topics in design, social software, input techniques, mobile, and ubiquitous computing. Student pairs perform a quarter-long mini research project; students are encouraged to select topics that leverage larger research efforts on campus. For undergraduates, CS147 is a prerequisite.

**CS 377. Topics in Human-Computer Interaction. 2-3 Units.**

Contents change each quarter. May be repeated for credit. See <http://hci.stanford.edu/academics> for offerings.

**CS 377D. Topics in Learning and Technology: d.compress - Designing Calm. 2-3 Units.**

Contents of the course change each year. The course can be repeated. Stress silently but steadily damages physical and emotional well-being, relationships, productivity, and our ability to learn and remember. This highly experiential and project-oriented class will focus on designing interactive technologies to enable calm states of cognition, emotion, and physiology for better human health, learning, creativity and productivity. Same as: EDUC 328A.

**CS 377L. Learning in a Networked World: Learning Analytics in Technology-Enhanced Education. 3 Units.**

Foundations, theories and empirical studies for interdisciplinary advances in how we conceive of the potentials and challenges associated with lifelong, lifewide and life-deep learning in a networked world given the growth of always-on cyberinfrastructure for supporting information and social networks across space and time with personal computers, netbooks, and mobiles. Same as: EDUC 298.

**CS 377T. Behavior Design for Better Health. 3 Units.**

Design solutions to improve health behaviors. Discover activity sequences that create lasting habits. Use tech platforms to trigger & facilitate. Rapid iteration to improve designs. Project oriented but coding is not required.

**CS 378. Phenomenological Foundations of Cognition, Language, and Computation. 3-4 Units.**

Critical analysis of theoretical foundations of the cognitive approach to language, thought, and computation. Contrasts of the rationalistic assumptions of current linguistics and artificial intelligence with alternatives from phenomenology, theoretical biology, critical literary theory, and socially-oriented speech act theory. Emphasis is on the relevance of theoretical orientation to the design, implementation, and impact of computer systems as it affects human-computer interaction.

**CS 379. Interdisciplinary Topics. 3 Units.**

Advanced material is often taught for the first time as a topics course, perhaps by a faculty member visiting from another institution. May be repeated for credit.

**CS 379C. Computational Models of the Neocortex. 3 Units.**

Repraisal of course offered spring 2012 of the same name ; see <http://www.stanford.edu/class/cs379c/> for more detail ; which emphasized scaling the technologies of systems neuroscience to take advantage of the exponential trend in computational power known as Moore's Law. Course covers many of the same topics but will focus on the near-term prospects for practical advances in health care, prosthetic augmentation, and artificial intelligence inspired by biological systems. Graded pass / no credit on the basis of class participation, a midterm white paper or business prospectus and a final technical report evaluating an appropriate technology selected in collaboration with the instructor. Focus will be on examining the assumptions underlying current claims for realizing the potential benefits of research in neuroscience and identifying real business opportunities, disruptive new technologies and advances in medicine that could substantially benefit patients within the next decade. Technology-minded critical thinkers seriously interested in placing their bets and picking careers in related areas of business, technology and science are welcome. Prerequisites: basic probability theory, algorithms, and statistics.

**CS 390A. Curricular Practical Training. 1 Unit.**

Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. 390 A, B, and C may each be taken once.

**CS 390B. Curricular Practical Training. 1 Unitss.**

Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. 390A,B,C may each be taken once.

**CS 390C. Curricular Practical Training. 1 Unitss.**

Educational opportunities in high technology research and development labs in the computing industry. Qualified computer science students engage in internship work and integrate that work into their academic program. Students register during the quarter they are employed and complete a research report outlining their work activity, problems investigated, results, and follow-on projects they expect to perform. 390A,B,C may each be taken once.

**CS 393. Computer Laboratory. 1-9 Units.**

For CS graduate students. A substantial computer program is designed and implemented; written report required. Recommended as a preparation for dissertation research. Register using the section number associated with the instructor. Prerequisite: consent of instructor.

**CS 395. Independent Database Project. 1-6 Units.**

For graduate students in Computer Science. Use of database management or file systems for a substantial application or implementation of components of database management system. Written analysis and evaluation required. Register using the section number associated with the instructor. Prerequisite: consent of instructor.

**CS 399. Independent Project. 1-9 Units.**

Letter grade only.

**CS 399P. Independent Project. 1-9 Units.**

Graded satisfactory/no credit.

**CS 402. Beyond Bits and Atoms: Designing Technological Tools. 3-5 Units.**

Practicum in designing and building technology-enabled curricula and learning environments. Students use software toolkits and state-of-the-art fabrication machines to design educational software, educational toolkits, and tangible user interfaces. How to design low-cost technologies, particularly for urban school in the US and abroad. The constructionist learning design perspective, critical pedagogy, and the application of complexity sciences in education. Same as: EDUC 236X.

**CS 402L. Beyond Bits and Atoms - Lab. 1-3 Units.**

This course is a hands-on lab in the prototyping and fabrication of tangible technologies, with a special focus in learning and education. We will learn how to use state-of-the-art fabrication machines (3D printers, 3D scanners, laser cutters, routers) to design educational toolkits, educational toys, science kits, and tangible user interfaces. A special focus of the course will be to design low-cost technologies, particularly for urban school in the US and abroad.

Same as: EDUC 211X.

**CS 431. High-Level Vision: Object Representation. 1-3 Units.**

(Formerly CS423 High-Level Vision: Behaviors, Neurons, and Computational Models) Interdisciplinary seminar focusing on understanding how computations in the brain enable rapid and efficient object perception. Covers topics from multiple perspectives drawing on recent research in Psychology, Neuroscience, Computer Science and Applied Statistics. Emphasis on discussing recent empirical findings, methods and theoretical debates in the field. Topics include: theories of object perception, neural computations underlying invariant object perception, how visual exemplars and categories are represented in the brain, what information is present in distributed activations across neural populations and how it relates to object perception, what modern statistical and analytical tools there are for multi-variate analysis of brain activations. Same as: PSYCH 250.

**CS 438X. Innovations in Education: Designing the teaching experience. 3-4 Units.**

A hands-on class about teaching online. Each year students in this course explore a new design challenge related to teaching. Teaching online presents a unique set of challenges and opportunities. From amateur hobbyist to college professor, how might we give every individual the tools to be the best teacher they can be? We welcome graduate students from a wide range of disciplines. Admission by application. Please see more information at <http://dschool.stanford.edu>. Same as: EDUC 338X.

**CS 442. High Productivity and Performance with Domain-specific Languages in Scala. 3 Units.**

Introduction to developing domain specific languages (DSLs) for productivity and performance using the Scala programming language. Goal is to equip students with the knowledge and tools to develop DSLs that can dramatically improve the experience of using high performance computation in important scientific and engineering domains. Aimed at two sorts of students: domain experts who can define key domain specific language elements that capture domain knowledge, and computer scientists who can implement these DSLs using a new DSL framework in Scala. First half of the course will focus on understanding the infrastructure for implementing DSLs in Scala and developing techniques for defining good DSLs. Second half of the course will focus on example DSLs that provide both high-productivity and performance. During the second half of the course groups of students will develop and implement their own DSLs using the Delite DSL process of implementing DSLs for parallel computation. Prerequisites: Systems course such as CS140, CS143 or CS149, and expertise is a particular domain and desire to improve productivity and performance of computation.

**CS 447. Software Design Experiences. 3-4 Units.**

Small teams develop technology prototypes combining product and interaction design. Focus is on software and hardware interfaces, interaction, design aesthetics, and underpinnings of successful design including a reflective, interactive design process, group dynamics of interdisciplinary teamwork, and working with users. Prerequisite: CS 247A.

**CS 448. Topics in Computer Graphics. 3-4 Units.**

Topic changes each quarter. Recent topics: computational photography, data visualization, character animation, virtual worlds, graphics architectures, advanced rendering. See <http://graphics.stanford.edu/courses> for offerings and prerequisites. May be repeated for credit.

**CS 448B. Data Visualization. 3 Units.**

Techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science. Topics: graphical perception, data and image models, visual encoding, graph and tree layout, color, animation, interaction techniques, automated design. Lectures, reading, and project. Prerequisite: one of 147, 148, or equivalent.

**CS 448M. Simulation of Human Movement. 1-4 Units.**

Foundations of human movement and motor control. Motion capture, motion graphs, and kinematic motion controllers. Physics-based optimization and dynamic controllers. Simulation of walking, running, jumping, balance, object manipulation, and airborne maneuvers. Prerequisites: CS248 and CS205A, or equivalent.

**CS 450. Introduction to Biotechnology. 3 Units.**

Academic and industrial experts discuss latest developments in fields such as bioenergy, green process technology, the production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Discussions of biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.

**CS 468. Geometry Processing Algorithms. 3 Units.**

Contents of this course change with each offering. Past offerings have included geometric matching, surface reconstruction, collision detection, computational topology, etc. May be repeated for credit. Fall quarter 2010/11 topic will be Geometry Processing Algorithms. Techniques for modeling and efficient processing of polygonal geometric models. Topics: data structures for polygonal models, discrete differential geometry, mesh parameterization, mesh simplification and remeshing reconstruction from point clouds, mesh editing and deformation, geometric image editing. Recommended: 164.

**CS 469. Algorithms in Mobile Applications. 1 Unitss.**

Review of algorithmic techniques used in popular mobile applications. Students will learn about uses of machine learning, information retrieval, and computer vision in mobile applications. Guest lectures are from industry experts who have created or led successful products. Prerequisites: CS 161.

**CS 476B. Music, Computing, Design II: Mobile Music. 1-4 Units.**

Aesthetic, design, and implementation of mobile music, centered around the modern super smartphones such as the iPhone). Similarities and intrinsic differences between mobile and traditional computing and design for music. Topics include mobile software design, social and cloud computing, mobile interface design, and programming phones, in the service of music. Prerequisite: MUSIC 256A. Same as: MUSIC 256B.

**CS 499. Advanced Reading and Research. 1-15 Units.**

Letter grade only. Advanced reading and research for CS graduate students. Register using the section number associated with the instructor. Prerequisite: consent of instructor.

**CS 499P. Advanced Reading and Research. 1-15 Units.**

Graded satisfactory/no credit. Advanced reading and research for CS graduate students. Register using the section number associated with the instructor. Prerequisite: consent of instructor.

**CS 545. Database and Information Management Seminar. 1 Unitss.**

Current research and industrial innovation in database and information systems.

**CS 546. Seminar on Liberation Technologies. 1 Unitss.**

This one-unit seminar will present speakers relevant in a variety of ways to how various forms of information technology are being used to defend human rights, improve governance, deepen democracy, empower the poor, promote economic development, protect the environment, enhance public health, and pursue a variety of other social goods. Same as: POLISCI 337S.

**CS 547. Human-Computer Interaction Seminar. 1 Unitss.**

Weekly speakers. May be repeated for credit.

**CS 548. Internet and Distributed Systems Seminar. 1 Unitss.**

Guest speakers from academia and industry. May be repeated for credit.

**CS 571. Surgical Robotics Seminar. 1 Unitss.**

Surgical robots developed and implemented clinically on varying scales. Seminar goal is to expose students from engineering, medicine, and business to guest lecturers from academia and industry. engineering and clinical aspects connected to design and use of surgical robots, varying in degree of complexity and procedural role. May be repeated for credit. Same as: ME 571.

**CS 801. TGR Project. 0 Unit.****CS 802. TGR Dissertation. 0 Unit.**

## Dance Courses

**DANCE 13AX. Ballet Intensive. 2 Units.**

Rigorous daily practice that will challenge and expand students' understanding of and perspective on the art form. Focus on strengthening technique, exploring ballet as an expressive form and performing art, and developing an artistic voice.

**DANCE 14AX. Modern Dance: Traditions of Creation. 2 Units.**

Interested in putting your hands in the clay? In this hands-on course, dancers will investigate and re-choreograph some of Robert Moses' signature works. Robert and long-term dancers in his company, Robert Moses Kin, will collaboratively guide students in intensive studio sessions as they revisit the significant issues, techniques, and directions in such seminal works as Word of Mouth, The Soft Sweet Smell of Firm Warm Things and Biography of Baldwin. Elements used to create the works will be re-investigated and re-framed through the lens of the students' experience and perspective. Students will coordinate a showcase of excerpts of their remolded choreography. This class will utilize the language of Robert Moses' repertory to train dancers in the basics of Moses' movement vocabulary. Students will improve and reinforce technical proficiency, artistic range, and performance skills. In addition, students will expand their movement range and vocabulary in a manner that demonstrates an increase in strength, agility, flexibility, and endurance through classical ballet and contemporary modern dance techniques.

**DANCE 27. Faculty Choreography. 1 Unitss.**

Hollis Brown, New Shows: students in this course will work collaboratively to create a new artistic work. Emphasis will be placed on dance's relationship to dialogue and music. This course will provide students with a basic understanding of the development, creation and staging of original performance pieces. The final performance of the new work will be during the final class period with an additional performance in the Bing Concert Hall Rehearsal Studio.

**DANCE 30. The Chocolate Heads Movement Band and Performance. 1 Unitss.**

Students from diverse dance styles (ballet to hip-hop to contemporary) participate in the dance-making/remix process and collaborate with musicians, visual artists, designers and spoken word artists, culminating a multidisciplinary fully produced production and installation.

**DANCE 38. Beginning Ballet Plus. 1 Unitss.**

Introductory ballet class open to all levels of beginners and focusing on the discovery and appreciation of ballet as a body-based knowledge and artistic practice. Structured studio lessons cover the basics of ballet technique including posture, the foundation steps, and ballet terms with an emphasis on the development of coordination, balance, strength, flexibility, sense of line, and sensitivity to rhythm and music. Discussions, video screenings, occasional reading and field trips reference the unfolding of the art form, its technique and aesthetic. Course may be repeated for credit.

**DANCE 42. Dances of Latin America. 1 Unitss.**

Dances of Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru, and Puerto Rico. May be repeated for credit.



**DANCE 43. Liquid Flow: Introduction to Contemporary Dance and Dance-making. 1 Unitss.**

Students learn fundamentals of contemporary dance, using modern technique, yoga and tai chi, focused on organic, successive movement and the continuum within everyday motions to studio dance practice. Basic compositional skills explored, culminating in end of quarter showing.

**DANCE 45. Dance Improvisation Techniques and Strategies Lab: From Hip Hop to Contact. 1 Unitss.**

By learning various dance improvisation forms across cultures, students will develop techniques to gain a deep understanding of generating movement from the inside-out, harnessing that potential for creating dances. Guest dancer/choreographer workshops and Dance Jams enhance the learning experience.

Same as: AFRICAAM 45.

**DANCE 46. Social Dance I. 1 Unitss.**

Introduction to the partner dances found in American popular culture: waltz, swing, tango, club two step, cha cha, merengue, and salsa. May be repeated for credit. (AU).

**DANCE 48. Beginning Ballet. 1 Unitss.**

Fundamentals of ballet technique including posture, placement, the foundation steps, and ballet terms; emphasis on the development of coordination, balance, flexibility, sense of lines, and sensitivity to rhythm and music. May be repeated for credit.

**DANCE 56. Ballet Repertory. 1 Unitss.**

Series of rehearsals focusing on the creation or revival of a choreography to be integrated in the Dance Division repertory and performed during the Division Winter Concert. The course is designed to engage students in acquiring skills working one on one with choreographers or ballet masters, increase adaptability of technique and style, develop movement knowledge base and sense of artistry, and cultivate presence and authority as performers.

**DANCE 57. Dance Repertory: Hope Mohr/Denae Hannah. 1 Unitss.**

Choreographer Hope Mohr/Denae Hannah will set contemporary work from her company repertory as part of an alumni commission initiative. Rehearsal Autumn Quarter. Culminate in performance on Winter Quarter concert. Participation by audition and/or invitation (Rehearsal Director: Diane Frank).

**DANCE 58. Beginning Hip Hop. 1 Unitss.**

Steps and styling in one of America's 21st-century vernacular dance forms. May be repeated for credit.

**DANCE 59. Intermediate-Advanced Hip-Hop. 1 Unitss.**

Steps and styling in one of America's 21st-century vernacular dance forms. May be repeated for credit.

**DANCE 60. The Evolution of Hip Hop and the Dance Stage: From Broadway to Hollywood and MTV. 1 Unitss.**

The repertory of Hip Hop history through steps and choreography. May be repeated for credit.

**DANCE 63. Beginning Dance and Dance Making. 1 Unitss.**

This Choreography course is designed to expose students to fundamental techniques and approaches used in the creation of dance. All of the basic elements of dance composition will be creatively touched upon including: style, form, theme and variation, narrative versus abstract methods of expression, elements of time, quality and use of space, motif and repetition. These different tools will be illustrated and the options and restrictions of each will be explored. Practical assignments will culminate in a performance of work generated and arranged by the instructor and students. The course is recommended for all students interested in the artistic process in a creative situation.

**DANCE 69. The Athletic Body in Dance: Conditioning to Aesthetics. 1 Unitss.**

This course provides instruction in the fundamentals of the goal-oriented body in the artistic practice. Emphasis will be placed on using sports movement as a base for training in dance.

**DANCE 100. Student Choreography: Studio to Stage. 1 Unitss.**

Students develop their own choreographic projects-from initial concept, through rehearsal phase, to culminating performance - under close faculty guidance. The course focuses on choreographic process, with no restrictions on movement vocabulary or movement style. Dancer/choreographers of all forms and genres are strongly encouraged to participate. This course is required for students working towards performance on Divisional concerts. Work includes individual mentoring within rehearsal setting as well as outside of rehearsal. May be repeated for credit.

**DANCE 103. Dance, Text, Gesture: Performance and Composition. 1 Unitss.**

Students practice, compose and combine the languages of dance, gestural movement, music and text, to render complete expression in performance. Suitable for dancers, actors, spoken word artists and triple threat performers to devise original performance, dance and theater, culminating in an end of quarter showing.

Same as: AFRICAAM 103.

**DANCE 108. Hip Hop Meets Broadway. 1 Unitss.**

What happens when Hip Hop meets "Fosse", "Aida", "Dream Girls" and "In the Heights"? The most amazing collaboration of Hip Hop styles adapted to some of the most memorable Broadway Productions. This class will explore the realm between Hip Hop Dance and the Broadway Stage. Infusing Acting thru dance movement and exploring the Art of Lip Sync thru Hip Hop Dance styles.

**DANCE 120. Hip Hop/Pop Fusion and Urban Dance: Choreography. 1 Unitss.**

This class will focus on defining, developing, and exploring stylistic elements in the many variations of Hip Hop and Urban Dance Styles. Visiting Hip Hop professionals will perform.

**DANCE 121. The Day Before Hip Hop: Lecture and Technique. 1 Unitss.**

Lecture and technique study of Hip hop dance (street dance) technique and Hip-hop dance history prior to the existence of the umbrella term "Hip-hop". Fundamental history of various street dance styles which may or may not fall under the umbrella term of Hip hop; technical foundation rooted in an Afro-centric approach to movement that is dynamic, fluid and rhythmically diverse in space.

**DANCE 127L. Viewpoints & Contact Improvisation. 2 Units.**

Aimed at actors and dancers this course develops kinesthetic awareness and physical presence in relationship to others through techniques of focus, spatial intent, task, and choreographic improvisation. Drawing on Contact Improvisation and Viewpoints technique this work centers on developing the capacity to perform with physical versatility from a place of authentic emotional commitment and open creative potential.

Same as: TAPS 127L.

**DANCE 131. Beginning/Intermediate Ballet. 1 Unitss.**

Structured studio practice reviewing the basics of ballet technique including posture, placement, the foundation steps and ballet terms, and progressing to more complex positions and combination of steps. Emphasis is placed on improving forms, developing coordination and connectivity, securing balance, increasing strength, flexibility, sense of lines, and sensitivity to rhythm and music.

**DANCE 140. Intermediate Contemporary Modern Technique. 1 Unitss.**

Intended to sharpen the practical skills of studio dancers, this intermediate contemporary modern technique class will focus on various elements of contemporary modern dance, upright, release and traditional dance styles will be covered. In addition, studio work will focus on phrasing, endurance, technical proficiency, and musicality. There also will be a viewing of a professional live performance and a survey of current influential dance trends. This course will culminate in an end of quarter showing of the material covered in class. An intermediate or advanced understanding of movement forms or dance is advisable.

**DANCE 141. Advanced Contemporary Modern Technique. 2 Units.**

Intended to hone the practical skills of studio dancers this advanced modern technique class will focus on various elements of contemporary dance. In addition to studio work focused on phrasing, endurance, technical proficiency, and musicality there will be viewing of a professional live performance and a survey of current influential dance trends. This course will culminate in an end of quarter showing of the material covered in class. An intermediate or advanced understanding of movement forms or dance is advisable. May be repeated for credit.

**DANCE 144. Intermediate Modern Jazz Dance. 1 Unitss.**

Practical skills of intermediate technique will focus on elements of contemporary jazz dance. Los Angeles, Broadway, and video dance styles will be covered. Studio work will focus on phrasing, endurance, technical proficiency, and musicality. Course includes viewing of a professional live performance. May be repeated for credit.

**DANCE 146. Social Dance II. 1 Unitss.**

Intermediate survey of dances in American popular culture: Lindy hop, Viennese waltz, cross-step waltz, foxtrot, and hustle. May be repeated for credit. Prerequisite: Dance 46 or equivalent.

**DANCE 147. Living Traditions of Swing. 1 Unitss.**

Swing dancing: the early Lindy of the 1920s; 6- and 8-count Lindy hop, Shag, Big Apple, 1950s Rock 'n' Roll swing, disco Hustle and West Coast Swing. Partnering and improvisation. Swing's crosscultural influences and personal creativity. May be repeated for credit.

**DANCE 148. Intermediate Ballet. 1 Unitss.**

Fusing techniques of classical ballet with modern movement philosophies, Erik designs a ballet class that helps dancers to maximize physical potential while minimizing superfluous effort and stress in the body. There is a focus on grounding energy so that strength and length are derived from the floor, using gravity and relaxation as a tool to increase movement options allowing one to discover physical availability. The informative techniques shared in his class are tools for both classical or contemporary dance styles. Erik Wagner worked with San Francisco Ballet, Béjart Ballet Lausanne, and Bern Ballet. His teaching credits include Cedar Lake Contemporary Ballet, Complexions Contemporary Ballet, Les Ballet Jazz du Montreal, Armitage Gone, Basel Ballet, Bern Ballet, as well as international dance festivals and schools.

**DANCE 149. Advanced Ballet. 2 Units.**

Series of studio practices focusing on the strengthening of advanced ballet technique and the adjustment of habits of work through class exercises. The course emphasizes the precision of leg and footwork, the clarity of port-de-bras, and the efficient use of coordination, and aims at developing ease, control and confidence in the student through the practice of expansiveness, creativity and risk taking in a supportive environment.

**DANCE 151H. Improvisational Strategy Laboratory for Innovation through Performance. 4-5 Units.**

Students will build a theoretical and practical foundation for improvisational practices used in Dance and Performance as methodologies for the creation of innovative artistic work. Guest Artists Workshops and a Public Lecture Series will accompany the texts, discussions, videos, and studio practice. We will explore improvisation as both praxis and theory. Texts include work by John Cage, Fred Moten, Anthony Braxton, Twyla Tharpe, Yayoi Kusama, Kwodo Oshun, Bill T. Jones, Harryette Mullen and more.

Same as: DANCE 251H, TAPS 151H, TAPS 351H.

**DANCE 156. Social Dance III. 1 Unitss.**

Advanced survey of the partner dances found in American popular culture: waltz, redowa, Bohemian National Polka, tango, cha cha, salsa, samba. May be repeated for credit. Prerequisite: Dance 46 or equivalent experience.

**DANCE 160. Performance and History: Rethinking the Ballerina. 4 Units.**

The ballerina occupies a unique place in popular imagination as an object of over-determined femininity as well as an emblem of extreme physical accomplishment for the female dancer. This seminar is designed as an investigation into histories of the ballerina as an iconographic symbol and cultural reference point for challenges to political and gender ideals. Through readings, videos, discussions and viewings of live performances this class investigates pivotal works, artists and eras in the global histories of ballet from its origins as a symbol of patronage and power in the 15th century through to its radical experiments as a site of cultural obedience and disobedience in the 20th and 21st centuries.

Same as: TAPS 160, TAPS 260.

**DANCE 161H. Dance, History and Conflict. 4 Units.**

This seminar investigates how moving bodies are compelling agents of social, cultural, and political change. Through readings, videos, discussions and viewings of live performances this class questions the impact of social conflict and war on selected 20th and 21st century dances and dance practices. This class asks to what extent dance, in its history as well as contemporary development, is linked to concepts of the political and conflict.

Same as: TAPS 161H.

**DANCE 162H. Baroque Modernities: Dance, Theater, Film, Political Theory. 4 Units.**

What do seventeenth-century choreography and dramaturgy contribute to (mean to) choreographic and theatrical modernity? How can we explain the recurrent baroque phenomenon across the twentieth century -- becoming particularly prominent in the 1980s -- beyond the historicist accounts of theatrical reconstruction? How does the baroque locate itself within cultural modernity? This seminar asks this question of choreography at several junctures: The analysis of seventeenth century baroque spectacle that fashioned dance and theatre into political tools of monarchical sovereignty; Twentieth-century literature on the Baroque that destabilizes received notions of subjectivity and political sovereignty; Twentieth-century choreography and film that deploys baroque figures and techniques. Thus, our material shall range from seventeenth-century dance and theater to contemporary dance, film and literature.

Same as: TAPS 162H.

**DANCE 167. Performing Indigeneity on Global Stage. 4 Units.**

Explores how indigeneity is expressed and embodied through performance on the global stage.

Same as: NATIVEAM 167.

**DANCE 177. Introduction to Dance on the Global Stage. 4 Units.**

The course will examine and engage with dance cultures from around the world. Through historical and theoretical readings, film screenings, and viewing performances, this course aims to introduce students to a number of theoretical issues central to the study of dance across various disciplines. As a class we set out to explore how dance is more than a set of organized bodily movements, pleasurable to both do and watch. We will consider what cultural work dance performance accomplishes in the world. Same as: CSRE 177B.

**DANCE 190. Special Research. 1-5 Units.**

Topics related to the discipline of dance. May be repeated for credit.

**DANCE 191. Independent Research. 1-18 Units.**

Individual supervision of off-campus internship. Prerequisite: consent of instructor.

**DANCE 197. Dance in Prison: The Arts, Juvenile Justice, and Rehabilitation in America. 4 Units.**

Participatory seminar. The nexus of art, community, and social action, using dance to study how the performing arts affect self-construction, perception and experiences of embodiment, and social control for incarcerated teenagers in Santa Clara Juvenile Hall. Service Learning Course (certified by Haas Center).

**DANCE 251H. Improvisational Strategy Laboratory for Innovation through Performance. 4-5 Units.**

Students will build a theoretical and practical foundation for improvisational practices used in Dance and Performance as methodologies for the creation of innovative artistic work. Guest Artists Workshops and a Public Lecture Series will accompany the texts, discussions, videos, and studio practice. We will explore improvisation as both praxis and theory. Texts include work by John Cage, Fred Moten, Anthony Braxton, Twyla Tharpe, Yayoi Kusama, Kwodo Oshun, Bill T. Jones, Harryette Mullen and more.

Same as: DANCE 151H, TAPS 151H, TAPS 351H.

**DANCE 290. Special Research. 1-18 Units.**

Individual project on the work of any choreographer, period, genre, or dance-related topic. May be repeated for credit.

## Dermatology Courses

**DERM 199. Undergraduate Research. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**DERM 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**DERM 399. Graduate Research. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members. Opportunities are available in dermatopathology, histochemistry, electron microscopy, biochemistry, tissue culture, quantitative and qualitative evaluation of peripheral vascular disease and sweating, immunofluorescent microscopy, connective tissue molecular biology, and wound healing. Prerequisite: consent of instructor.

## Developmental Biology Courses

**DBIO 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**DBIO 200. Genetics and Developmental Biology Training Camp. 1 Unitss.**

Open to first year Department of Genetics and Developmental Biology students, to others with consent of instructors. Introduction to basic manipulations, both experimental and conceptual, in genetics and developmental biology.

Same as: GENE 200.

**DBIO 201. Development and Disease Mechanisms. 4 Units.**

Mechanisms that direct human development from conception to birth. Conserved molecular and cellular pathways regulate tissue and organ development; errors in these pathways result in congenital anomalies and human diseases. Topics: molecules regulating development, cell induction, developmental gene regulation, cell migration, programmed cell death, pattern formation, stem cells, cell lineage, and development of major organ systems. Emphasis on links between development and clinically significant topics including infertility, assisted reproductive technologies, contraception, prenatal diagnosis, multiparity, teratogenesis, inherited birth defects, fetal therapy, adolescence, cancer, and aging.

**DBIO 202. Assisted Reproductive Technologies. 1-3 Units.**

Primary and current literature in basic and clinical science aspects of assisted reproductive technologies (ART), and demonstrations of current ART techniques including in vitro fertilization and embryo culture, and micromanipulation procedures such as intracytoplasmic sperm injection and embryo biopsy and cryopreservation. Class only may be taken for 1 unit. 2 units includes papers and attendance at clinical demonstrations. 3 units includes a term paper. Recommended: DBIO 201, or consent of instructors. Same as: HUMBIO 150A, OBGYN 202.

**DBIO 210. Developmental Biology. 4 Units.**

Current areas of research in developmental biology. How organismic complexity is generated during embryonic and post-embryonic development. The roles of genetic networks, induction events, cell lineage, maternal inheritance, cell-cell communication, and hormonal control in developmental processes in well-studied organisms such as vertebrates, insects, and nematodes. Team-taught. Students meet with faculty to discuss current papers from the literature. Prerequisite: graduate standing, consent of instructor. Recommended: familiarity with basic techniques and experimental rationales of molecular biology, biochemistry, and genetics.

**DBIO 215. Frontiers in Biological Research. 1 Unitss.**

Literature discussion in conjunction with the Frontiers in Biological Research seminar series in which investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker's primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research. Same as: BIOC 215, GENE 215.

**DBIO 220. Genomics and Personalized Medicine. 3 Units.**

Principles of genetics underlying associations between genetic variants and disease susceptibility and drug response. Topics include: genetic and environmental risk factors for complex genetic disorders; design and interpretation of genome-wide association studies; pharmacogenetics; full genome sequencing for disease gene discovery; population structure and genetic ancestry; use of personal genetic information in clinical medicine; ethical, legal, and social issues with personal genetic testing. Hands-on workshop making use of personal or publicly available genetic data. Prerequisite: GENE 202, Gene 203 or BIOS 200. Same as: GENE 210.

**DBIO 221. Current Issues in Aging. 2 Units.**

Current research literature on genetic mechanisms of aging in animals and human beings. Topics include: mitochondria mutations, insulin-like signaling, sirtuins, aging in flies and worms, stem cells, human progeria, and centenarian studies. Prerequisite: GENE 203 or BIOS 200. Same as: GENE 221.

**DBIO 257. The Biology of Stem Cells. 3 Units.**

The role of stem cells in human development and potential for treating disease. Guest lectures by biologists, ethicists, and legal scholars. Prerequisites: 2A,B, or consent of instructor. Same as: HUMBIO 157.

**DBIO 299. Directed Reading in Developmental Biology. 1-18 Units.**

Prerequisite: consent of instructor.

**DBIO 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**DBIO 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**DBIO 802. TGR Dissertation. 0 Unit.**

## Division of Literatures, Cultures, Languages Courses

**DLCL 1. History and Theory of Novel Group. 1 Unitss.**

For undergraduates in English, the DLCL, and East Asian literatures interested in the novel and the events sponsored by the Center for the Study of the Novel (CSN) and to prepare them to attend CSN events with some understanding of the material presented. Each CSN event, the New Book Events, the Ian Watt Lecture on the History and/or Theory of the Novel, and the Center's annual conference, will either be preceded or followed by a colloquium, led by a member of the graduate student staff. In these colloquia, students will engage with the material under discussion, usually written by the speaker(s) on whose work the events are based. Participation at 75% of events and colloquia is mandatory for course credit. Precirculated readings will be made available for all colloquia preceding an event, and often for those held after the event, to enable students to develop a familiarity with issues pertaining to the theoretical and historical study of the novel.

Same as: ENGLISH 1.

**DLCL 189A. Honors Thesis Seminar. 5 Units.**

For undergraduate majors in DLCL departments; required for honors students. Planning, researching, and writing an honors thesis. Oral presentations and peer workshops. Research and writing methodologies, and larger critical issues in literary studies.

**DLCL 189B. Honors Thesis Seminar. 5 Units.**

For undergraduate majors in DLCL departments; required for honors students. Planning, researching, and writing an honors thesis. Oral presentations and peer workshops. Research and writing methodologies, and larger critical issues in literary studies.

**DLCL 189C. Honors Thesis Seminar. 2 Units.**

For undergraduate majors in DLCL departments; required for honors students. Planning, researching, and writing an honors thesis. Oral presentations and peer workshops. Research and writing methodologies, and larger critical issues in literary studies.

**DLCL 209. Paleography of Medieval and Early Modern Manuscripts. 3-5 Units.**

Introductory course in the history of writing and of the book, from the late antique period until the advent of printing. Opportunity to learn to read and interpret medieval manuscripts through hands-on examination of original materials in Special Collections of Stanford Libraries as well as through digital images. Offers critical training in the reading of manuscripts for students from departments as diverse as Classics, History, Philosophy, Religious Studies, English, and the Division of Languages Cultures and Literatures. Same as: CLASSGEN 311, ENGLISH 209, HISTORY 309G, RELIGST 204.

**DLCL 222. Philosophy and Literature. 1 Unitss.**

The Focal Group in Philosophy and Literature brings together scholars and students from eight departments to investigate questions in aesthetics and literary theory, philosophically-inflected literary texts, and the form of philosophical writings. Fields of interest include both continental and analytic philosophy, as well as cognitive science, political philosophy, rational choice theory, and related fields.

**DLCL 224. Workshop in Poetics. 1 Unitss.**

The Workshop in Poetics is concerned with the theoretical and practical dimensions of the reading and criticism of poetry. During the three years of its existence, the Workshop has become a central venue at Stanford enabling participants to share their individual projects in a general conversation outside of disciplinary and national confinements. The two dimensions that the workshop sees as urgent are: poetics in its specificity as an arena for theory and interpretive practice, and historical poetics as a particular set of challenges for the reader and scholar.

**DLCL 293. Literary Translation. 3-5 Units.**

An overview of translation theories and practices over time. The aesthetic, ethical, and political questions raised by the act and art of translation and how these pertain to the translator's tasks. Discussion of particular translation challenges and the decision processes taken to address these issues. Coursework includes assigned theoretical readings, comparative translations, and the undertaking of an individual translation project. Same as: ENGLISH 293.

**DLCL 301. The Learning and Teaching of Second Languages. 3 Units.**

"Formally known as DLCL 201" Learning perspective rather than traditional teaching methods. Focus is on instructional decision making within the context of student intellectual and linguistic development in university settings to different populations. Readings in second-language acquisition.

**DLCL 302. The Learning and Teaching of Second-Language Literatures. 1-3 Units.**

Focuses on the research on advanced level reading and writing in second language contexts with a special focus on upper-level cultural texts. Discussion of second language writing and reading assessment including a writing familiarization workshop. Participants will focus on their cognizant language and literature for the completion of their assignments.

**DLCL 311. Professional Workshop. 1-2 Units.**

Meets regularly throughout the year to discuss issues in the professional study of literature. Topics include the academic job market and the challenges of research and teaching at different types of institutions. Supervised by the graduate affairs committee of the DLCL. May be repeated for credit.

**DLCL 320. Humanities Education in the Changing University. 3 Units.**

Advanced study in the humanities faces changes within fields, the university and the wider culture. Considers the debate over the status of the humanities with regard to historical genealogies and current innovations. Particular attention on changes in doctoral education. Topics include: origins of the research university; disciplines and specialization; liberal education in conflict with professionalization; literature and literacy education; interdisciplinarity as a challenge to departments; education policy; digital humanities; accountability in education, assessment and student-centered pedagogies.  
Same as: COMPLIT 275, GERMAN 250.

**DLCL 321. Classical Seminar: Rethinking Classics. 4-5 Units.**

Literary and philosophical texts from Antiquity (including Homer, the Greek tragedians, Plato, Aristotle, Virgil, and Augustine). In each case, we will examine the cultural contexts in which each text was composed (e.g. political regimes and ideologies; attitudes towards gender and sexuality; hierarchies of class and status; discourses on "barbarians" and resident aliens). We will study various theoretical approaches to these books in an effort to "rethink" these texts in the 21st century.  
Same as: CLASSGEN 321, HUMNTIES 321.

**DLCL 322. Medieval Seminar. 3-5 Units.**

The cultural, literary, and artistic evolution of the Middle Ages. The barbarian invasions and the Germanic ethos, the Celtic heritage, and the monastic tradition. Romanesque art and architecture, pilgrimages, and the Crusades. Gothic aesthetics, chivalry and courtly love, scholasticism, and the rise of universities. The late Middle Ages, humanism, and the threshold of the Renaissance. Texts include: Beowulf, Mabinogion, Song of Roland, Chretien de Troyes' Lancelot and Yvain, Dante's Divine Comedy, Boccaccio's Decameron, and Chaucer's Canterbury Tales. 3-5 units.

**DLCL 323. Early Modern Seminar. 3-5 Units.**

Explores some of the key texts of European early modernity and the critical paradigms according to which the idea of the "Renaissance" has been formed, analyzed, and questioned since the 19th century. Will aim to provide a broad introduction to Early Modern studies from the point of view of the Italian Renaissance and its reception in different European contexts. Taught in English.  
Same as: ITALIAN 220.

**DLCL 324. Enlightenment Seminar. 3-5 Units.**

The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.  
Same as: HISTORY 234, HISTORY 334, HISTORY 432A, HUMNTIES 324.

**DLCL 325. Modern Seminar. 3-5 Units.**

The postmodern condition as post-WWII rupture in Western tradition; moral, political, cultural, and aesthetic dimensions. Sources include literature, philosophy, essays, films, and painting. Authors and artists include: Primo Levi, Hannah Arendt, Alain Resnais, Samuel Beckett, Georges Bataille, Michel Foucault, Theodor Adorno, David Riesman, Georges Perec, Juliet Mitchell, and Francis Bacon.

**DLCL 369. Introduction to Graduate Studies: Criticism as Profession. 5 Units.**

A number of faculty will present published work and discuss their research and composition process. We will read critical, theoretical, and literary texts that address, in different ways, "What is a World?" Taught in English.  
Same as: COMPLIT 369, FRENCH 369, GERMAN 369, ITALIAN 369.

## Drama Courses

## Earth Sciences Courses

**EARTHSCI 1. Current Research in the Earth and Environmental Sciences. 1 Unitss.**

Primarily for freshmen and sophomores. An introduction to faculty and research areas in the School of Earth Sciences, including biogeochemistry, oceanography, paleobiology, geophysics, tectonics, geostatistics, soil science, hydrogeology, energy resources, earth surface processes, geochronology, volcanoes and earthquakes, and remote sensing. May be repeated for credit.

**EARTHSCI 5. Geokids: Earth Sciences Education. 1 Unitss.**

Service learning through the Geokids program. Eight weeks of supervised teaching to early elementary students about Earth sciences. Hands-on teaching strategies for science standards-based instruction.

**EARTHSCI 100. Research Preparation for Undergraduates. 1 Unitss.**

For undergraduates planning to conduct research during the summer with faculty in the School of Earth Sciences. Readings, oral presentations, proposal development. May be repeated for credit.

**EARTHSCI 117. Earth Sciences of the Hawaiian Islands. 4 Units.**

Progression from volcanic processes through rock weathering and soil-ecosystem development to landscape evolution. The course starts with an investigation of volcanic processes, including the volcano structure, origin of magmas, physical-chemical factors of eruptions. Factors controlling rock weathering and soil development, including depth and nutrient levels impacting plant ecosystems, are explored next. Geomorphic processes of landscape evolution including erosion rates, tectonic/volcanic activity, and hillslope stability conclude the course. Methods for monitoring and predicting eruptions, defining spatial changes in landform, landform stability, soil production rates, and measuring biogeochemical processes are covered throughout the course. This course is restricted to students accepted into the Earth Systems of Hawaii Program.  
Same as: EARTHYSYS 117, EESS 117.

**EARTHSCI 180. Introduction to Earth & Environmental Science Research Design. 1 Unitss.**

This course is an introduction to research planning and proposal writing. The primary focus of the course is on practical skill development: identifying relevant scientific literature, reading scientific articles, project planning, and proposal writing. In addition, you will hear from faculty and staff around the university about research methods and the scientific process. The course is designed around writing your own project proposal, with additional skill development exercises. Students are expected to come to this class with a research idea and a research advisor outside of this course. Preference to undergraduates writing applications for summer or honors research grants (e.g., SES, VPUE). Open to other projects and students with instructor permission.

**EARTHSCI 200. Professional Development in Earth Science Education. 1 Unitss.**

For graduate students who wish to gain experience for careers in teaching and mentoring. May be repeated for credit.

**EARTHSCI 201. Earth Science Course Enhancement. 3 Units.**

For graduate students working in collaboration with a faculty member to develop and improve activities for courses within the School of Earth Sciences. Weekly meetings to discuss pedagogical strategies and give feedback on activities. May be repeated for credit.

**EARTHSCI 211. Introduction to Programming for Scientists and Engineers. 3 Units.**

Basic usage of the Python and C/C++ programming languages are introduced and used to solve representative computational problems from various science and engineering disciplines. Software design principles including time and space complexity analysis, data structures, object-oriented design, decomposition, encapsulation, and modularity are emphasized. Usage of ICME and campus wide Linux compute resources: login, file system navigation, editing files, compiling and linking, file transfer, etc. Versioning and revision control, software build utilities, and the LaTeX typesetting software are introduced and used to help complete individual programming assignments and a group project. Same as: CME 211.

**EARTHSCI 218. Communicating Science. 3 Units.**

(Formerly GES 218.) For undergraduates and graduate students interested in teaching science in local schools. Inquiry-based science teaching methods. How to communicate scientific knowledge and improve presentations. Six weeks of supervised teaching in a local school classroom. Prerequisite: course in introductory biology, geology, chemistry, or marine sciences.

**EARTHSCI 251. Negotiation. 3 Units.**

Students learn to prepare for and conduct negotiations in a variety of arenas including getting a job, managing workplace conflict, negotiating transactions, and managing personal relationships. Interactive class. The internationally travelled instructor who has mediated cases in over 75 countries will require students to negotiate real life case studies and discuss their results in class. Application required before first day of class; see Coursework.

Same as: CEE 151, CEE 251.

**EARTHSCI 300. Earth Sciences Seminar. 1 Unitss.**

Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Panel discussions or faculty member presentations at each meeting. May be repeated for credit.

**EARTHSCI 310. Computational Geosciences Seminar. 1 Unitss.**

Weekly lectures focusing on high-performance computing in geoscientific research by experts from academia, national laboratories, industry, and doctoral students. May be repeated for credit.

**EARTHSCI 311. Computational Geomodels. 1 Unitss.**

The objective of this course will be to introduce Earth Science students to numeric and algorithmic models commonly used in computational geosciences (i.e., geomodels). Employing software packages used in industry and academia for data storage, computation and visualization, students will learn the steps necessary for writing and testing software modules for a range of applications. Students will also have the opportunity to gain hands-on experience with the School of Earth Sciences high-performance computer cluster.

**EARTHSCI 312. Integrative Modeling in Earth Sciences. 1 Unitss.**

Capstone Project providing opportunity for independent computational geoscience research project. Students may choose from either list of faculty projects or develop their own. Course will be graded on 1) literature review, 2) written proposal outlining research steps, 3) an oral presentation given at the end of the quarter. Classes will meet weekly and will focus on literature review, proposal writing, and oral presentation skills.

**EARTHSCI 320. Methods of High-Performance Computing in GeoSciences. 1 Unitss.**

Workshop consisting of 8 lectures addressing topics necessary for high-performance computing research on the CEES cluster in the School of Earth Sciences. In addition to attending lectures students will be required to complete a short project related to high-performance computing.

**EARTHSCI 400. Directed Research. 3 Units.**

Independent research for graduate student projects.

**EARTHSCI 401. Curricular Practical Training. 1 Unitss.**

Curricular Practical Training.

## Earth Systems Courses

**EARTHSYS 4. Evolution and Extinction: Introduction to Historical Geology. 4 Units.**

Introduction to the basic tools and principles geologists and paleontologists use to reconstruct the history of the Earth. Principles of stratigraphy, correlation, the geological timescale, the history of biodiversity, and the interpretation of fossils. The use of data from sedimentary geology, geochemistry, and paleontology to test theories for critical events in Earth history such as mass extinctions. Two half-day field trips.

Same as: GES 4.

**EARTHSYS 5. Ecology for Everyone. 4 Units.**

Basics of ecology, from gut bacteria to global climate change. We will link processes at several scales to connect individual behavior, population growth, species interactions and ecosystem function. Combining classroom and field experience, we will see how basic hypothesis testing provides a way to learn about the world by considering the ecology of familiar organisms such as ants, squirrels, trees and some kinds of food. No prerequisites except arithmetic; open to everyone, including but not only those who may be headed for more advanced courses in ecology and environmental science.

Same as: BIO 5.

**EARTHSYS 8. The Oceans: An Introduction to the Marine Environment. 3 Units.**

For non-majors and majors in earth science or environmental science. Students will learn about the major ocean ecosystems and how they function both naturally and under the influence of human activities. Emphasis will be placed on the dominant organisms of each ecosystem and how they interact with each other and their physical and chemical environment. The types of ecosystems discussed will include coral reefs, deep-sea hydrothermal vents, coastal upwelling systems, blue-water oceans, estuaries, near-shore dead zones, etc. The course will incorporate a mix of lectures, multi-media presentations, and group activities.

Same as: EESS 8.

**EARTHSYS 10. Introduction to Earth Systems. 4 Units.**

For non-majors and prospective Earth Systems majors. Multidisciplinary approach using the principles of geology, biology, engineering, and economics to describe how the Earth operates as an interconnected, integrated system. Goal is to understand global change on all time scales. Focus is on sciences, technological principles, and sociopolitical approaches applied to solid earth, oceans, water, energy, and food and population. Case studies: environmental degradation, loss of biodiversity, and resource sustainability.

**EARTHSYS 11SI. Grow It, Cook It, Eat It: Personal Empowerment in Interdisciplinary Food Systems. 2 Units.**

Interdisciplinary examination of sustainable food systems and decision-making at personal, local, and global scales. Discussions focusing on food systems from farm to fork. Hands-on experience farming at the Stanford Educational Farm and cooking in the Stanford Demonstration Kitchen. Guest lecturers from the local food justice movement. Students will become empowered to make informed decisions regarding food choices.

**EARTHSYS 12SC. Environmental and Geological Field Studies in the Rocky Mountains. 2 Units.**

The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and increased demand for its abundant natural resources. These broad topics are integrated into a coherent field-study as we examine earth/ environmental science-related questions in three different settings: 1) the three-billion-year-old rocks and the modern glaciers of the Wind River Mountains of Wyoming; 2) the sediments in the adjacent Wind River basin that host abundant gas and oil reserves and also contain the long-term climate history of this region; and 3) the volcanic center of Yellowstone National Park and the mountainous region of Teton National Park, and the economic and environmental problems associated with gold mining and extraction of oil and gas in areas adjoining these national parks. Students will complete six assignments based upon field exercises, working in small groups to analyze data and prepare reports and maps. Lectures will be held in the field prior to and after fieldwork. Note: This course involves one week of backpacking in the Wind Rivers and hiking while staying in cabins near Jackson Hole, Wyoming. Students must arrive in Salt Lake City on Monday, September 3. (Hotel lodging will be provided for the night of September 3, and thereafter students will travel as a Sophomore College group.) We will return to campus on Friday, September 21.

Same as: EESS 12SC, GES 12SC.

**EARTHSYS 13SC. People, Land, and Water in the Heart of the West. 2 Units.**

Salmon River. Sun Valley. Pioneer Mountains. The names speak of powerful forces and ideas in the American West. Central Idaho - a landscape embracing snow-capped mountains, raging rivers, sagebrush deserts, farms, ranches, and resort communities - is our classroom for this field-based seminar led by David Freyberg, professor of Civil and Environmental Engineering, and David Kennedy, professor emeritus of History. This course focuses on the history and future of a broad range of natural resource management issues in the western United States. We will spend a week on campus preparing for a two-week field course in Idaho exploring working landscapes, private and public lands, water and fisheries, conservation, and the history and literature of the relationship between people and the land in the American West. After the first week spent on campus, we will drive to Idaho to begin the field portion of our seminar. In Idaho, we will spend time near Twin Falls, at Lava Lake Ranch near Craters of the Moon National Monument, in Custer County at the Upper Salmon River, and near Stanley in the Sawtooth National Forest. No prior camping experience is required, but students should be comfortable living outdoors in mobile base camps for periods of several days. Students will investigate specific issues in-depth and present their findings at the end of the course. Same as: CEE 11SC, HISTORY 23SC.

**EARTHSYS 14SI. Human and Environmental Rights from Farm to Fork. 1 Unit.**

This course aims to understand the environmental and human rights implications of our modern globalized food system-from farm, to factory, to international commerce, and finally, to fork. Focus will be on the labor and environmental conditions of industrial agriculture, working conditions and environmental consequences of processing factories, the implications of international food commerce, the modern obesity crisis, and emerging solutions that aim to correct these problems.

Same as: EESS 11SI.

**EARTHSYS 18. Promoting Sustainability Behavior Change at Stanford. 2 Units.**

Stanford Green Living Council training course. Effective strategies for enacting sustainable behavior change on campus. Community-based social marketing, psychology, sociology, and design. Behavior change intervention project targeting a specific sustainable behavior. Lectures online.

**EARTHSYS 37N. Climate Change: Science & Society. 3 Units.**

Preference to freshmen. How and why do greenhouse gases cause climate to change? How will a changing climate affect humans and natural ecosystems? What can we do to prevent climate change and better adapt to the climate change that does occur? This course will focus on developing quantitative understanding of these issues rooted in both the physical and social sciences. Exercises will be based on simple quantitative observations and calculations; algebra only, no calculus.

Same as: EESS 37N.

**EARTHSYS 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration. 3 Units.**

Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include *The Worst Journey in the World* by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar)

Same as: EESS 38N, GES 38N.

**EARTHSYS 39N. The Carbon Cycle: Reducing Your Impact. 3 Units.**

Preference to freshmen. Changes in the long- and short-term carbon cycle and global climate through the burning of fossil fuels since the Industrial Revolution. How people can shrink their carbon footprints. Long-term sources and sinks of carbon and how they are controlled by tectonics and short-term sources and sinks and the interaction between the biosphere and ocean. How people can shrink their carbon footprints. Held at the Stanford Community Farm.

Same as: EESS 39N.

**EARTHSYS 41N. The Global Warming Paradox. 3 Units.**

Preference to freshman. Focus is on the complex climate challenges posed by the substantial benefits of energy consumption, including the critical tension between the enormous global demand for increased human well-being and the negative climate consequences of large-scale emissions of carbon dioxide. Topics include: Earth's energy balance; detection and attribution of climate change; the climate response to enhanced greenhouse forcing; impacts of climate change on natural and human systems; and proposed methods for curbing further climate change. Sources include peer-reviewed scientific papers, current research results, and portrayal of scientific findings by the mass media and social networks.

Same as: EESS 41N.

**EARTHSYS 42. The Global Warming Paradox II. 1 Unitss.**

Further discussion of the complex climate challenges posed by the substantial benefits of energy consumption, including the critical tension between the enormous global demand for increased human well-being and the negative climate consequences of large-scale emissions of carbon dioxide. Discussions will explore topics of student interest, including peer-reviewed scientific papers, current research results, and portrayal of scientific findings by the mass media and social networks. Focus will also be placed on student engagement in on-campus and off-campus activities. Grading is Ltr-CR/NC. Prerequisite: EESS/EARTHSYS 42 or consent of instructor.

Same as: EESS 42.

**EARTHSYS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough. 3 Units.**

Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries, and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's *Changes in a California Estuary: A Profile of Elkhorn Slough*. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.

Same as: EESS 46N.

**EARTHSYS 49N. Multi-Disciplinary Perspectives on a Large Urban Estuary: San Francisco Bay. 3 Units.**

This course will be focused around San Francisco Bay, the largest estuary on the Pacific coasts of both North and South America as a model ecosystem for understanding the critical importance and complexity of estuaries. Despite its uniquely urban and industrial character, the Bay is of immense ecological value and encompasses over 90% of California's remaining coastal wetlands. Students will be exposed to the basics of estuarine biogeochemistry, microbiology, ecology, hydrodynamics, pollution, and ecosystem management/restoration issues through lectures, interactive discussions, and field trips. Knowledge of introductory biology and chemistry is recommended.

Same as: EESS 49N.

**EARTHSYS 56Q. Changes in the Coastal Ocean: The View From Monterey and San Francisco Bays. 3 Units.**

Preference to sophomores. Recent changes in the California current, using Monterey Bay as an example. Current literature introduces principles of oceanography. Visits from researchers from MBARI, Hopkins, and UCSC. Optional field trip to MBARI and Monterey Bay.

Same as: EESS 56Q.

**EARTHSYS 57Q. Climate Change from the Past to the Future. 3 Units.**

Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history.

Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.

Same as: EESS 57Q.

**EARTHSYS 61Q. Food and security. 3 Units.**

The course will provide a broad overview of key policy issues concerning agricultural development and food security, and will assess how global governance is addressing the problem of food security. At the same time the course will provide an overview of the field of international security, and examine how governments and international institutions are beginning to include food in discussions of security.

Same as: EESS 61Q, INTNLREL 61Q.

**EARTHSYS 70. How the Earth Works: Physics for Earth and Environmental Scientists. 3 Units.**

How do tsunamis form? What drives a hurricane? How are environmental pollutants transported? Introduction to the study of motion, forces, waves, and electromagnetism from the perspective of Earth and environmental scientists. Examination of the physics behind Earth processes that shape the environment we live in. Topics include groundwater flow, geothermal gradients, tidal and tsunami wave motion, seismic waves, earthquake propagation and hazard assessment, and the energy of photosynthesis. Lab/computer exercises incorporated into class time. Prerequisites: GES 1A, B or C or EARTHSYS 10 or GEOPHYS 113; and MATH 21 or 42; or instructor consent.

**EARTHSYS 100. Environmental and Geological Field Studies in the Rocky Mountains. 3 Units.**

Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns.

Same as: EESS 101, GES 101.

**EARTHSYS 101. Energy and the Environment. 3 Units.**

Energy use in modern society and the consequences of current and future energy use patterns. Case studies illustrate resource estimation, engineering analysis of energy systems, and options for managing carbon emissions.

Focus is on energy definitions, use patterns, resource estimation, pollution.

Recommended: MATH 21 or 42.

Same as: ENERGY 101.

**EARTHSYS 102. Renewable Energy Sources and Greener Energy Processes. 3 Units.**

The energy sources that power society are rooted in fossil energy although energy from the core of the Earth and the sun is almost inexhaustible; but the rate at which energy can be drawn from them with today's technology is limited. The renewable energy resource base, its conversion to useful forms, and practical methods of energy storage. Geothermal, wind, solar, biomass, and tidal energies; resource extraction and its consequences.

Recommended: MATH 21 or 42.

Same as: ENERGY 102.

**EARTHSYS 103. Energy Resources. 4-5 Units.**

Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities.

Optional discussion section for extra unit. CEE 173 is offered for 4-5 units; ES 103 is offered for 4-5 units; CEE 207A is offered for 3-5 units: instructor approval required for 3-unit option.

Same as: CEE 173A, CEE 207A.

**EARTHSYS 104. The Water Course. 3 Units.**

The pathway that water takes from rainfall to the tap using student home towns as an example. How the geological environment controls the quantity and quality of water; taste tests of water from around the world. Current U.S. and world water supply issues. Offered occasionally.

Same as: GEOPHYS 104.



**EARTHSYS 105. Food and Community: New Visions for a Sustainable Future. 3-5 Units.**

Service and research focused on providing healthy and environmentally friendly food for the under served in our community. Hands-on collaboration with the Stanford Glean student group, the Stanford Community Garden, and San Francisco nonprofits. Coverage of the broad spectrum from garden development to food dispersal to the needy. Design and implementation of projects that address an aspect of food and social justice, such as urban farming in low-income communities and sustainable food networks for the elderly. Service Learning Course (certified by Haas Center). Limited enrollment. May be repeated for credit. Same as: EESS 105.

**EARTHSYS 105A. Ecology and Natural History of Jasper Ridge Biological Preserve. 4 Units.**

Formerly 96A - Jasper Ridge Docent Training. First of two-quarter sequence training program to join the Jasper Ridge education/docent program. The scientific basis of ecological research in the context of a field station, hands-on field research, field ecology and the natural history of plants and animals, species interactions, archaeology, geology, hydrology, land management, multidisciplinary environmental education; and research projects, as well as management challenges of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes and research, and attend continuing education classes available to members of the JRBP community after the course.

Same as: BIO 105A.

**EARTHSYS 105B. Ecology and Natural History of Jasper Ridge Biological Preserve. 4 Units.**

Formerly 96B - Jasper Ridge Docent Training. First of two-quarter sequence training program to join the Jasper Ridge education/docent program. The scientific basis of ecological research in the context of a field station, hands-on field research, field ecology and the natural history of plants and animals, species interactions, archaeology, geology, hydrology, land management, multidisciplinary environmental education; and research projects, as well as management challenges of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes and research, and attend continuing education classes available to members of the JRBP community after the course.

Same as: BIO 105B.

**EARTHSYS 106. World Food Economy. 5 Units.**

The interrelationships among food, populations, resources, and economic development. The role of agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis is on public sector decision making as it relates to food policy.

Same as: ECON 106, EESS 106.

**EARTHSYS 108. Coastal Wetlands. 3 Units.**

Ecological structure and function of wetlands emphasizing local, coastal wetlands. Topics include: wetland distribution, classification, and history; and interactions between biotic and abiotic components of wetland ecosystems. Labs and local field trips for exposure to landscape patterns, and common sampling equipment and methods. Recommended: 104 or CEE 166A.

Same as: EARTHSYS 208.

**EARTHSYS 109. Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision. 2 Units.**

Examination of program-based local actions that promote resource conservation and an educational environment for sustainability. Examination of building-level actions that contribute to conservation, lower utility costs, and generate understanding of sustainability consistent with Stanford's commitment to sustainability as a core value. Overview of operational sustainability including energy, water, buildings, waste, and food systems. Practical training to enable students to become sustainability coordinators for their dorms or academic units. Same as: CEE 109, ENVRINST 109.

**EARTHSYS 111. Biology and Global Change. 4 Units.**

The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisite: Biology or Human Biology core or graduate standing.

Same as: BIO 117, EESS 111.

**EARTHSYS 112. Human Society and Environmental Change. 4 Units.**

Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A

Same as: EESS 112, HISTORY 103D.

**EARTHSYS 113. Earthquakes and Volcanoes. 3 Units.**

Earthquake location, magnitude and intensity scales, seismic waves, styles of eruptions and volcanic hazards, tsunami waves, types and global distribution of volcanoes, volcano forecasting. Plate tectonics as a framework for understanding earthquake and volcanic processes. Forecasting; earthquake resistant design; building codes; and probabilistic hazard assessment. For non-majors and potential earth scientists. Offered every year, spring quarter.

Same as: GEOPHYS 113.

**EARTHSYS 116. Ecology of the Hawaiian Islands. 4 Units.**

Terrestrial and marine ecology and conservation biology of the Hawaiian Archipelago. Taught in the field in Hawaii as part of quarter-long sequence of courses including Earth Sciences and Anthropology. Topics include ecological succession, plant-soil interactions, conservation biology, biological invasions and ecosystem consequences, and coral reef ecology. Restricted to students accepted into the Earth Systems of Hawaii Program.

Same as: BIO 116.

**EARTHSYS 117. Earth Sciences of the Hawaiian Islands. 4 Units.**

Progression from volcanic processes through rock weathering and soil-ecosystem development to landscape evolution. The course starts with an investigation of volcanic processes, including the volcano structure, origin of magmas, physical-chemical factors of eruptions. Factors controlling rock weathering and soil development, including depth and nutrient levels impacting plant ecosystems, are explored next. Geomorphic processes of landscape evolution including erosion rates, tectonic/volcanic activity, and hillslope stability conclude the course. Methods for monitoring and predicting eruptions, defining spatial changes in landform, landform stability, soil production rates, and measuring biogeochemical processes are covered throughout the course. This course is restricted to students accepted into the Earth Systems of Hawaii Program.

Same as: EARTHSCI 117, EESS 117.

**EARTHSYS 118. Heritage, Environment, and Sovereignty in Hawaii. 4 Units.**

This course explores the cultural, political economic, and environmental status of contemporary Hawaiians. What sorts of sustainable economic and environmental systems did Hawaiians use in prehistory? How was colonization of the Hawaiian Islands informed and shaped by American economic interests and the nascent imperialism of the early 20th century? How was sovereignty and Native Hawaiian identity shaped by these forces? How has tourism and the leisure industry affected the natural environment? This course uses archaeological methods, ethnohistorical sources, and historical analysis in an exploration of contemporary Hawaiian social economic and political life.

Same as: ANTHRO 118.

**EARTHSYS 122. Paleobiology. 4 Units.**

Introduction to the fossil record with emphasis on marine invertebrates. Major debates in paleontological research. The history of animal life in the oceans. Topics include the nature of the fossil record, evolutionary radiations, mass extinctions, and the relationship between biological evolution and environmental change. Fossil taxa through time. Exercises in phylogenetics, paleoecology, biostratigraphy, and statistical methods.

Same as: GES 123.

**EARTHSYS 123. From Local to Global: Collaborations for International Environmental Education. 2 Units.**

A collaboration with three universities in Africa. Discourse and debate using Internet and mobile technology interactions. Topics include the global environment, climate change, sustainable development, and food security.

Same as: EDUC 122X.

**EARTHSYS 124. Environmental Justice: Local, National, and International Dimensions. 4 Units.**

Focus is on whether minorities and low income citizens suffer disproportionate environmental and health impacts resulting from government and corporate decision making in contexts such as the siting of industrial facilities and waste dumps, toxic chemical use and distribution, and the enforcement of environmental mandates and policies. Implications of environmental justice issues at the international level, emphasizing climate change.

Same as: EARTHSYS 224.

**EARTHSYS 126. Institutions and the Natural Environment. 4 Units.**

Institutional theory is one of the most dynamic fields in social science today. The course will explore foundational and more recent literature in institutional theory from different disciplinary perspectives as it applies to environmental issues. Critical reading and active discussions will contribute to a deeper understanding of how environmental change is informed by institutions and organizations. Enrollment is limited to graduate students or permission from the instructor.

Same as: EARTHSYS 226, EESS 126, EESS 226.

**EARTHSYS 131. Communicating Environmental Research Using Narratives and Stories. 1 Unitss.**

Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

Same as: EARTHSYS 231, EESS 131, EESS 231.

**EARTHSYS 132. Energy and Climate Cooperation in the Western Hemisphere. 4 Units.**

Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

Same as: EARTHSYS 232, INTNLREL 146A, IPS 263.

**EARTHSYS 133. Climate Change Law and Policy: From California to the Federal Government. 3 Units.**

California climate laws, including the California Global Warming Solutions Act of 2006 (AB32), the Clean Cars and Trucks Bill (SB 1493), and the Greenhouse Gas Emissions Performance Standard (SB 1368), and complementary and subsidiary regulations such as the Renewable Portfolio Standard, the Low Carbon Fuel Standard, land use law, and energy efficiency and decoupling. The draft scoping plan to outline California's policies for achieving its ambitious economy-wide reductions in greenhouse gas emissions. The Western Climate Initiative. The history, details, and current status of California's efforts as platforms to delve into larger legal issues.

Same as: EARTHSYS 233.

**EARTHSYS 134. Stable Isotopes in Biogeochemistry. 3 Units.**

Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals.

Same as: EARTHSYS 234, EESS 134, EESS 234.

**EARTHSYS 135. Podcasting the Anthropocene. 1 Unitss.**

Identification and interview of a Stanford researcher to be featured in an audio podcast. Exploration of interviewing techniques, audio manipulation, and podcasting as a newly emerging media platform. Individual and group projects. Group workshops focused on preparation, review, and critiques of podcasts.

Same as: EARTHSYS 235.

**EARTHSYS 141. Remote Sensing of the Oceans. 3-4 Units.**

How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features.

Same as: EARTHSYS 241, EESS 141, EESS 241.

**EARTHSYS 142. Remote Sensing of Land. 4 Units.**

The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

Same as: EARTHSYS 242, EESS 162, EESS 262.

**EARTHSYS 142A. Negotiating Sustainable Development. 3 Units.**

How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.  
Same as: CEE 142A, CEE 242A, EARTHSYS 242A.

**EARTHSYS 143J. Climate Change in the West: A History of the Future. 5 Units.**

Global warming is changing the American West. But this region is no stranger to environmental change and human adaption to harsh environments. How can history create more clear thinking about the current crisis and choices for the future? The long history of climate change in the West, as well as current warming, through scientific research, historical sources, environmental histories, and visions for the future, including plans for mitigation and adaption, scientific predictions, and science fiction.  
Same as: HISTORY 243J.

**EARTHSYS 144. Fundamentals of Geographic Information Science (GIS). 4 Units.**

Survey of geographic information including maps, satellite imagery, and census data, approaches to spatial data, and tools for integrating and examining spatially-explicit data. Emphasis is on fundamental concepts of geographic information science and associated technologies. Topics include geographic data structure, cartography, remotely sensed data, statistical analysis of geographic data, spatial analysis, map design, and geographic information system software. Computer lab assignments.  
Same as: EESS 164.

**EARTHSYS 145. The Environmental History of North America. 4-5 Units.**

Concentrates on anthropogenic environmental change and its consequences for both the natural environment and human society. Human alteration of the continent began well before the arrival of Europeans, and many developments usually considered as only human history are embedded in a wider environmental history. Begins with the Columbian Exchange and the demographic disaster that followed and ends with global climate change.  
Same as: HISTORY 169.

**EARTHSYS 146A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.  
Same as: EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A.

**EARTHSYS 146B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. This course will give an overview of the structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic Circumpolar Current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A or EESS 246A, or CEE 164 or CEE 262D, or consent of instructor.  
Same as: EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B.

**EARTHSYS 147. Controlling Climate Change in the 21st Century. 3 Units.**

Climate change is a global environmental, social, cultural and economic challenge. Responding to this challenge requires a paradigm shift which will alter energy production, transport, industry, politics, development strategies, north/south equity, and individual freedom and responsibilities around the world. Given the short term planning horizon of the majority of political, economic and social institutions, the slow burn of climate change presents major policy challenges. The course is designed to clarify the primary issues embedded in these challenges.  
Same as: BIO 147, BIO 247, EARTHSYS 247, HUMBIO 116.

**EARTHSYS 151. Biological Oceanography. 3-4 Units.**

Required for Earth Systems students in the oceans track. Interdisciplinary look at how oceanic environments control the form and function of marine life. Topics include distributions of planktonic production and abundance, nutrient cycling, the role of ocean biology in the climate system, expected effects of climate changes on ocean biology. Local weekend field trips. Designed to be taken concurrently with Marine Chemistry (EESS/EARTHSYS 152/252). Prerequisites: BIO 43 and EESS 8 or equivalent.  
Same as: EARTHSYS 251, EESS 151, EESS 251.

**EARTHSYS 152. Marine Chemistry. 3-4 Units.**

Introduction to the interdisciplinary knowledge and skills required to critically evaluate problems in marine chemistry and related disciplines. Physical, chemical, and biological processes that determine the chemical composition of seawater. Air-sea gas exchange, carbonate chemistry, and chemical equilibria, nutrient and trace element cycling, particle reactivity, sediment chemistry, and diagenesis. Examination of chemical tracers of mixing and circulation and feedbacks of ocean processes on atmospheric chemistry and climate. Designed to be taken concurrently with Biological Oceanography (EESS/EARTHSYS 151/251)  
Same as: EARTHSYS 252, EESS 152, EESS 252.

**EARTHSYS 155. Science of Soils. 3-4 Units.**

Physical, chemical, and biological processes within soil systems. Emphasis is on factors governing nutrient availability, plant growth and production, land-resource management, and pollution within soils. How to classify soils and assess nutrient cycling and contaminant fate. Recommended: introductory chemistry and biology.  
Same as: EESS 155.

**EARTHSYS 156. Soil and Water Chemistry. 1-4 Units.**

(Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.  
Same as: EARTHSYS 256, EESS 156, EESS 256.

**EARTHSYS 156M. Marine Resource Economics and Conservation. 5 Units.**

Economic and ecological frameworks to understand the causes of and potential solutions to marine resource degradation. Focus on conservation of marine biodiversity and ecosystem-based management. Applications include: commercial and recreational fisheries, marine reserves, and offshore energy production.

Same as: ECON 156, HUMBIO 111M.

**EARTHSYS 158. Geomicrobiology. 3 Units.**

How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

Same as: EARTHSYS 258, EESS 158, EESS 258.

**EARTHSYS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction. 3 Units.**

Extracting information from data using statistical summaries and graphical visualization, statistical measures of association and correlation, distribution models, sampling, error estimation and confidence intervals, linear models and regression analysis, introduction to time-series and spatial data with geostatistics, applications including environmental monitoring, natural hazards, and experimental design.

Same as: EESS 160.

**EARTHSYS 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics. 3-4 Units.**

Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools.

Same as: EESS 161, ENERGY 161.

**EARTHSYS 164. Introduction to Physical Oceanography. 4 Units.**

The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53). (Note: this course will be offered Win Qtr 2012-13. For Academic Year 2013-14, this course will potentially be moved to Aut Qtr)

Same as: CEE 164, CEE 262D, EESS 148.

**EARTHSYS 170. Environmental Geochemistry. 4 Units.**

Solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and chemical interactions. Contrast between natural sources of hazardous elements and compounds and types and sources of anthropogenic contaminants and pollutants. Chemical and physical processes of weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. The release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The impact of contaminants and design of remediation strategies. Case studies. Prerequisite: 90 or consent of instructor.

Same as: GES 170.

**EARTHSYS 173. Aquaculture and the Environment: Science, History, and Policy. 3 Units.**

Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures. By application only - instructor consent required. Contact gerhart@stanford.edu or dhklinger@stanford.edu prior to first day of class.

Same as: EARTHSYS 273, EESS 173, EESS 273.

**EARTHSYS 174. Marine Biodiversity: Law, Science, and Policy. 3 Units.**

Examination of the mechanisms that create marine biodiversity and the ways in which biodiversity and natural resources are linked. Introduction to the federal laws and policies that impact marine biodiversity and natural resources. Interactions between biological and political systems.

Same as: EARTHSYS 274.

**EARTHSYS 175. California Coast: Science, Policy, and Law. 3-4 Units.**

Same as LAW 514. Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.

Same as: CEE 175A, CEE 275A, EARTHSYS 275.

**EARTHSYS 177. Interdisciplinary Research Survival Skills. 2 Units.**

Learning in interdisciplinary situations. Framing research questions. Developing research methods that benefit from interdisciplinary understanding. Writing for multiple audiences and effectively making interdisciplinary presentations. Discussions with interdisciplinary experts from across campus regarding interdisciplinary research projects.

Same as: EARTHSYS 277.

**EARTHSYS 178. The Ethics of Environmental Choices. 4 Units.**

(Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

Same as: EARTHSYS 278, PHIL 178A, PHIL 278A.

**EARTHSYS 179S. Issues in Environmental Science, Technology and Sustainability. 1-2 Units.**

Weekly seminar series that explores a wide range of topics associated with the environmental science and engineering and sustainability. Students taking the class for one unit must generate critiques and participate in discussion sections for a subset of the seminars. Students taking the class for 2 units will in addition to the one unit requirements will give a presentation on a relevant topic of their own choosing.

Same as: CEE 179S, CEE 279S, EESS 179S.

**EARTHSYS 180B. Principles and Practices of Sustainable Agriculture. 3-4 Units.**

Field-based training in ecologically sound agricultural practices at the Stanford Community Farm. Weekly lessons, field work, and group projects. Field trips to educational farms in the area. Topics include: soils, composting, irrigation techniques, IPM, basic plant anatomy and physiology, weeds, greenhouse management, and marketing.

Same as: EESS 180B.

**EARTHSYS 181. Concepts of Urban Agriculture. 3 Units.**

For advanced undergraduates and graduate students from all fields. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips are required. Students must attend one field trip from group A and another from group B. See below. Enrollment is limited. Application on the first day of class, attendance mandatory. Enrollment permissions will be determined after first class meeting. Contact [tcostell@stanford.edu](mailto:tcostell@stanford.edu) with questions. Group A: Community Urban Gardens - Saturday, April 14 (morning); Saturday, April 21 (morning) Group B: Commercial Urban Agriculture Operations - Friday, April 20 (all day); Friday, April 27 (all day)

Same as: EARTHSYS 281, EESS 181, EESS 281.

**EARTHSYS 182. Current Issues in Sustainable Agriculture. 2 Units.**

Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.

Same as: EARTHSYS 282, EESS 182, EESS 282.

**EARTHSYS 183. Food Matters: Agriculture in Film. 1 Unit.**

Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.

Same as: EARTHSYS 283, EESS 183, EESS 283.

**EARTHSYS 184. Climate and Agriculture. 3-4 Units.**

The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.

Same as: EARTHSYS 284, EESS 184, EESS 284.

**EARTHSYS 188. Social and Environmental Tradeoffs in Climate Decision-Making. 1-2 Units.**

How can we ensure that measures taken to mitigate global climate change don't create larger social and environmental problems? What metrics should be used to compare potential climate solutions beyond cost and technical feasibility, and how should these metrics be weighed against each other? How can modeling efforts and stakeholder engagement be best integrated into climate decision making? What information are we still missing to make fully informed decisions between technologies and policies? Exploration of these questions, alongside other issues related to potential negative externalities of emerging climate solutions. Evaluation of energy, land use, and geoengineering approaches in an integrated context, culminating in a climate stabilization group project.

Same as: EARTHSYS 288.

**EARTHSYS 195. Natural Hazards and Risk Communication. 3 Units.**

Introduction to the science behind natural hazards, the risks associated with these hazards, and effective methods of communicating them to a variety of audiences. Examination of methods of translation and communication. Investigation of the relative effectiveness of these methods for increasing preparedness and resiliency to natural hazards. Satisfies the Earth Systems WIM requirement.

**EARTHSYS 199. Honors Program in Earth Systems. 1-9 Units.****EARTHSYS 200. Sustaining Action: Research, Analysis and Writing for the Public. 3 Units.**

Preference to graduate students and senior undergraduates in environmental, natural and social sciences, engineering, journalism. Students help produce and publish SAGE, an eco advice column, by choosing, researching, and answering questions about sustainable living submitted by Stanford alumni and the general public. Prerequisite: admission by application, available from instructor, [thayden@stanford.edu](mailto:thayden@stanford.edu), and due 9/21/11 (Aut) or 3/28/12 (Spr). (Meets Earth Systems WIM requirement). Same as: ENVRES 200.

**EARTHSYS 208. Coastal Wetlands. 3 Units.**

Ecological structure and function of wetlands emphasizing local, coastal wetlands. Topics include: wetland distribution, classification, and history; and interactions between biotic and abiotic components of wetland ecosystems. Labs and local field trips for exposure to landscape patterns, and common sampling equipment and methods. Recommended: 104 or CEE 166A.

Same as: EARTHSYS 108.

**EARTHSYS 210A. Senior Seminar. 3 Units.**

Interdisciplinary problem analysis and oral communication. Students present results of their Earth Systems internship or research project. Students participate in a research or service learning group project focused on a local environmental issue. Service Learning Course (certified by Haas Center). Prerequisite: EARTHSYS 260.

**EARTHSYS 210B. Senior Seminar. 3 Units.**

Interdisciplinary problem analysis and oral communication. Students present results of their Earth Systems internship or research project. Students participate in a research or service learning group project focused on a local environmental issue. Service Learning Course (certified by Haas Center). Prerequisite: EARTHSYS 260.

**EARTHSYS 210C. Senior Seminar. 3 Units.**

Interdisciplinary problem analysis and oral communication. Students present results of their Earth Systems internship or research project. Students participate in a research or service learning group project focused on a local environmental issue. Service Learning Course (certified by Haas Center). Prerequisite: EARTHSYS 260.

**EARTHSYS 210D. Senior Seminar. 3 Units.**

Interdisciplinary problem analysis and oral communication. Students present results of their Earth Systems internship or research project. Students participate in a research or service learning group project focused on a local environmental issue. Service Learning Course (certified by Haas Center). Prerequisite: EARTHSYS 260.

**EARTHSYS 211. Fundamentals of Modeling. 3-5 Units.**

Simulation models are a powerful tool for environmental research, if used properly. The major concepts and techniques for building and evaluating models. Topics include model calibration, model selection, uncertainty and sensitivity analysis, and Monte Carlo and bootstrap methods. Emphasis is on gaining hands-on experience using the R programming language. Prerequisite: basic knowledge of statistics. Same as: EESS 211.

**EARTHSYS 224. Environmental Justice: Local, National, and International Dimensions. 4 Units.**

Focus is on whether minorities and low income citizens suffer disproportionate environmental and health impacts resulting from government and corporate decision making in contexts such as the siting of industrial facilities and waste dumps, toxic chemical use and distribution, and the enforcement of environmental mandates and policies. Implications of environmental justice issues at the international level, emphasizing climate change.

Same as: EARTHSYS 124.

**EARTHSYS 226. Institutions and the Natural Environment. 4 Units.**

Institutional theory is one of the most dynamic fields in social science today. The course will explore foundational and more recent literature in institutional theory from different disciplinary perspectives as it applies to environmental issues. Critical reading and active discussions will contribute to a deeper understanding of how environmental change is informed by institutions and organizations. Enrollment is limited to graduate students or permission from the instructor.

Same as: EARTHSYS 126, EESS 126, EESS 226.

**EARTHSYS 231. Communicating Environmental Research Using Narratives and Stories. 1 Unitss.**

Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

Same as: EARTHSYS 131, EESS 131, EESS 231.

**EARTHSYS 232. Energy and Climate Cooperation in the Western Hemisphere. 4 Units.**

Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

Same as: EARTHSYS 132, INTNLREL 146A, IPS 263.

**EARTHSYS 233. Climate Change Law and Policy: From California to the Federal Government. 3 Units.**

California climate laws, including the California Global Warming Solutions Act of 2006 (AB32), the Clean Cars and Trucks Bill (SB 1493), and the Greenhouse Gas Emissions Performance Standard (SB 1368), and complementary and subsidiary regulations such as the Renewable Portfolio Standard, the Low Carbon Fuel Standard, land use law, and energy efficiency and decoupling. The draft scoping plan to outline California's policies for achieving its ambitious economy-wide reductions in greenhouse gas emissions. The Western Climate Initiative. The history, details, and current status of California's efforts as platforms to delve into larger legal issues.

Same as: EARTHSYS 133.

**EARTHSYS 234. Stable Isotopes in Biogeochemistry. 3 Units.**

Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals.

Same as: EARTHSYS 134, EESS 134, EESS 234.

**EARTHSYS 235. Podcasting the Anthropocene. 1 Unitss.**

Identification and interview of a Stanford researcher to be featured in an audio podcast. Exploration of interviewing techniques, audio manipulation, and podcasting as a newly emerging media platform. Individual and group projects. Group workshops focused on preparation, review, and critiques of podcasts.

Same as: EARTHSYS 135.

**EARTHSYS 241. Remote Sensing of the Oceans. 3-4 Units.**

How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features.

Same as: EARTHSYS 141, EESS 141, EESS 241.

**EARTHSYS 242. Remote Sensing of Land. 4 Units.**

The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

Same as: EARTHSYS 142, EESS 162, EESS 262.

**EARTHSYS 242A. Negotiating Sustainable Development. 3 Units.**

How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.

Same as: CEE 142A, CEE 242A, EARTHSYS 142A.

**EARTHSYS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

Same as: EARTHSYS 146A, EESS 146A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A.

**EARTHSYS 246B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. This course will give an overview of the structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic Circumpolar Current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A or EESS 246A, or CEE 164 or CEE 262D, or consent of instructor.

Same as: EARTHSYS 146B, EESS 146B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B.

**EARTHSYS 247. Controlling Climate Change in the 21st Century. 3 Units.**

Climate change is a global environmental, social, cultural and economic challenge. Responding to this challenge requires a paradigm shift which will alter energy production, transport, industry, politics, development strategies, north/south equity, and individual freedom and responsibilities around the world. Given the short term planning horizon of the majority of political, economic and social institutions, the slow burn of climate change presents major policy challenges. The course is designed to clarify the primary issues embedded in these challenges.

Same as: BIO 147, BIO 247, EARTHSYS 147, HUMBIO 116.

**EARTHSYS 250. Directed Research. 1-9 Units.**

Independent research related to student's primary track, carried out after the junior year, during the summer, and/or during the senior year. Student develops own project with faculty supervision. 10-15 page thesis. May be repeated for credit.

**EARTHSYS 251. Biological Oceanography. 3-4 Units.**

Required for Earth Systems students in the oceans track. Interdisciplinary look at how oceanic environments control the form and function of marine life. Topics include distributions of planktonic production and abundance, nutrient cycling, the role of ocean biology in the climate system, expected effects of climate changes on ocean biology. Local weekend field trips. Designed to be taken concurrently with Marine Chemistry (EESS/EARTHSYS 152/252). Prerequisites: BIO 43 and EESS 8 or equivalent. Same as: EARTHSYS 151, EESS 151, EESS 251.

**EARTHSYS 252. Marine Chemistry. 3-4 Units.**

Introduction to the interdisciplinary knowledge and skills required to critically evaluate problems in marine chemistry and related disciplines. Physical, chemical, and biological processes that determine the chemical composition of seawater. Air-sea gas exchange, carbonate chemistry, and chemical equilibria, nutrient and trace element cycling, particle reactivity, sediment chemistry, and diagenesis. Examination of chemical tracers of mixing and circulation and feedbacks of ocean processes on atmospheric chemistry and climate. Designed to be taken concurrently with Biological Oceanography (EESS/EARTHSYS 151/251)

Same as: EARTHSYS 152, EESS 152, EESS 252.

**EARTHSYS 256. Soil and Water Chemistry. 1-4 Units.**

(Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.

Same as: EARTHSYS 156, EESS 156, EESS 256.

**EARTHSYS 258. Geomicrobiology. 3 Units.**

How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

Same as: EARTHSYS 158, EESS 158, EESS 258.

**EARTHSYS 260. Internship. 1-9 Units.**

Supervised field, lab, or private sector project. May consist of directed research under the supervision of a Stanford faculty member, participation in one of several off campus Stanford programs, or an approved non-Stanford program relevant to the student's Earth Systems studies. Required of and restricted to declared Earth Systems majors. Includes 15-page technical summary research paper that is subject to iterative revision. (WIM).

**EARTHSYS 272. Antarctic Marine Geology. 3 Units.**

For upper-division undergraduates and graduate students. Intermediate and advanced topics in marine geology and geophysics, focusing on examples from the Antarctic continental margin and adjacent Southern Ocean.

Topics: glaciers, icebergs, and sea ice as geologic agents (glacial and glacial marine sedimentology, Southern Ocean current systems and deep ocean sedimentation), Antarctic biostratigraphy and chronostratigraphy (continental margin evolution). Students interpret seismic lines and sediment core/well log data. Examples from a recent scientific drilling expedition to Prydz Bay, Antarctica. Up to two students may have an opportunity to study at sea in Antarctica during Winter Quarter.

Same as: EESS 242.

**EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy. 3 Units.**

Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures. By application only - instructor consent required. Contact gerhart@stanford.edu or dhklinger@stanford.edu prior to first day of class.

Same as: EARTHSYS 173, EESS 173, EESS 273.

**EARTHSYS 274. Marine Biodiversity: Law, Science, and Policy. 3 Units.**

Examination of the mechanisms that create marine biodiversity and the ways in which biodiversity and natural resources are linked. Introduction to the federal laws and policies that impact marine biodiversity and natural resources. Interactions between biological and political systems.

Same as: EARTHSYS 174.

**EARTHSYS 275. California Coast: Science, Policy, and Law. 3-4 Units.**

Same as LAW 514. Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.

Same as: CEE 175A, CEE 275A, EARTHSYS 175.

**EARTHSYS 277. Interdisciplinary Research Survival Skills. 2 Units.**

Learning in interdisciplinary situations. Framing research questions. Developing research methods that benefit from interdisciplinary understanding. Writing for multiple audiences and effectively making interdisciplinary presentations. Discussions with interdisciplinary experts from across campus regarding interdisciplinary research projects.

Same as: EARTHSYS 177.

**EARTHSYS 278. The Ethics of Environmental Choices. 4 Units.**

(Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

Same as: EARTHSYS 178, PHIL 178A, PHIL 278A.

**EARTHSYS 281. Concepts of Urban Agriculture. 3 Units.**

For advanced undergraduates and graduate students from all fields. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips are required. Students must attend one field trip from group A and another from group B. See below. Enrollment is limited. Application on the first day of class, attendance mandatory. Enrollment permissions will be determined after first class meeting. Contact [tcostell@stanford.edu](mailto:tcostell@stanford.edu) with questions. Group A: Community Urban Gardens - Saturday, April 14 (morning); Saturday, April 21 (morning) Group B: Commercial Urban Agriculture Operations - Friday, April 20 (all day); Friday, April 27 (all day)

Same as: EARTHSYS 181, EESS 181, EESS 281.

**EARTHSYS 282. Current Issues in Sustainable Agriculture. 2 Units.**

Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.

Same as: EARTHSYS 182, EESS 182, EESS 282.

**EARTHSYS 283. Food Matters: Agriculture in Film. 1 Unit.**

Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.

Same as: EARTHSYS 183, EESS 183, EESS 283.

**EARTHSYS 284. Climate and Agriculture. 3-4 Units.**

The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.

Same as: EARTHSYS 184, EESS 184, EESS 284.

**EARTHSYS 288. Social and Environmental Tradeoffs in Climate Decision-Making. 1-2 Units.**

How can we ensure that measures taken to mitigate global climate change don't create larger social and environmental problems? What metrics should be used to compare potential climate solutions beyond cost and technical feasibility, and how should these metrics be weighed against each other? How can modeling efforts and stakeholder engagement be best integrated into climate decision making? What information are we still missing to make fully informed decisions between technologies and policies? Exploration of these questions, alongside other issues related to potential negative externalities of emerging climate solutions. Evaluation of energy, land use, and geoengineering approaches in an integrated context, culminating in a climate stabilization group project.

Same as: EARTHSYS 188.

**EARTHSYS 290. Master's Seminar. 2 Units.**

Required of and open only to Earth Systems master's students. Reflection on the Earth Systems cotermin experience and development of skills to clearly articulate interdisciplinary expertise to potential employers, graduate or professional schools, colleagues, business partners, etc. Hands-on projects to take students through a series of guided reflection activities. Individual and small group exercises. Required, self-chosen final project encapsulates each student's MS expertise in a form relevant to his or her future goals (ie. a personal statement, research poster, portfolio, etc.).

**EARTHSYS 297. Directed Individual Study in Earth Systems. 1-9 Units.**

Under supervision of an Earth Systems faculty member on a subject of mutual interest.

**EARTHSYS 298. Earth Systems Book Review. 2 Units.**

For Earth Systems master's students and advanced undergraduates only. Analysis and discussion of selected literary nonfiction books relevant to Earth systems topics. Examples of previous topics include political presentations of environmental change in the popular press, review of the collected works of Aldo Leopold, disaster literature, and global warming.

**EARTHSYS 299. M.S. Thesis. 1-9 Units.****EARTHSYS 323. Stanford at Sea. 16 Units.**

(Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

Same as: BIOHOPK 182H, BIOHOPK 323H, EESS 323.

## Earth, Energy, Environmental Sciences Courses

**EES 302. Challenges and Practices in Crossdisciplinary Research and Teaching. 1 Unit.**

Required EES core course. Presentations by Earth Sciences faculty. Pedagogical tools to present interdisciplinary concepts to a non-specialist audience.

**EES 400. Research in Earth, Energy, and Environmental Sciences. 1-15 Units.**

May be repeated for credit.

**EES 802. TGR Dissertation. 0 Unit.**

## East Asian Studies Courses

**EASTASN 117. Health and Healthcare Systems in East Asia. 3-5 Units.**

China, Japan, and both Koreas. Healthcare economics as applied to East Asian health policy, including economic development, population aging, infectious disease outbreaks (SARS, avian flu), social health insurance, health service delivery, payment incentives, competition, workforce policy, pharmaceutical industry, and regulation. No prior knowledge of economics or healthcare required.

Same as: EASTASN 217.



**EASTASN 189K. Changing North Korean Society. 3 Units.**

Topics on Korea vary each year. Topics this year is on the changing North Korean society. North Korea is constantly in the news with a lot of analyses based on guess-work and speculation. The instructor having lived and worked in North Korea for 5 years (2006-10), the course content is mainly based on this experience and includes social and cultural topics, including humanitarian aid and development cooperation, economics, and politics. Same as: EASTASN 289K.

**EASTASN 190K. Law and Society in South Korea. 3 Units.**

Over the past several decades, South Korea has made important strides in political and legal development. With the institutionalization of democracy and the strengthening of the rule of law, South Korea offers many lessons for students of comparative politics and law. As an introduction to Korean law and society, this course provides students with a comprehensive understanding of the historical background and development of the country's legal system, covering general topics such as judicial power, legal education, and the lawyer profession, to specific political and social issues such as competition law, adultery, and human rights. Each week's reading also strives to bring a comparative perspective, contextualizing South Korea's experience with that of other countries and to general theories of law and legal institutions. Where relevant and useful, students will read actual cases from Korean courts to supplement their engagement with the secondary literature.

Same as: EASTASN 290K.

**EASTASN 191. Journal of East Asian Studies. 1 Unitss.**

(Staff).

**EASTASN 217. Health and Healthcare Systems in East Asia. 3-5 Units.**

China, Japan, and both Koreas. Healthcare economics as applied to East Asian health policy, including economic development, population aging, infectious disease outbreaks (SARS, avian flu), social health insurance, health service delivery, payment incentives, competition, workforce policy, pharmaceutical industry, and regulation. No prior knowledge of economics or healthcare required.

Same as: EASTASN 117.

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Same as: EASTASN 190K.

**EASTASN 300. Graduate Directed Reading. 1-7 Units.**

Independent studies under the direction of a faculty member for which academic credit may properly be allowed. For East Asian Studies M.A. students only.

**EASTASN 330. Core Seminar: Issues and Approaches in East Asian Studies. 1 Unitss.**

For East Asian Studies M.A. students only.

**EASTASN 390. Practicum Internship. 1 Unitss.**

On-the-job training under the guidance of experienced, on-site supervisors. Meets the requirements for curricular practical training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. May be repeated for credit. Prerequisite: qualified offer of employment and consent of adviser.

**EASTASN 801. TGR Project. 0 Unit.**

## Economic Analysis Policy Courses

**MGTECON 200. Managerial Economics. 4 Units.**

This course covers microeconomic concepts relevant to managerial decision making. Topics include: demand and supply analysis; consumer demand theory; production theory; price discrimination; perfect competition; partial equilibrium welfare analysis; externalities and public goods; risk aversion and risk sharing; hidden information and signaling; moral hazard and incentives; game theory; oligopoly; and transaction cost economics.

**MGTECON 203. Managerial Economics - Accelerated. 4 Units.**

MGTECON 203 is the accelerated option in microeconomics for 1st year MBA students. It will cover the usual array of topics, with an emphasis on topics more useful for students of management (although the order in which the topics are covered will be different from that in 200). No previous background in economics is required or expected, but in comparison with MGTECON 200, less time will be spent in class on basic problems. Therefore, students choosing this option should be completely comfortable with calculus and linear algebra. A good diagnostic is to read Sections 3.5 and 3.6 (pp. 57-67) in Kreps, *Microeconomics for Managers*. If you find this easy, 203 is a good choice. If not, 200 is the right course for you. Students with extensive background in microeconomics should take one of the Advanced Applications options; in particular, MGTECON 203 is NOT a good fit for students who have an undergraduate major in economics.

**MGTECON 209. Sloan: Statistics and Economics. 4 Units.**

This course will be divided into two halves. The first half of the course will provide an introduction to Statistics. We will cover the very basics (calculating means, standard deviations, etc.), then work our way up to hypothesis testing and several sessions on the basics of regression analysis. There will be a Regression Project due in the middle of the quarter and a mid-term that will cover the Statistics material. The second half of the course is an introduction to Microeconomics, focusing on microeconomic concepts relevant to managerial decision making. Topics include demand and supply, cost structure, price discrimination, perfect competition, externalities, and the basics of game theory. The final exam will cover material from the Microeconomics portion of the course. No prior Economics or Statistics background is required but students who have not had courses in this area (or not had one in a very long time) may want to brush up on math prior to the start of classes.

**MGTECON 300. Growth and Stabilization in the Global Economy. 4 Units.**

This course gives students the background they need to understand the broad movements in the global economy. Key topics include long-run economic growth, technological change, wage inequality, international trade, interest rates, inflation, exchange rates, and monetary policy. By the end of the course, students should be able to read and understand the discussions of economic issues in *The Economist*, the *Wall Street Journal*, the *New York Times*, or the *Congressional Budget Office*.

**MGTECON 330. Economics of Organization. 4 Units.**

This is an advanced applications economics course that applies recent innovations and high-powered tools to organization and general management. MBA1 students must have a strong background in microeconomics to take the course and should consult with their advisors. The course is appropriate for MBA2 students who have taken either Mgtecon 200 or Mgtecon 203. The course objective is to equip managers with an extensive set of analytical and applicable tools for handling the following topics: organization for coordination, designing incentives for moral hazard, monitoring and private information, applications to scope, scale, global management and mergers, principles for allocating decision power, managing supplier relations, downstream controls, franchising and alliances, bargaining, high order reasoning, repeated interactions and reputation, holdups and strategizing with unawareness. These topics will be covered in a combination of lectures and cases.

**MGTECON 331. Political Economy of Health Care in the United States. 3 Units.**

This course provides the legal, institutional, and economic background necessary to understand the financing and production of health services in the US. Potential topics include: health reform, health insurance (Medicare and Medicaid), employer-sponsored insurance, the uninsured), medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons.

**MGTECON 332. Analysis of Costs, Risks, and Benefits of Health Care. 4 Units.**

For graduate students. The principal evaluative techniques for health care, including utility assessment, cost-effectiveness analysis, cost-benefit analysis, and decision analysis. Emphasis is on the practical application of these techniques. Group project presented at end of quarter. Guest lectures by experts from the medical school, pharmaceutical industry, health care plans, and government.

**MGTECON 334. The International Economy. 4 Units.**

The objective of this course is to give students an understanding of what international trade policy means for business leaders. To do this, students will have to understand the economic forces that determine the patterns and consequences of international trade. We will analyze trade policy tools used by governments (e.g., tariffs, subsidies and quotas), and examine the role of industry and politics at the domestic and global level in applying these tools. This course will combine lecture, case studies and group interaction.

**MGTECON 343. The Financial Crisis. 4 Units.**

This class will focus on the evolution of the financial crisis and the implications for the future of financial markets and the economy. Part of the course will concern the history of the financial crisis, from 2008-12, including policy responses. The rest will focus on current events. There will be a number of guest speakers, either live or by Skype. Last year's list included Tanya Beder, John Geanakoplos, Bob Joss, Tom Kempner, Ken Rogoff, Larry Summers, Kevin Warsh, and Nancy Zimmerman. Myron Scholes participated in about half the classes. I assume that this year there will be a similar but not identical list.

**MGTECON 364. Motivation in Theory and in Practice. 3 Units.**

This course focuses on one question: How do organizations motivate their key employees to provide consummate effort? By consummate effort, we mean effort above and beyond what is normal or expected, with particular emphasis on cases where the key employees are knowledge workers performing ambiguous and creative tasks. We will begin with three weeks or so of twice-weekly class sessions, at which different theories of motivation will be explored as theories and as practiced in case studies. This will include both the economic theory of incentives, but also social psychological theories of motivation and, in particular, on when and how economic forces and social psychological forces come into conflict and when and how they can be marshaled together. During this initial three-week period, students in course will organize themselves into teams of 3 to 5 students. Each team will identify a organization or related group of organizations (say, several firms inside the same niche in an industry), and during weeks 4 through 7 of the quarter, each team will investigate how the organization(s) they are studying answer the basic question. Students will be expected to relate what they find to the theoretical constructs of the early part of the quarter. During this period, each team will meet at least weekly with the instructor to review progress achieved and to plan next steps. In the final two weeks or so (depending on the number of teams), teams will present what they have learned about the organizations they are studying to their peers. Each team will make a presentation of 45 minutes to an hour. These presentations should include a full analysis of the organization(s) (any relevant history, business model and strategy, and so forth). They should then answer the basic question, giving to the greatest extent possible tangible measures and evidence for their assertions. This will be followed by a Q&A from the other members of the class, exploring what the teams have presented. Each team will be expected to prepare a written "case-let" of their findings, to be circulated to other members of the class at least three days prior to the in-class discussion. Organizations to be studied must be existing organizations. Teams will NOT be allowed to present "designs" for organizations that they are in the process of founding or that they hope to found. There must be evidence---anecdotal at least, more systematic if possible---of how well the organization's approach to motivation is working. Organizations studied should consent to be "used" in this fashion, although you will be asked to try to gain permission for the case-lets and your presentations to be used more broadly in the GSB's curriculum. The instructor will attempt to "recruit" willing organizations, from which teams can choose, although it is equally preferable if not better for teams to identify on their own the organizations they will studied. Grades will be determined as follows: 20%--class participation in the first three weeks, with emphasis on contribution to case discussions. 20%--group-assigned grade based on the written case-let 30%--group-assigned grade based on the oral (in class) presentation 20%--participation in the discussion of the presentations of other groups 10%--based on an individual "final exam," in which students will be asked to write a short report (three to five pages, double spaced, 12pt) evaluating what they learned, with emphasis on what they consider is important in answering the basic question, on the basis of the course experience. This report will be due on the last day of final exams, may be prepared off campus and emailed in. Students are free to discuss these matters with one another, but each student is expected to be the sole author of his/her "final exam." There are no formal prerequisites for this course, but students considering this course will be well prepared if they have taken a course in human resource management. This course is a Bass Seminar and is limited to enrollment of 25 students. Please note: I have a reputation for requiring a LOT of work from students. This reputation is deserved. I have every intention of enhancing my reputation in this regard, in this course, so caveat discipulus. (Unhappily, you cannot access course evaluation data on the number of hours that students report they work, so you will have to take my word for it: My courses are in the far upper tail of the distribution. You can access data on the question on "Sets High Expectations." And I urge you to read ALL the entries on me at Course Unofficial for MGTECON 200 and 203.) If you have any questions, please contact me in the first instance via email, at kreps@stanford.edu.

**MGTECON 381. Contemporary Economic Policy. 4 Units.**

Economic issues permeate all that happens in government. This topics-based course will exam a variety of historic and current issues on the political agenda where economics is central to decision making. It is taught by faculty who served at the White House in either the Clinton or George W. Bush Administration.

**MGTECON 514. Markets of Information. 2 Units.**

Valuable information may be distributed among people. We will study the problems associated with identifying, retrieving and aggregating this information. We will turn to the existing solutions currently offered in the market and study their scope and the potential of these recent technologies. Along the way we will gain a better understanding of the various types and dimensions of valuable information. We will study how information flows and how it initially becomes distributed. We will then analyze the strategic aspects of locating information, information transmission, reliability and elicitation. Applications covered include: social networks, entertainment and media, rating systems, expert advice, "wisdom of the crowd" tools, sales forecasting, prediction markets and more.

**MGTECON 591. Management Practices in Europe, the US and Emerging Markets. 1 Unitss.**

The course will review the results from a large management practices project involving Harvard, the London School of Economics, McKinsey & Company and Stanford. McKinsey & Company have developed a basic management practice evaluation tool - detailing the 18 key practices in firms - which has been used to evaluate almost 10,000 organizations in manufacturing, retail, healthcare and education across the US, Europe, Asia, Australasia and South America. These results provide a global insight into the basic management practices around monitoring, targets and talent management that firms adopt around the world, their link to performance, and the reasons for differences in these across countries. This will be supplemented with the results from more recent research with Accenture and the World Bank in India carrying out change-management interventions. Full syllabus and lectures from 2011 available here: [http://www.stanford.edu/~nbloom/Course\\_591.zip](http://www.stanford.edu/~nbloom/Course_591.zip).

**MGTECON 600. Microeconomic Analysis I. 4 Units.**

This course provides an introduction to the foundations of modern microeconomic theory. Topics include choice theory, with and without uncertainty, consumer and producer theory, dynamic choice and dynamic programming, social choice and efficiency, and fundamentals of general equilibrium. Students interested in this course should consult the instructor by email: [kreps@stanford.edu](mailto:kreps@stanford.edu).

**MGTECON 601. Microeconomic Analysis II. 4 Units.**

This course studies the roles of information, incentives and strategic behavior in markets. The rudiments of game theory are developed and applied to selected topics regarding auctions, bargaining, and firms' competitive strategies; information economics; and contracting and market design.

**MGTECON 602. Auctions, Bargaining, and Pricing. 4 Units.**

This course covers auction theory, matching, and related parts of the literature on bargaining and pricing. Key papers in the early part of the course are Myerson and Satterthwaite on bargaining, Myerson on optimal auctions, and Milgrom and Weber's classic work. We then turn to markets in which complicated preferences and constraints, limitations on the use of cash, or variations in contract details among bidders play an important role. Emphasis is on matching markets such as the National Resident Matching Program and asset auctions such as the spectrum auctions.

**MGTECON 603. Econometric Methods I. 4 Units.**

This is the first course in the sequence in graduate econometrics. The course covers some of the probabilistic and statistical underpinnings of econometrics, and explore in depth the large-sample properties of maximum likelihood estimators. You are assumed to have introductory probability and statistics and matrix theory, and to have exposure to basic real analysis. Topics covered in the course include random variables, distribution functions, functions of random variables, expectations, conditional probabilities and Bayes' law, convergence and limit laws, hypothesis testing, confidence intervals, and maximum likelihood estimation.

**MGTECON 604. Econometric Methods II. 4 Units.**

This course is exclusively for PhD students at the GSB. This course presents a comprehensive treatment of econometric methods used in economics, finance, marketing, and other management disciplines. Among the topics covered are: the classical linear regression analysis, linear simultaneous equations systems, panel data models, generalized method of moments, selection models, and limited dependent variable models. This course uses Matlab or similar computational software, but previous experience with such software is not a prerequisite. This course assumes working knowledge of undergraduate econometrics, basic linear algebra, basic probability theory, and statistics that are covered in MGTECON 603. Those who did not take MGTECON 603 or similar should see the instructor.

**MGTECON 605. Econometric Methods III. 4 Units.**

This course completes the first-year sequence in econometrics. The course develops nonlinear models in more detail, as well as methods used to estimate nonlinear models, including maximum likelihood and moment-based estimators such as GMM. The instructor will discuss both theoretical properties of these estimators and how they are used in practice. Computational challenges and issues are explored in detail. Depending on student and instructor interest, we will consider advanced topics and applications, including: semiparametric, nonparametric, and simulation estimators.

**MGTECON 606. Microeconomic Theory for Non-Economist PhDs. 4 Units.**

This course will be a first quarter PhD course in microeconomic theory, aimed at PhD students who do not plan to become professional economists. Relative to a course geared to economics PhDs the class will differ in two important ways. First, there will be almost no emphasis on proofs. Second, the topics covered will be broader than the standard set covered in say Econ 202.

**MGTECON 608. Multiperson Decision Theory. 4 Units.**

Students and faculty review and present recent research papers on basic theories and economic applications of decision theory, game theory and mechanism design. Applications include market design and analyses of incentives and strategic behavior in markets, and selected topics such as auctions, bargaining, contracting, signaling, and computation.

**MGTECON 609. Applied Econometrics and Economic Research. 4 Units.**

The primary objective of this course is to prepare students to evaluate and produce research in empirical microeconomics. The emphasis will be on the overall process of conducting such research: from defining a clear research question, to collecting suitable data, to selecting and executing an appropriate mode of econometric analysis. Students will be expected to read and discuss papers covering a variety of applied topics. Methodological issues will be discussed in depth wherever they arise, and especially where they are central to understanding a paper's implications, but methodology will not be the central focus of the course. Some of the topics to be covered in the course include: nonlinear pricing in imperfectly competitive markets; innovation and the diffusion of innovations; the economics of advertising; consumer information and product-market outcomes. Other topics will be selected based partly on student input.

**MGTECON 610. Macroeconomics. 4 Units.**

This course covers various topics in macroeconomics and is designed to expose students to macroeconomic methods, classic papers in the field, and the latest research at the frontier. The current focus is on economic growth. Using theoretical and empirical tools, we consider questions like: How do we understand long-run growth in per capita income? Why are some countries so much richer than others? Other topics include misallocation as a source of TFP differences, the direction of technical change, growth and the environment, the rise in health spending, patenting, and international trade. This course satisfies the GSB PhD macro requirement.

**MGTECON 611. Open Economy Macroeconomics. 4 Units.**

The goal of this course is to teach students how to use the tools of open economy macroeconomics to connect to the burgeoning literature on institutions in a way that helps them to frame interesting research questions in the area of stabilization, reform, and growth in developing countries. The growth rate of total factor productivity (TFP) plays an essential role in economic growth. In turn, two principal forces drive TFP growth: (1) changes in ideas (i.e. technological change) and (2) changes in institutions. This course will employ the tools of open economy macroeconomics to study the second of these two forces. Recent contributions in the literature focus on the impact of cross-country differences in initial institutions on long-run growth and development. Prominent examples of such institutional differences include the nature of the legal origins and property rights bequeathed to a country by its colonial masters. This is a PhD course in economics, but it is open to students from any discipline (i.e. Political Science, History, International Relations) who are willing to make the analytical investment that is necessary to understand and debate the issues in a logical, coherent, and systematic fashion.

**MGTECON 614. Topics in Stabilization and Reform. 4 Units.**

This course develops the essential tools of dynamic, open-economy macroeconomics for the purpose of analyzing policy changes in developing countries. The first half of the course develops the work-horse models needed to undertake an analytical study of stabilization and reform: the basic tools of dynamic optimization; dynamic models of the current account, investment, growth, and the real exchange rate; international asset pricing. The second half of the course explores analytical models of policy reform in developing countries: sovereign risk and investment, debt buybacks, moral hazard in international lending; inflation crises, balance of payments crises and stabilization; current account liberalization, capital account liberalization, and optimal sequencing of reforms; political economy of stabilization and adjustment.

**MGTECON 615. Topics in Economics of Information. 3 Units.**

The goal of this course is to introduce students to current research topics and open issues related to the role of information in markets and other economic mechanisms. Topics may include: information aggregation in prediction markets and other mechanisms, microstructure of financial markets, forecast testing, scoring mechanisms, information in auctions, information in e-commerce and novel marketplaces.

**MGTECON 616. Topics in Game Theory. 3 Units.**

This is an advanced game theory course and requires a basic background in game theory or an advanced applied game theory course. The course covers foundational topics such as type spaces, modeling reasoning and rationality, game forms, solution refinements and more. A collection of additional topics will be covered independently via problem solving assignments in workshop style meetings with student presentations.

**MGTECON 620. Economics of Electronic Commerce and the Internet. 4 Units.**

This course is designed to introduce students to research topics in electronic commerce and the economics of the internet. The primary audience is advanced graduate students in economics or closely related areas, but the course is also open to students from related fields such as computer science and operations provided students have completed graduate coursework in economics, game theory, and/or market design. The methodological focus is on applied economic theory models, empirical work, and field experiments. The course requires a literature review and research proposal, which will be presented to the class at the end of the term. Core topics include: economics of platform markets and multi-sided markets, with case studies including online advertising, online auctions, mobile computing, cloud computing, electronic and mobile payment systems, and media markets; markets for information; internet search, including specialized search platforms such as shopping and travel; the impact of the internet on the news media; and the impact of technological and business practice shifts on both old and new industries, including data-driven decision-making, machine learning, and increased reliance on experimentation. Other topics that may be selected according to student interest include social networks, social media, intellectual property and innovation, broader economic impacts of technological innovation, security, internet policy, the impact of the internet on education and health, privacy, and other regulatory issues surrounding the internet.

**MGTECON 624. Dynamic Political Economy Theory. 4 Units.**

This course is intended to be an introduction to dynamic political economy theory. We will cover research at the frontier of this field and some useful tools. Tools will be those of dynamic game theory. Topics covered will include distributive politics, dynamic bargaining, dynamic government formation, and private politics.

**MGTECON 628. Reading Group in Industrial Organization. 1 Unitss.**

This course meets weekly on Tuesdays at Noon. The primary purpose of the course is to read and discuss current working papers in Industrial Organization and related fields (e.g., Econometrics, Marketing, and Labor). Students are required to present either a paper or their own work once per quarter. Both students and faculty attend and present.

**MGTECON 629. Microeconomics Workshop. 1 Unitss.**

Each week, a different economics faculty member will discuss his or her important and /or current research. The course is an important introduction to PhD level research topics and techniques. Attendance is mandatory.

**MGTECON 640. Quantitative Methods for Empirical Research. 3 Units.**

This is an advanced course on quantitative methods for empirical research. Students are expected to have taken a course in linear models before. In this course I will discuss modern econometric methods for nonlinear models, including maximum likelihood and generalized method of moments. The emphasis will be on how these methods are used in sophisticated empirical work in social sciences. Special topics include discrete choice models and methods for estimating treatment effects.

**MGTECON 651. Natural Resource and Energy Economics. 4 Units.**

Management and provision non-renewable and renewable natural resources, with considerable attention to energy provision and use. Topics include: fisheries problems and policy; energy industry market structure, pricing, and performance; and policies to facilitate transitions from non-renewable to renewable energy.

**MGTECON 652. Personnel Economics. 3 Units.**

This seminar will examine applications of labor economics to business issues and firms' practices. Material will include both theoretical and empirical work, and the syllabus will range from classics in Personnel Economics to current (unpublished) research. Some of the topics to be covered include, but are not limited to, compensation practices, assignment of decision rights, organizational structure, attracting, retaining, and displacing employees, and workplace practices (such as team-based organization, profit sharing, etc.).

**MGTECON 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, HRMGT 691, MKTG 691, OB 691, OIT 691, POLECON 691, STRAMGT 691.

**MGTECON 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, HRMGT 692, MKTG 692, OB 692, OIT 692, POLECON 692, STRAMGT 692.

**MGTECON 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, HRMGT 802, MKTG 802, OB 802, OIT 802, POLECON 802, STRAMGT 802.

## Economics Courses

**ECON 1A. Introductory Economics A. 5 Units.**

The economic way of thinking and the functioning of a market economy. The behavior of consumers and firms, markets for goods and inputs, and principles of international exchange. Applications and policy issues in economics.

**ECON 1B. Introductory Economics B. 5 Units.**

Aggregate economic relationships, including output, employment, inflation, interest rates, and exchange rates. Short-run fluctuations and long-run growth. Issues in monetary and fiscal policy. Prerequisite: 1A.

**ECON 10. Silicon Valley Meets Wall Street. 1 Unit.**

Seminar in applied economics with focus on the microcosm of Silicon Valley, how growth companies are originated, managed and financed from start-up to IPO. Round-table discussion format. Applicable to those students with an interest in technical innovation and business development. Enrollment limited to 10 students.

**ECON 11N. Understanding the Welfare System. 2 Units.**

Welfare-reform legislation passed by the federal government in the mid 1990s heralded a dramatic step in the movement that has been termed the devolution revolution. The centerpiece of this legislation is the transfer of much responsibility for antipoverty programs to the states. States now have had their first opportunity since the War on Poverty of the 1960s to undertake radical changes in the design of their public-assistance programs. This seminar will explore how recent reforms have changed the welfare system and examine who is affected by these changes. In addition to conventional welfare programs (e.g., food stamps, AFDC, TANF, SSI, Medicaid), we will examine other governmental policies assisting low-income families. These will include direct income-transfer programs (e.g., Earned Income Tax Credit and income taxes) and labor-market regulations imposed by governments to enhance the earnings of poor families (e.g., minimum wages and overtime rules). We will apply economics principles to understand the effectiveness of these programs and their consequences on the behavior of families. Prerequisites: an understanding of basic concepts of labor markets, taxes, and transfers is recommended. Co-requisite: ECON 1A.

**ECON 13SC. Economic Policies of the Presidential Candidates. 2 Units.**

This course will look at the performance of the economy over the past twenty years with particular attention to the past four years. Macroeconomic data such as the unemployment rate, the inflation rate, the rate of productivity growth, and the budget deficit will be reviewed. The performance of financial markets will be examined, along with issues such as job creation and the outsourcing of work overseas. The economic outlook and budget documents of the Congressional Budget Office and the Office of Management and Budget will be evaluated. There will be some emphasis on such spending categories as Social Security, Medicare, and defense. We will include a brief overview of U.S. tax policies. With this overview of the economy and its problems as a backdrop, we will invite the economic advisors of the two major presidential candidates to address the class. We will take a trip to Washington D.C. and meet with political and economic policy leaders. There will be a required paper and an oral presentation in which students evaluate particular programs or proposals. We will try to avoid strictly political debates and stick to economic and political economy analyses.

**ECON 17N. Energy, the Environment, and the Economy. 2 Units.**

Preference to freshmen. The relationship between environmental quality and production and consumption of energy. Can environmentally-friendly energy production and consumption compete with conventional sources? How to estimate and compare environmental impact costs of nonrenewable sources such as fossil fuels and nuclear power versus renewable sources such as solar and wind power. Implicit subsidies in conventional energy sources and the environmental costs of these subsidies. Regulatory and legal barriers to more environmentally friendly energy sources.

**ECON 18. The Washington Debate About American Competitiveness. 1 Unit.**

One of the central challenges for policymakers is how to make sure the United States remains the world's strongest economy and continues to create good paying jobs. Discusses what the proper role of government should be when it comes to our economy by exploring the history of American economic thought dating back to Alexander Hamilton. Considers the perspective of classical economists, Keynesian economists, and economists identifying themselves as part of the innovation school of economics. Examines various policy alternatives concerning taxes, regulations, immigration, and investment that can foster economic growth. Selection based on short application.

**ECON 20SI. Sustainability from the Economic Perspective. 1-2 Units.**

In spite of its apparent universal popularity, environmental sustainability is a concept that is impossible to define objectively. Nevertheless, many aspects of economic activity reduce the quality of environmental services available to consumers. The local and global pollutants that result from the production and consumption of fossil fuels is perhaps the most highly publicized example of this phenomenon. However, virtually all aspects of modern economic activity degrade some aspect of available environmental services. Consequently, a major challenge to increasing the share of the world's population with a modern standard of living is the need to balance the adverse impacts of modern economic activity on all of the dimensions of environmental services. This course will analyze the full range of mechanisms available to manage these tradeoffs. The course will focus on solutions from business, government, and the non-profit sectors. Guest speakers will include venture capitalists, consultants, government policy makers, and members of the non-profit community.

**ECON 21N. Economic Inequality. 2 Units.**

Addresses elementary and yet fundamental issues regarding economic inequality including inequality of what?; inequality among whom?; how is inequality measured?; how has inequality changed in the U.S.?; how does inequality in the U.S. compare with inequality elsewhere?; why is inequality what it is and what accounts for changes and differences in inequality? What is the line between taxes and inequality, parents and inequality, and how does poverty relate to inequality? Classroom participation and presentation play an important part in this class. Prerequisites: Econ 1A recommended.

**ECON 23SI. Introduction to Microfinance. 1-2 Units.**

Introduction to microfinance as an important development effort in the war against poverty. Why and how microfinance operations have grown to provide financial services to poor and low-income people on a sustainable basis. Advice and best practices from successful practitioners and institutions around the world as well as new technology startups targeting the industry. Faculty and student led discussions concerning assigned articles and readings.

**ECON 25N. Public Policy and Personal Finance. 3 Units.**

The seminar will provide an introduction and discussion of the impact of public policy on personal finance. Voters regularly rate the economy as one of the most important factors shaping their political views and most of those opinions are focused on their individual bottom lines. In this course we will discuss the rationale for different public policies and how they affect personal financial situations. We will explore personal finance issues such as taxes, loans, charity, insurance, and pensions. Using the context of (hypothetical) personal finance positions, we will discuss the public policy implications of various proposals and how they affect different groups of people, for example: the implications of differential tax rates for different types of income, the promotion of home ownership in the U.S., and policies to care for our aging population. While economic policy will be the focus of much of the course, we will also examine some of the implications of social policies on personal finance as well.

Same as: PUBLPOL 55N.

**ECON 49. Managerial Economics. 5 Units.**

Intermediate microeconomics, with a focus on topics and methods of interest to future managers. Topics include market pricing and price discrimination, incentives, signaling, implicit collusion, decision making under uncertainty, auctions and basic game theory. Use of calculus and math-based analysis. Topics overlap considerably with Econ 50 and Econ 51. Aimed at Juniors and Seniors with non-Econ majors. Does not fulfill Econ major requirements. Economics majors should take Econ 50 and Econ 51. Prerequisites: Math 51.

**ECON 50. Economic Analysis I. 5 Units.**

Individual consumer and firm behavior under perfect competition. The role of markets and prices in a decentralized economy. Monopoly in partial equilibrium. Economic tools developed from multivariable calculus using partial differentiation and techniques for constrained and unconstrained optimization. Prerequisites: ECON 1A and MATH 51 (must be taken for a letter grade).

**ECON 51. Economic Analysis II. 5 Units.**

Neoclassical analysis of general equilibrium, welfare economics, imperfect competition, externalities and public goods, intertemporal choice and asset markets, risk and uncertainty, game theory, adverse selection, and moral hazard. Multivariate calculus is used. Prerequisite: ECON 50.

**ECON 52. Economic Analysis III. 5 Units.**

Long-run economic growth and short-run economic fluctuations. Focus on the macroeconomic tools of government: fiscal policy (spending and taxes) and monetary policy, and their effects on growth, employment, and inflation. Prerequisites: ECON 1B, ECON 50.

**ECON 101. Economic Policy Analysis. 5 Units.**

Economic policy analysis, writing, and oral presentation. Topics vary with instructor. Limited enrollment. Prerequisites: 51 and 52, 102B, and two field courses. Some sections require additional prerequisites.

**ECON 102A. Introduction to Statistical Methods (Postcalculus) for Social Scientists. 5 Units.**

Probabilistic modeling and statistical techniques relevant for economics. Concepts include: probability trees, conditional probability, random variables, discrete and continuous distributions, correlation, central limit theorems, point estimation, hypothesis testing and confidence intervals for both one and two populations. Prerequisite: MATH 41 or equivalent.

**ECON 102B. Introduction to Econometrics. 5 Units.**

Descriptive statistics. Regression analysis. Hypothesis testing. Confidence regions. Simultaneous equation models. Instrumental variables. Panel data. Limited dependent variables. Time series. Prerequisites: 50, 102A or equivalent. Recommended: computer experience.

**ECON 102C. Advanced Topics in Econometrics. 5 Units.**

Identification and estimation of the effect of human capital variables on earnings (such as the return to education, tenure). The evaluation problem. Identification and estimation of social interactions. Topics: instrumental variable estimation, limited dependent variable models (probit, logit, and Tobit models), panel data techniques (fixed effect and random effect models, dynamic panel data models), introduction to non-parametric methods. Prerequisite: Econ 102B.

**ECON 106. World Food Economy. 5 Units.**

The interrelationships among food, populations, resources, and economic development. The role of agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis is on public sector decision making as it relates to food policy. Same as: EARTHSYS 106, EESS 106.

**ECON 110. History of Financial Crises. 5 Units.**

Understand the causes of past crises and develop a conceptual framework that ties common elements together. Overview of history of financial crises, asset price bubbles, banking collapses and debt crises, starting with the Tulip mania in 1636 and ending with the recent credit and debt crises. Discussion of lessons which can be drawn for financial markets today. Prerequisites Econ 1A & 1B.

**ECON 111. Money and Banking. 5 Units.**

Money, interest rates, banks and other financial institutions at both micro and macro levels. Micro: alternative financial instruments, the determination of interest rates, the yield curve, and the role of banks and other capital market institutions in the intermediation process. Supply of money, regulation, and supervision. Macro: the choice of monetary policy by the central bank, the impact of monetary policy making institutions on this choice and the various channels through which monetary policy affects inflation and real variables in the economy. Emphasis is on the institutional structure of Federal Reserve System and the conduct of monetary policy in the U.S. Prerequisites: 52.

**ECON 113. Economics of Innovation. 5 Units.**

The modern, knowledge-based economy characterized by: rapid innovation; a dramatic increase in the rate of production of information and decline in the cost of producing it; and pervasive network externalities or increasing returns to scale. Emphasis is on the role of patents and alternative mechanisms for creating incentives for firms to innovate. Topics include: why there may be too much innovative activity; how patent laws may slow rather than help innovation; and the interaction between public and private sector innovation. Prerequisites: 51, 102B. Same as: PUBLPOL 354.

**ECON 114. Economy and Economics of Ancient Greece. 5 Units.**

Cultural and political background for Athens of the 5th and 4th century BC. Athenian economy of the 4th century BC. Economic ideas of Plato, Aristotle, and Xenophon. Pros and Cons of utilitarianism in light of the ethical theories of Plato and Aristotle. Economy and economics of ancient Greece will be compared to the same of ancient China. There is an interesting parallel. Same as: CLASSHIS 114.

**ECON 116. American Economic History. 5 Units.**

The American economy from colonial times to the present, illustrating the role of history in economic life. Topics: U.S. economic development in global and comparative context; slavery as an economic system; origins and consequences of the American technology and business organization; economics of the Great Depression and New Deal; post-World War II economic performance and social change. Prerequisite: 1A. Same as: AMSTUD 116.

**ECON 118. Development Economics. 5 Units.**

The microeconomic problems and policy concerns of developing countries. Topics include: land productivity; risk and insurance; microfinance; health and nutrition; education; gender; politics and corruption. Emphasis is on economic models and econometric evidence. Prerequisites: 52, 102B.

**ECON 119. The Russian Economy. 4-5 Units.**

Brief introduction to the economic history of Russia, general overview of the modern Russian economy with analysis of its macroeconomic features and dynamics, industrial structure, and the major institutional features that are important for understanding Russian economic development. The period of transition from Soviet-type planned economy to a market economy and market reforms (1991-1998), the period of economic growth (1999-2007), and the economic development of Russia during the current global crisis of 2008-2010. Analysis of Russia's social structure and social policy, labor markets, the regional structure of the economy, the role of the state, and major Russian industries (oil, metals, machinery). Emphasis on the specific institutional aspects that have shaped Russia's economic development. Same as: REES 119, REES 219.

**ECON 123. Regulation and Competition in Less Developed Countries. 5 Units.**

The economics and workings of public intervention, control and liberalization of markets in less developed countries. Topics: natural monopoly regulation; institutions and regulatory commitment; infrastructure concessions; regulation and competition in network industries such as telecoms and electricity; liberalization of markets and competition policy; competition and efficiency; antitrust with a weak judiciary. Prerequisite: 51.

**ECON 126. Economics of Health and Medical Care. 5 Units.**

Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: demand for medical care and medical insurance; institutions in the health sector; economics of information applied to the market for health insurance and for health care; measurement and valuation of health; competition in health care delivery. Graduate students with research interests should take ECON 248. Prerequisites: ECON 50 and ECON 102A or Stats 116 or the equivalent. Recommended: ECON 51. Same as: BIOMEDIN 156, BIOMEDIN 256, HRP 256.

**ECON 127. Economics of Health Improvement in Developing Countries. 5 Units.**

Application of economic paradigms and empirical methods to health improvement in developing countries. Emphasis is on unifying analytic frameworks and evaluation of empirical evidence. How economic views differ from public health, medicine, and epidemiology; analytic paradigms for health and population change; the demand for health; the role of health in international development. Prerequisites: ECON 50 and ECON 102B. Same as: MED 262.

**ECON 128. Economic Development: A Historical Perspective. 5 Units.**

Economic development from a historical perspective, drawing on multiple disciplines and analytical frameworks. Focus on institutional, cultural, and social foundations of development and how they relate to political and economic factors. Discussion of conceptual and historical issues; approaches to the process of development; literature dealing with historical process. Student presentations required. Limited Enrollment. Prerequisites: ECON 50, ECON 52, ECON 102B. Recommended: ECON 118.

**ECON 135. Finance for Non-MBAs. 3-5 Units.**

For graduate students and advanced undergraduates. The foundations of finance; applications in corporate finance and investment management. Financial decisions made by corporate managers and investors with focus on process valuation. Topics include criteria for investment decisions, valuation of financial assets and liabilities, relationships between risk and return, market efficiency, and the valuation of derivative securities. Corporate financial instruments including debt, equity, and convertible securities. Equivalent to core MBA finance course, FINANCE 220. Prerequisites: ECON 51, or ENGR 60, or equivalent; ability to use spreadsheets, and basic probability and statistics concepts including random variables, expected value, variance, covariance, and simple estimation and regression. Same as: MSE 245G.

**ECON 136. Market Design. 5 Units.**

Use of economic theory and analysis to design allocation mechanisms and market institutions. Course focuses on three areas: the design of matching algorithms to solve assignment problems, with applications to school choice, entry-level labor markets, and kidney exchanges; the design of auctions to solve general resource allocation problems, with applications to the sale of natural resources, financial assets, and advertising; and the design of platforms and exchanges, with applications to internet markets. Emphasis on connecting economic theory to practical applications. Students must write term paper. Prerequisites: recommended: ECON 51.

**ECON 137. Decision Modeling and Information. 5 Units.**

Effective decision models consider a decision maker's alternatives, information and preferences. The construction of such models in single-party situations with emphasis on the role of information. The course then evolves to two-party decision situations where one party has more information than the other. Models examined include: bidding exercises and the winner's curse, the Akerlof Model and adverse selection, the Principal-Agent model and risk sharing, moral hazard and contract design. Prerequisite: ECON 102A or equivalent. Recommended: Econ 50, Optimization and simulation in Excel.

**ECON 138. Risk and Insurance. 5 Units.**

The nature of economic risk, its effect on allocation of resources and how public policy should be conducted in markets for risk. Preferences among risky prospects: expected utility theory and the theory of risk aversion. Allocation of risk using markets for contingent claims vs. insurance pools in economies with complete information. The functioning of insurance markets when information is asymmetric, under moral hazard and adverse selection. Can insurance markets function well in a competitive equilibrium and what should be public policy in markets such as medical insurance? Role of asset markets in allocating risk. Hedging strategies using futures markets, options and other derivative assets. The role of risk taking in the 2007-2008 financial crises. Prerequisite: ECON 50., ECON 102A.

**ECON 139D. Directed Reading. 1-10 Units.**

May be repeated for credit.

**ECON 140. Introduction to Financial Economics. 5 Units.**

Modern portfolio theory and corporate finance. Topics: present value and discounting, interest rates and yield to maturity, various financial instruments including financial futures, mutual funds, the efficient market theory, basic asset pricing theory, the capital asset pricing model, and models for pricing options and other contingent claims. Use of derivatives for hedging. Prerequisites: ECON 51, ECON 102A.

**ECON 141. Public Finance and Fiscal Policy. 5 Units.**

What role should and does government play in the economy? What are the effects of government spending, borrowing, and taxation on efficiency, equity and economic stability and growth? The course covers economic analysis, statistical evidence and historical and current fiscal policy debates in the U.S. and around the world. Policy topics: Fiscal crises, budget surpluses/deficits; tax reform; social security, public goods, and externalities; fiscal federalism; public investment; and cost-benefit analysis. Prerequisites: ECON 51, ECON 52 (can be taken concurrently). Same as: PUBLPOL 107.

**ECON 145. Labor Economics. 5 Units.**

Analysis and description of labor markets. Determination of employment, unemployment, hours of work, wages. Welfare programs and work effort. Wage differentials by schooling, experience, gender, and race. Income inequality, changes in inequality, and differences in inequality. Employment contracts, labor unions, and bargaining. International comparisons. Prerequisites: ECON 51, ECON 102B.

**ECON 146. Economics of Education. 5 Units.**

How a decision to invest in education is affected by factors including ability and family background. Markets for elementary and secondary schooling; topics such as vouchers and charter schools, accountability, expenditure equalization among schools, and the teacher labor market. The market for college education emphasizing how college tuition is determined, and whether students are matched efficiently with colleges. How education affects economic growth, focusing on developing countries. Theory and empirical results. Application of economics from fields such as public economics, labor economics, macroeconomics, and industrial organization. Prerequisites: ECON 50, ECON 102B.

**ECON 147. Economics of Human Resources. 5 Units.**

Issues in the economics of human beings including the organization of work inside firms, the link between family background and adult outcomes, the operation of some cooperative organizations, the economic analysis of inequality, and the association between health and income. Prerequisite: ECON 51.

**ECON 149. The Modern Firm in Theory and Practice. 5 Units.**

Combines the latest theory and empirics on the modern firm. Theoretical topics will include transactions cost theory, contract theory and incentives. Applied topics include the organization of firms in US and internationally. Management practices around information systems, target setting and human resources. Focus on management practices in manufacturing, but also analyze retail, hospitals and schools, plus some recent field-experiments in developing countries. Prerequisites: Econ 51, ECON 102B.

**ECON 150. Economic Policy Analysis. 4-5 Units.**

The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Theoretical foundations of policy making and analysis, and applications to program adoption and implementation. Prerequisites: ECON 50 and ECON 102B.

Same as: PUBLPOL 104, PUBLPOL 204.

**ECON 152. Policy & Strategy Issues in Financial Engineering. 2 Units.**

(Same as LAW 564). This is a non-technical course that will focus on a series of case studies each designed to illuminate a serious public policy issue raised by the evolution of modern financial engineering. These will include discussions of Freddie Mac, Fannie Mae, sub-prime and Alt-A mortgages and the flaws of AAA CDOs; the spectacular losses by Orange County and the Florida Local Government Investment Pool and the challenges posed by unregulated investment pools; how credit default swaps are likely to change with central clearing using the PIIGS (Portugal/ Ireland/ Iceland/ Greece/ Spain), the monolines, AIG, Lehman and MF Global as examples; views of rogue trading using the similarities and disparities of Askin, Madoff, Barings, Soc Gen and UBS for discussion; and Risk Management 101: the why/ how/ where/ when firms went wrong plus what to keep and what to throw out in the next phase of risk programs among other case studies. The subject matter, by necessity, is multi-disciplinary and so the course is particularly suited to those students having an interest in public policy and the evolution of modern financial markets. This includes students from the law or business schools, or the public policy, economics, EES, political science, or financial math and engineering programs among others. Several themes will tie the case studies, reading and discussions together: -Is this an example of an innovation that got too far ahead of existing operations, risk management, legal, accounting, regulatory or supervisory oversight? -How might temporary infrastructure be implemented without stifling innovation or growth? -How might losses be avoided by requiring permanent infrastructure sooner? Will Dodd-Frank, Basel III, etc., help to prevent such problems? What are the potential unintended consequences? -Is this an example of improperly viewing exposures that are subject to uncertainty or incorrectly modeling risk or both? Guest speakers will be invited to share their experiences. This course will aim to provide a practitioner(s) view of financial engineering over the past 3 ½ decades as well as a broad understanding of what went right and what went wrong plus cutting edge views of the future of financial engineering.

Same as: ECON 252, PUBLPOL 364.



**ECON 153. Economics of the Internet. 5 Units.**

Economic models and tools used to understand online market phenomena, including standards, network and platform economics, online transactions, advertising, auctions, information, communications, and networking. The contemporary economics literature on internet markets and mobile communications markets. Public policy issues in competition policy, communication policy, and support for innovation. Prerequisites: ECON 51 and ECON 102B.

**ECON 154. Law and Economics. 4-5 Units.**

Law as a tool for correcting market and cognitive failures. Design and consequences of laws, given alternative policy objectives. Welfarist approach to legal policy; deontological perspectives including Kant, Mill, and Rawls. Economic efficiency and agent rationality, effects of law on expectations and incentives, balancing costs of type I and type II legal errors. Empirical studies of law's effects. Applications: property, tort, contract, antitrust, discrimination, crime, legal procedure. Examples chiefly from U.S. law, but analytical tools of general applicability. Prerequisite: ECON 50.

Same as: PUBLPOL 106, PUBLPOL 206.

**ECON 155. Environmental Economics and Policy. 5 Units.**

Economic sources of environmental problems and alternative policies for dealing with them (technology standards, emissions taxes, and marketable pollution permits). Evaluation of policies addressing regional air pollution, global climate change, water allocation in the western U.S., and the use of renewable resources. Connections between population growth, economic output, environmental quality, and human welfare. Prerequisite: ECON 50.

**ECON 156. Marine Resource Economics and Conservation. 5 Units.**

Economic and ecological frameworks to understand the causes of and potential solutions to marine resource degradation. Focus on conservation of marine biodiversity and ecosystem-based management. Applications include: commercial and recreational fisheries, marine reserves, and offshore energy production.

Same as: EARTHSYS 156M, HUMBIO 111M.

**ECON 157. Imperfect Competition. 5 Units.**

The interaction between firms and consumers in markets that fall outside the benchmark competitive model. How firms acquire and exploit market power. Game theory and information economics to analyze how firms interact strategically. Topics include monopoly, price discrimination, oligopoly, collusion and cartel behavior, anti-competitive practices, the role of information in markets, anti-trust policy, and e-commerce. Sources include theoretical models, real-world examples, and empirical papers. Prerequisite: ECON 51.

**ECON 158. Regulatory Economics. 5 Units.**

The history, economics, and legal background of the institutions under which U.S. industry is subject to government control. Topics: economics and practice of public utility regulation in the communications, television, transportation, energy, and postal delivery sectors and health and safety regulation. Emphasis on the application of economic concepts in evaluating the performance and policies of government agencies. Antitrust law will be introduced and discussed where necessary. Prerequisite: ECON 51 or equivalent intermediate microeconomics course.

**ECON 160. Game Theory and Economic Applications. 5 Units.**

Introduction to game theory and its applications to economics. Topics: strategic and extensive form games, dominant strategies, Nash equilibrium, subgame-perfect equilibrium, Bayesian equilibrium, and behavioral game theory. The theory is applied to repeated games, voting, auctions, and bargaining with examples from economics and political science. Prerequisites: Working knowledge of calculus and basic probability theory.

**ECON 164. Law, Economics and Politics of International Trade. 5 Units.**

Examines aspects of the WTO system from legal and economic perspectives. Presents theoretical and empirical research in economics to develop both positive and normative themes regarding the WTO as an international institution. Overview of the economics of international cooperation on trade, and an introduction to the WTO as an institution and its core obligations. Topics may include: the dispute resolution system; the choice between multilateral and regional or bilateral trade agreements; the role of developing countries in the WTO; and the relationship between WTO law, domestic regulation and national sovereignty. Prerequisite: Econ 51 or equivalent undergraduate microeconomics.

**ECON 165. International Finance. 5 Units.**

Introduction to international macroeconomics. Topics: intertemporal approach to the current account, international investment patterns, sovereign debt, crises in international financial markets, real and nominal exchange rate determination and exchange rate policy. Prerequisite: ECON 52.

**ECON 166. International Trade. 5 Units.**

Different sources of comparative advantage in production and trade among nations. Aggregate gains from trade, winners and losers from globalization. International migration, outsourcing and multinational companies. Trade policy and international trade agreements. Theory, empirical evidence, and real-life anecdotes. Lectures supplemented by in-class debates on current topics from the popular press. Prerequisite: ECON 51.

**ECON 179. Experimental Economics. 5 Units.**

Methods and major subject areas that have been addressed by laboratory experiments. Focus is on a series of experiments that build on one another. Topics include decision making, two player games, auctions, and market institutions. How experiments are used to learn about preferences and behavior, trust, fairness, and learning. Final presentation of group projects. Prerequisites: ECON 50, ECON 51, ECON 102A.

**ECON 180. Honors Game Theory. 5 Units.**

Rigorous introduction to game theory and its applications. Topics include solution concepts for static and dynamic games of complete and incomplete information, repeated games, bargaining, and reputation formation. applications from economics, political science, biology, and computer science. Prerequisites: Experience with abstract mathematics and willingness to work hard. No prior knowledge of economics required.

**ECON 181. Honors Information and Incentives. 5 Units.**

Rigorous introduction to the theory of economic mechanisms under asymmetric information. Covers applications to price discrimination, taxation, regulation, long-term relationships, single-unit and multi-unit auctions. Forms a sequence with ECON 180 and ECON 182, but can be taken independently. Prerequisite: Experience with abstract mathematics and willingness to work hard. No prior knowledge of economics is required, although basic knowledge in game theory is useful.

**ECON 182. Honors Market Design. 5 Units.**

Rigorous introduction to the theory of matching and resource allocation, and its application to practical market design. Theory covers two-sided matching, "house allocation" problems, random assignment, and their variants. Applied topics include school choice, labor market, house allocation, and organ allocation for transplantation. Forms a sequence with ECON 180 and ECON 181, but can be taken independently. Prerequisites: Experience with abstract mathematics and willingness to work hard. No prior knowledge of economics is required, although basic knowledge in game theory is useful.

**ECON 190. Introduction to Financial Accounting. 5 Units.**

How to read, understand, and use corporate financial statements. Oriented towards the use of financial accounting information (rather than the preparer), and emphasizes the reconstruction of economic events from published accounting reports.

**ECON 191. Introduction to Cost Accounting. 5 Units.**

The use of internal financial data for managerial decision making.

**ECON 198. Junior Honors Seminar. 5 Units.**

Primarily for students who expect to write an honors thesis. Weekly sessions discuss writing an honors thesis proposal (prospectus), submitting grant applications, and completing the honors thesis. Readings focus on writing skills and research design. Students select an adviser, outline a program of study for their senior year, and complete a prospectus by the end of the quarter. Enrollment limited to 25.

Same as: PUBLPOL 197.

**ECON 199D. Honors Thesis Research. 1-10 Units.**

In-depth study of an appropriate question and completion of a thesis of very high quality. Normally written under the direction of a member of the Department of Economics (or some closely related department). See description of honors program. Register for at least 1 unit for at least one quarter. Meets first week of Autumn Quarter.

**ECON 202. Core Economics: Modules 1 and 2. 2-5 Units.**

(Non-Economics graduate students register for 202N.) Open to advanced undergraduates with consent of instructors. Theory of the consumer and the implications of constrained maximization; uses of indirect utility and expenditure functions; theory of the producer, profit maximization, and cost minimization; behavior under uncertainty; partial equilibrium analysis and introduction to models of general equilibrium. Limited enrollment. Prerequisite: thorough understanding of the elements of multivariate calculus and linear algebra.

**ECON 202N. 202 For Non-Economics Ph.D. Students. 2-5 Units.**

Core Economics modules 1 and 2 for non-Economics Ph.D. students.

**ECON 203. Core Economics: Modules 5 and 6. 2-5 Units.**

(Non-Economics graduate students register for 203N.) Non-cooperative game theory including normal and extensive forms, solution concepts, games with incomplete information, and repeated games. Externalities and public goods. The theory of imperfect competition: static Bertrand and Cournot competition, dynamic oligopoly, entry decisions, entry deterrence, strategic behavior to alter market conditions. Limited enrollment. Prerequisite: ECON 202.

**ECON 203N. 203 For Non-Economics Ph.D. Students. 2-5 Units.**

Non-cooperative game theory including normal and extensive forms, solution concepts, games with incomplete information, and repeated games. Externalities, public goods, and asymmetric information. The theory of imperfect competition and other applications. Limited enrollment. Prerequisite: ECON 202N or consent of instructor.

**ECON 204. Core Economics: Modules 9 and 10. 2-5 Units.**

The theory of contracts, emphasizing contractual incompleteness and the problem of moral hazard. Incentive regulation. Competition with imperfect information, including signaling and adverse selection. The theory of resource allocation over time, competitive equilibrium, and intertemporal efficiency. Limited enrollment. Prerequisite: ECON 203.

**ECON 210. Core Economics: Modules 3 and 7. 2-5 Units.**

Dynamic economics applied to aggregate economic fluctuations and economic growth. Solving dynamic, stochastic rational expectation models using discrete time dynamic programming. Growth theory (neoclassical models, growth accounting, technical change, endogenous growth) using optimal control theory. Limited enrollment.

**ECON 211. Core Economics: Modules 11 and 12. 2-5 Units.**

Investment theory and empirics, including adjustment costs and the q theory; consumption theory and empirics, focusing on the life-cycle model; and the labor market. Macro economics of financial markets. Limited enrollment. Prerequisite: ECON 210.

**ECON 212. Core Economics: Modules 4 and 8. 2-5 Units.**

General equilibrium with incomplete markets: precautionary savings; income, wealth, and consumption distribution; constrained efficiency. Endogenous market incompleteness: limited commitment, moral hazard, hidden income and hidden savings; recursive contracts. Optimal income taxation: the primal approach; taxation of capital income; optional taxation with heterogeneity; commitment and time inconsistency. Monetary theory and policy: time series techniques to characterize and evaluate policy; models with rational expectations and rigidities; the Lucas critique; time inconsistency; staggered price and wage setting; optimal policy rules; the term structure of interest rates. Limited enrollment. Prerequisites: ECON 203, ECON 211.

**ECON 215. Economic Development. 2-5 Units.**

Microeconomic analysis of markets and institutions in developing countries. Topics: agriculture; insurance, credit and saving; health and nutrition; education; public service delivery. Emphasis is on empirical tests of and evidence for theoretical models. Prerequisites: ECON 202 or ECON 202N.

**ECON 216. Development Economics III. 2-5 Units.**

Use of quantitative theory to understand various aspects of the growth and development process. Emphasis on family and demographic issues and their importance for development. Theoretical models of fertility and marriage decisions, and their empirical relevance. Unified growth theories: demographic transition and industrial revolution. Family institutions such as marriage payments and polygamy. The political economy of family-related institutions, e.g. the evolution of women's and children's rights. Female labor supply and development. Theories of disease and development. Prerequisite: 202, 203, 204, 210, 211, 212, 270, 271, 272.

**ECON 217. Topics in International Macroeconomics: Theory and Evidence for Latin America. 2-5 Units.**

Banking systems, interest rates, regulatory policies, and the productivity of capital in developing countries. Controlling inflation: fiscal and monetary policies for macroeconomic stability. Currency crises, exchange rates, and the liberalization of foreign trade. Further applications to transitional socialist economies in Asia and E. Europe.

**ECON 225. Economics of Technology and Innovation. 2-5 Units.**

Theoretical and empirical analysis of innovation. Topics include optimal design of patents laws and alternative mechanisms to create incentives for innovation, such as technology transfer to developing countries, (compulsory) licensing, and patent pools. Emphasis on empirical analyses of both historical and contemporary data.

**ECON 226. U.S. Economic History. 2-5 Units.**

The role of economic history as a distinctive approach to the study of economics, using illustrations from U.S. history. Topics: historical and institutional foundations of the U.S. rise to world economic preeminence; economic causes and consequences of slavery; the American national system of technology; the Great Depression of the 30s; national economic performance in a globalizing world. Prerequisite: ECON 51 and ECON 52. Intended for graduate students.

**ECON 227. European Economic History. 2-5 Units.**

European economic history from middle ages to the twentieth century. Topics: competing hypotheses in explaining long term trends in economic growth and cross-country differences in long-term economic growth; formation, function, and persistence of institutions and organizations; the role of institutions and organizations (e.g. apprenticeship, servitude, partnerships, cooperatives, social networks, share cropping, and communes) as solutions to contractual problems; the economics of migration; the changing economic role of the family. Use of economic theory in guiding hypothesis testing, as well as construction of new datasets and the execution of empirical analysis.

**ECON 228. Institutions and Organizations in Historical Perspective. 2-5 Units.**

Emphasis is on the formative period from the 11th to 18th centuries. Formation, function, and evolution of institutions; alternative conceptual frameworks such as neoclassical, transaction cost economics, institutionalism, and Marxism and neo-Marxism; game theory, mechanism design, and contract theory. Institutions related to trade organization, the organization of production, feudalism, mercantilism, and the state.

**ECON 233. Advanced Macroeconomics I. 2-5 Units.**

Topics in the theory and empirics of economic growth.

**ECON 235. Advanced Macroeconomics III. 2-5 Units.**

Current topics to prepare student for research in the field. Recent research in labor-market friction, reallocation, fluctuations, wage and price determination, innovation, and productivity growth. Research methods, presentations skills, and writing in advanced economics.

**ECON 236. Financial Economics I. 2-5 Units.**

Tools: solving choice problems and equilibrium models with multiple risky assets, many agents, and frictions. Applications: household finance (including housing and mortgage choice); risk sharing and financial innovation; economies; trading volume; international capital flows and financial market integration. Prerequisites: 210, 211, 212.

**ECON 237. Financial Economics II. 2-5 Units.**

Topics in financial Economics. Discussion of recent academic papers on asset pricing. Student presentations and course paper requirement. Designed for second year PhD students in economics or finance.

**ECON 239D. Directed Reading. 1-10 Units.**

May be repeated for credit.

**ECON 241. Public Finance and Taxation I. 2-5 Units.**

Design of tax systems, transfers intended to alleviate poverty, the effect of taxes on earnings, fees intended to internalize externalities like pollution, school finance and other forms of fiscal federalism, local public goods such as schools. Students will learn sophisticated applications of frontier applied econometric techniques including synthetic controls, regression discontinuity, advanced instrumental variables methods. Prerequisites: ECON 202-204, ECON 210, ECON 270, ECON 271, or equivalent with consent of instructor.

**ECON 242. Public Finance and Taxation II. 2-5 Units.**

Topics concerning dynamic taxation, including capital income taxation, taxation and saving, and corporate income taxation. Public expenditures, including government interventions in private insurance markets, adverse selection, optimal unemployment insurance design, and health economics. Prerequisites: 202, 203, 204, 210, 270, 271, or equivalent with consent of instructor. Recommended: 241.

**ECON 246. Labor Economics I. 2-5 Units.**

The demand for workers and hours of work, substitution among different types of labor in production, technological change, adjustment costs, restrictions on layoffs. The supply of labor, hours of work, participation, life-cycle models of behavior, welfare programs. Wage differentials by schooling, age, cohort, gender, and race. Changes in these wage differentials and differences across countries. Income inequality. Employment contracts and turnover. Models of labor union behavior. Bargaining. Worker-owned enterprises.

**ECON 247. Labor Economics II. 2-5 Units.**

Recent topics in applied micro, focusing on papers from top journals (QJE, AER, JPE, Econometrica and REStud) over the last ten years. Broad overview of current topic and techniques in applied-micro research. Topics include inequality, polarization and skill-biased technical change, discrimination, technology adoption and the spread of information, productivity and management practices, field experiments, culture, peer effects and academic spillovers. Combination of student and faculty presentations. Additional sessions on general presentations, paper writing and research skills to prepare for job market, as well as practical Stata feedback on estimation procedures. Class trip to the NBER West-Coast labor meetings at the San Francisco Fed.

**ECON 248. Labor Economics III. 2-5 Units.**

Topics in current applied microeconomic research including skill-biased technical change, income distribution, program evaluation, job search, migration, consumption behavior. Student and faculty presentations.

**ECON 250. Environmental Economics. 2-5 Units.**

Theoretical and empirical analysis of sources of and solutions to environmental problems, with application to local pollution challenges and global environmental issues such as climate change. Topics include: analysis of market failure, choice of environmental policy instruments, integrating environmental and distortionary taxes, environmental policy making under uncertainty, valuing environmental amenities, and measuring /promoting sustainable development.

**ECON 251. Natural Resource and Energy Economics. 2-5 Units.**

Management and provision non-renewable and renewable natural resources, with considerable attention to energy provision and use. Topics include: fisheries problems and policy; energy industry market structure, pricing, and performance; and policies to facilitate transitions from non-renewable to renewable energy. Prerequisites: 202, 203, 204, 271, and 272, or equivalents with consent of instructor.

**ECON 252. Policy & Strategy Issues in Financial Engineering. 2 Units.**

(Same as LAW 564). This is a non-technical course that will focus on a series of case studies each designed to illuminate a serious public policy issue raised by the evolution of modern financial engineering. These will include discussions of Freddie Mac, Fannie Mae, sub-prime and Alt-A mortgages and the flaws of AAA CDOs; the spectacular losses by Orange County and the Florida Local Government Investment Pool and the challenges posed by unregulated investment pools; how credit default swaps are likely to change with central clearing using the PIIGS (Portugal/ Ireland/ Iceland/ Greece/ Spain), the monolines, AIG, Lehman and MF Global as examples; views of rogue trading using the similarities and disparities of Askin, Madoff, Barings, Soc Gen and UBS for discussion; and Risk Management 101 : the why/ how/ where/ when firms went wrong plus what to keep and what to throw out in the next phase of risk programs among other case studies. The subject matter, by necessity, is multi-disciplinary and so the course is particularly suited to those students having an interest in public policy and the evolution of modern financial markets. This includes students from the law or business schools, or the public policy, economics, EES, political science, or financial math and engineering programs among others. Several themes will tie the case studies, reading and discussions together: -Is this an example of an innovation that got too far ahead of existing operations, risk management, legal, accounting, regulatory or supervisory oversight? -How might temporary infrastructure be implemented without stifling innovation or growth? -How might losses be avoided by requiring permanent infrastructure sooner? Will Dodd-Frank, Basel III, etc., help to prevent such problems? What are the potential unintended consequences? -Is this an example of improperly viewing exposures that are subject to uncertainty or incorrectly modeling risk or both? Guest speakers will be invited to share their experiences. This course will aim to provide a practitioner(s) view of financial engineering over the past 3 ½ decades as well as a broad understanding of what went right and what went wrong plus cutting edge views of the future of financial engineering.

Same as: ECON 152, PUBLPOL 364.

**ECON 257. Industrial Organization I. 2-5 Units.**

Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; price discrimination; price dispersion and consumer search; differentiated products; the role of information in markets, including insurance and adverse selection; auctions; collusion and cartel behavior; advertising; entry and market structure; market dynamics; strategic behavior.

**ECON 258. Industrial Organization 2A. 2-5 Units.**

Theoretical and empirical analyses of adverse selection and insurance markets; health care; vertical restraints and bundling; auctions; financial markets.

**ECON 259. Industrial Organization II B. 2-5 Units.**

Theoretical and empirical analyses of the determinants of market structure; firm behavior and market efficiency in oligopolies; economics of antitrust and regulation, with focus on energy and environmental economics; the role of information asymmetries in markets: adverse selection and moral hazard, with focus on insurance and credit markets.

**ECON 260. Industrial Organization III. 2-5 Units.**

Current research and policy questions in industrial organization. Course combines lectures by the instructors with student presentations, with an emphasis on initiating dissertation research in industrial organization. Prerequisites: ECON 257, ECON 258.

**ECON 265. International Economics I. 2-5 Units.**

International macroeconomics and finance, emphasizing current research. The course is organized around the role of different types of frictions (in asset and goods markets) in explaining features of the international macroeconomy. Prerequisites: 202, 203, 204, 210, 211, 212.

**ECON 266. International Economics II. 2-5 Units.**

Commercial policies, unilateral trade policies, political economy of trade policy and the economics of trade agreements. Trade with perfectly and imperfectly competitive markets.

**ECON 267. Topics in International Trade. 2-5 Units.**

Topics from the frontier of current international trade research, presented through recent theoretical and empirical papers. Firm heterogeneity in trade and firms' export decisions. Different types of foreign direct investment. Multinational firms and the interaction between international trade and the theory of the firm. Institutional frictions and their effects on trade and FDI activity. Course goal is to prepare students for doing research in international trade and related fields.

**ECON 270. Intermediate Econometrics I. 2-5 Units.**

Probability, random variables, and distributions; large sample theory; theory of estimation and hypothesis testing. Limited enrollment. Prerequisites: math and probability at the level of Chapter 2, Paul G. Hoel, *Introduction to Mathematical Statistics*, 5th ed.

**ECON 271. Intermediate Econometrics II. 2-5 Units.**

Linear regression model, relaxation of classical-regression assumptions, simultaneous equation models, linear time series analysis. Limited enrollment. Prerequisite: 270.

**ECON 272. Intermediate Econometrics III. 2-5 Units.**

Continuation of 271. Nonlinear estimation, qualitative response models, limited dependent variable (Tobit) models. Limited enrollment. Prerequisite: 271.

**ECON 273. Advanced Econometrics I. 2-5 Units.**

Possible topics: parametric asymptotic theory. M and Z estimators. General large sample results for maximum likelihood; nonlinear least squares; and nonlinear instrumental variables estimators including the generalized method of moments estimator under general conditions. Model selection test. Consistent model selection criteria. Nonnested hypothesis testing. Markov chain Monte Carlo methods. Nonparametric and semiparametric methods. Quantile Regression methods.

**ECON 275. Time Series Econometrics. 2-5 Units.**

Stochastic processes and concepts such as stationarity, ergodicity, and mixing. Inference with heteroskedastic and autocorrelated time series; autoregressive and moving average models; unit root processes and asymptotic analysis of such; tests for structural change; vector autoregressive models; cointegration; impulse response analysis; forecasting; ARCH and GARCH volatility models. Prerequisites: 270, 271.

**ECON 276. Limited Dependent Variables. 2-5 Units.**

(Formerly 274) Parametric and semi-parametric approaches to the estimation of econometric models with discrete or limited dependent variables. Maximum likelihood, linear and nonlinear panel data, duration models, rank estimation and index models, Bayesian approaches and MCMC, measurement error models, dynamic programming discrete choice analysis and dynamic discrete games. models. Prerequisite: ECON 273 or consent of instructor.

**ECON 277. Behavioral and Experimental Economics III. 2-5 Units.**

This is part of a three course sequence (along with Econ 278 & 279) on behavioral and experimental economics. The sequence has two main objectives: 1) examines theories and evidence related to the psychology of economic decision making, 2) Introduces methods of experimental economics, and explores major subject areas (including those not falling within behavioral economics) that have been addressed through laboratory experiments. Focuses on series of experiments that build on one another in an effort to test between competing theoretical frameworks, with the objects of improving the explanatory and predictive performance of standard models, and of providing a foundation for more reliable normative analyses of policy issues. Prerequisites: 204 and 271, or consent of instructor.

**ECON 278. Behavioral and Experimental Economics I. 2-5 Units.**

This is the first half of a three course sequence (along with Econ 277 & 279) on behavioral and experimental economics. The sequence has two main objectives: 1) examines theories and evidence related to the psychology of economic decision making, 2) Introduces methods of experimental economics, and explores major subject areas (including those not falling within behavioral economics) that have been addressed through laboratory experiments. Focuses on series of experiments that build on one another in an effort to test between competing theoretical frameworks, with the objects of improving the explanatory and predictive performance of standard models, and of providing a foundation for more reliable normative analyses of policy issues. Prerequisites: 204 and 271, or consent of instructor.

**ECON 279. Behavioral and Experimental Economics II. 2-5 Units.**

This is part of a three course sequence (along with Econ 277 & 278) on behavioral and experimental economics. The sequence has two main objectives: 1) examines theories and evidence related to the psychology of economic decision making, 2) Introduces methods of experimental economics, and explores major subject areas (including those not falling within behavioral economics) that have been addressed through laboratory experiments. Focuses on series of experiments that build on one another in an effort to test between competing theoretical frameworks, with the objects of improving the explanatory and predictive performance of standard models, and of providing a foundation for more reliable normative analyses of policy issues. Prerequisites: 204 and 271, or consent of instructor.

**ECON 282. Contracts, Information, and Incentives. 2-5 Units.**

Basic theories and recent developments in mechanism design and the theory of contracts. Topics include: hidden characteristics and hidden action models with one and many agents, design of mechanisms and markets with limited communication, long-term relationships under commitment and under renegotiation, property rights and theories of the firm.

**ECON 283. Theory and Practice of Auction Market Design. 2-5 Units.**

Basics of auction theory and recent contributions. Multi-item and combinatorial auctions. Robust auction design. Applied auction design with practical applications. Applied topics may include auctions for Internet advertising, radio spectrum auctions, securities markets, commodities, and complex procurements. US "incentive auctions" are likely applications for 2012. Prerequisite: ECON 282 or consent of instructor.

**ECON 285. Market Design. 2-5 Units.**

This is an introduction to market design, intended mainly for second year PhD students in economics (but also open to other graduates students from around the university and to undergrads who have taken undergrad market design). It will emphasize the combined use of economic theory, experiments and empirical analysis to analyze and engineer market rules and institutions. In this first quarter we will pay particular attention to matching markets, which are those in which price doesn't do all of the work, and which include some kind of application or selection process. In recent years market designers have participated in the design and implementation of a number of marketplaces, and the course will emphasize the relation between theory and practice, for example in the design of labor market clearinghouses for American doctors, and school choice programs in a growing number of American cities (including New York and Boston), and the allocation of organs for transplantation. Various forms of market failure will also be discussed. Assignment: One final paper. The objective of the final paper is to study an existing market or an environment with a potential role for a market, describe the relevant market design questions, and evaluate how the current market design works and/or propose improvements on the current design.

**ECON 288. Computational Economics. 2-5 Units.**

Computational approaches to solving economic problems. Overview of numerical analysis. Economic problems in computationally tractable forms, and the use of numerical analysis techniques to solve them. Examples of problems solved numerically (general equilibrium models, optimal taxation, dynamic programming, economic growth, life-cycle models, intervention in commodity markets, Bayesian econometrics, equilibria of dynamic and repeated games, and nonlinear rational expectations equilibria with asymmetric information). Prerequisite: equivalent of first-year graduate core economics sequence.

**ECON 289. Advanced Topics in Game Theory and Information Economics. 2-5 Units.**

Topics course covering a variety of game theory topics with emphasis on market design, such as matching theory and auction theory. Prerequisites: ECON 285 or equivalent. ECON 283 recommended.

**ECON 291. Social and Economic Networks. 2-5 Units.**

Synthesis of research on social and economic networks by sociologists, economists, computer scientists, physicists, and mathematicians, with an emphasis on modeling. Includes methods for describing and measuring networks, empirical observations about network structure, models of random and strategic network formation, as well as analyses of contagion, diffusion, learning, peer influence, games played on networks, and networked markets.

**ECON 299. Practical Training. 1-10 Units.**

Students obtain employment in a relevant research or industrial activity to enhance their professional experience consistent with their degree programs. At the start of the quarter, students must submit a one page statement showing the relevance of the employment to the degree program along with an offer letter. At the end of the quarter, a three page final report must be supplied documenting work done and relevance to degree program. May be repeated for credit.

**ECON 300. Third-Year Seminar. 1-10 Units.**

Restricted to Economics Ph.D. students. Students present current research. May be repeated for credit.

**ECON 310. Macroeconomic Workshop. 1-10 Units.****ECON 315. Development Workshop. 1-10 Units.****ECON 325. Economic History Workshop. 1-10 Units.**

May be repeated for credit.

**ECON 335. Experimental/Behavioral Seminar. 1-10 Units.**

Field seminar in experimental and behavioral economics.

**ECON 341. Public Economics and Environmental Economics Seminar. 1-10 Units.**

Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and regulatory policies; their effects on levels and distribution of income, wealth, and environmental quality; alternative policies and methods of evaluation. Workshop format combines student research, faculty presentations, and guest speakers. Prerequisite: ECON 241 or consent of instructor.

**ECON 345. Applications Workshop. 1-10 Units.****ECON 354. Workshop in Law and Economics. 2-6 Units.****ECON 355. Industrial Organization Workshop. 1-10 Units.**

Current research in the field by visitors, presentations by students, and discussion of recent papers. Students write an original research paper, make a formal presentation, and lead a structured discussion.

**ECON 365. International Trade Workshop. 1-10 Units.****ECON 370. Econometrics Workshop. 1-10 Units.**

**ECON 391. Microeconomic Theory Seminar. 1-10 Units.**

**ECON 400. Ph.D. Dissertation. 1-15 Units.**  
Pre-TGR dissertation research.(Staff).

**ECON 801. TGR Project. 0 Unit.**

**ECON 802. TGR Dissertation. 0 Unit.**

## Education Courses

**EDUC 11SC. Work and Family. 2 Units.**

Examination into the forces behind the rise in women's paid work and subsequent changes in the workplace and in families. Topics include gendered division of labor, decisions about marriage and childrearing, economic issues, employers' role in structuring work and family, and public policy issues such as anti-discrimination laws, divorce laws, and subsidized child care.

**EDUC 12SC. Hip Hop as a Universal Language. 2 Units.**

This seminar-cipher considers the prospect of Hip Hop as a Universal Language. Hip Hop Culture has captured the minds of youth "all around the world, from Japan to Amsterdam" (like the homie Kurupt says), shaping youth identities, styles, attitudes, languages, fashions, and both physical and political stances. The field of global Hip Hop studies has emerged as scholars around the world grapple with what is arguably the most profound cultural, musical, and linguistic youth movement of the early 21st century. Participants in this seminar-cipher will be engaged in critical discussions around a particular constellation of concerns: Hip Hop Cultures, youth identities, the politics of language, race, and ethnicity, and the simultaneous processes of globalization and localization. Through the examination of various texts (scholarly readings, documentary films, guest speakers and artists), we span the Global Hip Hop Nation through scenes as diverse as Hong Kong's urban center, Germany's Mannheim inner-city district of Weststadt, the Brazilian favelas, the streets of Lagos and Dar es Salaam, and the hoods of the San Francisco Bay Area to explore Hip Hop's global linguistic flows.

**EDUC 13SC. Language, Identity, and the Power of Public Discourse. 2 Units.**

Have you ever engaged in a conversation with someone who sounds different than you expect? This course explores instances like those that highlight the interaction between language and identity and its implications for learning. The theme of language and identity emerges as significant because of the subtle yet powerful impact it has on our cultural interactions. We have an inherent expectation of how we expect people to communicate. Yet, do these expectations interfere with teaching and learning practices? Many individuals take seminars and classes that focus on teaching professional modes of communication and discourse. This course will offer a detailed examination of scholarship that investigates the power of the subtle messages embedded in language. In addition, to gain a sense of the power of these interactions in practice, we will engage in the following research activities: (a) Participants will engage in school site visits to examine these interactions in practice; (b) Participants will engage in critical interviews of broadcasters at a local television station to discuss the role of language and identity in their presentation; and (c) We will visit a recording studio to discuss the role of language and identity with local hip-hop producers and artists.

**EDUC 98X. Service Learning Practicum. 1 Unitss.**

For Alternative Spring Break program leaders. The skills and philosophical framework to develop and lead an ASB experience.

**EDUC 100A. EAST House Seminar: Current Issues and Debates in Education. 1 Unitss.**

Education and Society Theme (EAST) House seminar. In fall quarter, faculty from around the University discuss the latest issues, debates, and research in Education. In winter quarter, research and practice pertaining to gender, sexuality, and education are covered by scholars from around the University and beyond. In the spring, the seminar revolves around higher education and political activism through the lens of race and ethnicity. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice.

**EDUC 100B. EAST House Seminar: Current Issues and Debates in Education. 1 Unitss.**

Education and Society Theme (EAST) House seminar. In fall quarter, faculty from around the University discuss the latest issues, debates, and research in Education. In winter quarter, research and practice pertaining to gender, sexuality, and education are covered by scholars from around the University and beyond. In the spring, the seminar revolves around higher education and political activism through the lens of race and ethnicity. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice.

**EDUC 100C. EAST House Seminar: Current Issues and Debates in Education. 1 Unitss.**

Education and Society Theme (EAST) House seminar. In fall quarter, faculty from around the University discuss the latest issues, debates, and research in Education. In winter quarter, research and practice pertaining to gender, sexuality, and education are covered by scholars from around the University and beyond. In the spring, the seminar revolves around higher education and political activism through the lens of race and ethnicity. Through an examination of these topics, students are able to share and develop their varied interests in educational research, policy, and practice. Same as: ASNAMST 100C.

**EDUC 101. Introduction to Teaching and Learning. 3-5 Units.**

This course is designed to help undergraduates explore career interests in education; it is the core course for the Undergraduate Minor in Education, and fulfills requirements for Honors in Education. The course considers the philosophy, history, politics, professional practice and social structures of teaching in the United States. Students will read and discuss teaching theory and research, participate in learning activities and visit school teaching sites, as well as examine and analyze artifacts and models of teaching.

**EDUC 102. Examining Social Structures, Power, and Educational Access. 2-3 Units.**

Goal is to prepare Education and Youth Development fellows for their work with adolescents in the Haas Center's pre-college summer programs and to define their role in addressing educational inequities in the summer programs and beyond.

**EDUC 103A. Tutoring: Seeing a Child through Literacy. 4 Units.**

Experience tutoring grade school readers in a low income community near Stanford under supervision. Training in tutoring; the role of instruction in developing literacy; challenges facing low income students and those whose first language is not English. How to see school and print through the eyes of a child. Ravenswood Reads tutors encouraged to enroll. Service Learning Course (certified by Haas Center). Same as: EDUC 203A.

**EDUC 103B. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices. 3-5 Units.**

Focus is on classrooms with students from diverse racial, ethnic and linguistic backgrounds. Studies, writing, and media representation of urban and diverse school settings; implications for transforming teaching and learning. Issues related to developing teachers with attitudes, dispositions, and skills necessary to teach diverse students. Same as: AFRICAAM 106, CSRE 103B, EDUC 337.

**EDUC 103C. Educational Policy, Diversity, and English Learners. 3-4 Units.**

Undergraduates engage in the real world of teaching. Historical and legal foundations, and materials, methods, and strategies for English and primary language development. Students tutor an English learner.

**EDUC 104X. Conduct of Research with and in Communities. 3-4 Units.**

For undergraduates interested in service learning and research in community settings. The historical and theoretical underpinnings of community-based participatory research (CBPR), action research, community-embedded research, participant observation, and qualitative research.

**EDUC 105X. Introduction to Education Research for Undergraduates. 3 Units.**

EDUC 105X explores types and purposes and products of education research. Broadly, this seminar course is designed to support Stanford undergraduates in exploring academic and career interests in education; specifically, this course satisfies requirements for the Education Minor, and supports students considering application to the Education Honors Program. In this course we consider what defines education research, and what factors make for quality research. Each week we will read current research by School of Education scholars and welcome the researcher-authors as guest speakers to the class. Students will identify an education topic of interest and write an educational literature review to that topic.

**EDUC 106. Interactive Media in Education. 3-5 Units.**

Workshop.

**EDUC 109X. Educational Issues in Contemporary China. 3-4 Units.**

Reforms such as the decentralization of school finance, emergence of private schools, expansion of higher education, and reframing of educational policy to focus on issues of quality. Have these reforms exacerbated educational inequality.

Same as: EDUC 309X.

**EDUC 110. Sociology of Education: The Social Organization of Schools. 4 Units.**

Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy.

Same as: EDUC 310, SOC 132, SOC 332.

**EDUC 111. The Young Adult Novel: A Literature For and About Adolescents. 4 Units.**

For undergraduates considering teaching or working with adolescents, and for those planning to apply to the coterminous program in the Stanford Teacher Education program (STEP). Students work together to define the genre of young adult novels. What they reveal about adolescence in America. How to read and teach young adult literature.

**EDUC 112X. Urban Education. 3-4 Units.**

(Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education.

Same as: AFRICAAM 112, EDUC 212X, SOC 129X, SOC 229X.

**EDUC 113X. Gender and Sexuality in Schools. 1-3 Units.**

Issues at the intersection of queer theory and educational practice. Experiences, rights, and responsibilities of lesbian, gay, bisexual, transgender, intersex, queer, and questioning students and teachers as members of marginalized or majority cultures.

**EDUC 114N. Growing Up Bilingual. 3 Units.**

This course is a Freshman Introductory Seminar that has as its purpose introducing students to the sociolinguistic study of bilingualism by focusing on bilingual communities in this country and on bilingual individuals who use two languages in their everyday lives. Much attention is given to the history, significance, and consequences of language contact in the United States. The course focuses on the experiences of long-term US minority populations as well as that of recent immigrants.

Same as: CHILATST 14N, CSRE 14N.

**EDUC 115N. How Do People Learn Math? What We Know from Research and the Problems that Persist in US Math Class. 3 Units.**

What is going on in mathematics education in the United States? Why do so many people hate and fear math? What contributes to the high levels of innumeracy in the general population? Why do girls and women opt out of math when they get a chance? In this seminar we will consider seminal research on math learning in K-12 classrooms. We will also spend time investigating cases of teaching and learning, usually through watching video and considering other records of practice. We will consider what learning theories have to tell us about math learning, the nature of good teaching and the reasons for ongoing inequities in math learning and participation. This seminar is for those who are interested in education, and who would like to learn about ways to help students (and maybe yourselves?) learn and enjoy mathematics.

**EDUC 115Q. Identities, Race, and Culture in Urban Schools. 3 Units.**

Preference to sophomores. How urban youth come to a sense of themselves as students, members of cultural and racial groups, and young people in urban America. The nature and interaction of racial and academic identities: how identity takes shape; how it has been conceptualized. The relation between identities and learning. Urban schools as contexts for identity development. Theoretical perspectives include psychology, sociolinguistics, sociology, anthropology, and education. Students shadow a high-school student in a public school and write a case study.

**EDUC 116N. Howard Zinn's 'A People's History' and the Quest for Historical Truth. 3 Units.**

Howard Zinn's 'A People's History of the United States' has few peers among contemporary historical works. With more than two million copies in print, A People's History is more than a book. It is a cultural icon, a symbol of our time. "You wanna read a real history book," Matt Damon tells Robin Williams in Good Will Hunting, "read People's History of the US. That book'll knock you on your ass." Today, A People's History's original grey cover has been colorized in red, white, and blue for its Harper "Perennial Modern Classic" edition, and is now marketed with special displays in suburban megastores. You can buy A People's History T-shirts and tote-bags. Zinn's book was not the first but is certainly the defining example of a genre of historical writing known as revisionism, in which the cherished truths of a previous generation are turned on their head. In this seminar, we will use A People's History to probe the question of historical truth. How do we determine what was true in the past? Why and under what circumstances should we believe what historians say? Under what circumstances are we required to rethink our own interpretations about the past, even if doing so causes discomfort and upheaval? A People's History will be our point of departure, but our journey will visit a variety of historical trouble spots: debates about whether the US was founded as a Christian nation, Holocaust denial, and the "Birther" controversy of President Obama.

**EDUC 116X. Service Learning as an Approach to Teaching. 3 Units.**

History, theory, and practice. Topics include: responsive community partnerships, cultural awareness, the role of reflection, and best practices in service learning.

**EDUC 117. Research and Policy on Postsecondary Access. 3 Units.**

The transition from high school to college. K-16 course focusing on high school preparation, college choice, remediation, pathways to college, and first-year adjustment. The role of educational policy in postsecondary access. Service Learning Course (certified by Haas Center). Same as: EDUC 417.

**EDUC 120C. Education and Society. 4-5 Units.**

The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.

Same as: EDUC 220C, SOC 130, SOC 230.

**EDUC 121X. Hip Hop, Youth Identities, and the Politics of Language. 3-4 Units.**

Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture.

Same as: AFRICAAM 121X, AMSTUD 121X, ANTHRO 121A, CSRE 121X, LINGUIST 155.

**EDUC 122X. From Local to Global: Collaborations for International Environmental Education. 2 Units.**

A collaboration with three universities in Africa. Discourse and debate using Internet and mobile technology interactions. Topics include the global environment, climate change, sustainable development, and food security. Same as: EARTHSYS 123.

**EDUC 123X. Contexts that Promote Youth Development: Understandings of Effective Interventions. 2-4 Units.**

How psychology, medicine, public health, sociology, education, and public policy define and promote youth development. How to build the resilience and competencies of youth through safe, supportive environments for building social, emotional, and intellectual skills. How to design settings that best promote youth development.

**EDUC 124. Collaborative Design and Research of Technology-integrated Curriculum. 3-4 Units.**

Design models for the development of educational materials through a studio-based, curriculum development project. Teams work with a teacher or non-school educator to design and test technology-integrated curricula. Focus is on the role that technologies can play in teaching and learning in school and out-of-school contexts. Open to all.

**EDUC 126A. Introduction to Public Service Leadership. 1-2 Units.**

Offered through the Haas Center for Public Service. A foundation and vision for a future of public service leadership. Students identify personal values and assess strengths as leaders. The ethics of public service and leadership theory.

**EDUC 126B. Public Service Leadership Program Practicum. 1 Unitss.**

This course is for students in the Public Service Leadership Program offered through the Haas Center for Public Service. Designed as a follow-up course to EDUC 126A: Introduction to Public Service Leadership, the PSLP Practicum provides an opportunity for PSLP students to reflect on their own leadership experiences and to learn from each other's leadership experiences while continuing to build a community of peer service leaders. The PSLP Practicum will meet every other week throughout the quarter.

**EDUC 130. Introduction to Counseling. 3 Units.**

The goal of counseling is to help others to create more satisfying lives for themselves. Clients learn to create and capitalize on unexpected events to open up new opportunities. The success of counseling is judged, not by the words and actions of the counselor, but by the progress that the client makes in the real world after counseling itself is ended. Students are encouraged to exert their full efforts within reasonable time limits to improve their competence.

Same as: PSYCH 148.

**EDUC 131. Mediation for Dispute Resolution. 3 Units.**

Mediation as more effective and less expensive than other forms of settling disputes such as violence, lawsuits, or arbitration. How mediation can be structured to maximize the chances for success. Simulated mediation sessions.

Same as: PSYCH 152.

**EDUC 132N. Religion, Music and Identity. 3 Units.**

Music is one of the most powerful artistic media in American culture. From coffee shops to shopping malls, it plays a crucial role in creating both common experiences and individual conceptions of self. Yet, music also has this powerful ability to seemingly transcend particular people, moments, or places. What is it about music that can so strongly anchor us to our own experiences, and paradoxically shake us loose from our mornings and wake us from our everyday lives? Lots of people have stories about music that evidences both of these tendencies. But nowhere else are these two, seemingly opposing qualities on display than in the music of religious communities. Whether we are talking about Gregorian chant, contemporary Christian worship music, Jewish cantillation of Sufi qawwali, music and musical style play a central role in the experience of ritual and in shaping how people understand themselves in relation to it. But what is it about music that fuels that experience? Does music have to be "religious" to do that kind of cultural work? Can you have a "religious" experience in a "secular" setting? The answer might depend on your relationship to the music you are hearing or playing. In this seminar, we are going to explore these questions by attending first and foremost to the sounds of religious life. We are going to begin by listening, and expand our understandings through readings and ethnographic fieldwork. Each of these modes of exploration will provide us with greater insight into the role that music plays in shaping religious experience and, in turn, how people understand themselves in relationship to both religion and music.

**EDUC 133N. The Role of Language in Education and Society. 3 Units.**

The goal of this course is to explore the various issues affecting educational policy and classroom practice in multilingual, multicultural settings. In this class we will examine US and international cases to illustrate more general concerns relating to learners' bilingual/multilingual development in formal educational settings. We begin at the macro level, looking at policy contexts and program structures, and move to the micro level to consider teaching and learning in the multilingual classroom. Throughout, we consider how discourses and identities are interwoven in multilingual education policy and practice. We will also consider the role of communities in implementing change in schools.

**EDUC 134. Career and Personal Counseling. 3 Units.**

Theories and methods for helping people create more satisfying lives for themselves. Simulated counseling experiences.

Same as: EDUC 234, PSYCH 192.

**EDUC 136. World, Societal, and Educational Change: Comparative Perspectives. 4-5 Units.**

Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture.

Same as: EDUC 306D, SOC 231.



**EDUC 139X. Educating Young STEM Thinkers. 3-5 Units.**

The course will introduce students to the design thinking process, the national conversations about the future of STEM careers, and provide opportunities to work with middle school students and K-12 teachers in STEM-based after-school activities and intercession camps. The course will be both theory and practice focused. The purpose is twofold; to provide reflection and mentoring opportunities for students to learn about pathways to STEM careers and to introduce mentoring opportunities with young STEM thinkers.

Same as: EDUC 239X, ME 139, ME 231.

**EDUC 140. Honors Research. 1-5 Units.**

Provides opportunity for research in pursuit of senior honors theses.

**EDUC 143. Boys' Psychosocial Development. 3 Units.**

From early childhood through adolescence. Emphasis is on how boys' lives and experiences are embedded within their interpersonal relationships and social and cultural contexts. Interdisciplinary approach including perspectives from fields such as psychology, sociology, anthropology, family studies, and education. Prerequisite: Human Biology core, or Developmental Psychology, or consent of instructor.

Same as: HUMBIO 144.

**EDUC 146X. Perspectives on the Education of Linguistic Minorities. 3-4 Units.**

Social, political, linguistic, and pedagogical issues associated with educating students who do not speak the language or language variety of the majority society. Focus is on the U.S.; attention to minorities elsewhere. American attitudes toward linguistic and racial minorities. Educational problems of linguistically different children and non-English- or limited-English-speaking children. Approaches to solving problems.

**EDUC 147X. Human-Computer Interaction in Education. 3 Units.**

Required for students in the Learning Design and Technology Master's Program. Concepts underlying the design of human-computer interaction including usability and affordances, direct manipulation, systematic design methods, user conceptual models and interface metaphors, design languages and genres, human cognitive and physical ergonomics, information and interactivity structures, design tools, and environments. Studio/discussion component applies these principles to the design of interactive technology for teaching and learning.

**EDUC 148X. Critical Perspectives on Teaching and Tutoring English Language Learners. 3 Units.**

Theoretical foundation for volunteer tutors of English language learners in urban environments working with children in school-based programs or adults in community-based settings.

**EDUC 149. Theory and Issues in the Study of Bilingualism. 3-5 Units.**

Sociolinguistic perspective. Emphasis is on typologies of bilingualism, the acquisition of bilingual ability, description and measurement, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings.

Same as: EDUC 249.

**EDUC 165. History of Higher Education in the U.S.. 3-5 Units.**

Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities.

Same as: AMSTUD 165, EDUC 265, HISTORY 158C.

**EDUC 170X. Preparation for Independent Public Service Projects. 2 Units.**

Open only to recipients of the Haas Summer Fellowship, which offers students the opportunity to initiate and carry out an innovative service project in collaboration with a community partner. Goal is to expand upon the work fellows did during the application process with respect to the feasibility and sustainability of their field projects.

**EDUC 171. Early Childhood Education Practicum. 2-4 Units.**

Year-long seminar; restricted to students who participate in JumpStart, a service learning program. Training for activities in preschool classrooms. Background on issues related to: young children's cognitive, language, and social development; classroom management; literacy; math; science teaching; cultural diversity; and early childhood education programs. May be repeated for credit.

**EDUC 173. Gender and Higher Education: National and International Perspectives. 4 Units.**

This course examines the ways in which higher education structures and policies affect females, males, and students in relation to each other and how changes in those structures and policies improve experiences for females and males similarly or differently. Students are expected to gain an understanding of theories and perspectives from the social sciences relevant to an understanding of the role of higher education in relation to structures of gender differentiation and hierarchy. Topics include undergraduate and graduate education; identity and sexuality; gender and science; gender and faculty; and the development of feminist scholarship and pedagogy. Attention is paid to how these issues are experienced by women and men in the United States, including people of color, and by academics throughout the world, and how these have changed over time.

Same as: EDUC 273, SOC 173, SOC 273.

**EDUC 176X. The Design of Technologies for Casual Learning - Lab. 1 Unit.**

Lab. Studio-based, participatory, and user-centered development of casual learning technologies is explored, using the Apple iPhone as a prototype platform. The term "casual" is borrowed from casual gaming to denote that the learning technologies are meant for learners to use in "extreme informal" learning circumstances (while "on the go", "any time and any place"). The class builds on learning about and synthesizing knowledge, theory and development activity in four areas including learning theories, mobile technologies, games and participatory design processes.

**EDUC 178X. Latino Families, Languages, and Schools. 3-5 Units.**

The challenges facing schools to establish school-family partnerships with newly arrived Latino immigrant parents. How language acts as a barrier to home-school communication and parent participation. Current models of parent-school collaboration and the ideology of parental involvement in schooling.

**EDUC 179. Urban Youth and Their Institutions: Research and Practice. 4-5 Units.**

The determinants and consequences of urban life for youth, emphasizing disciplinary and methodological approaches, and the gap between the perspectives of state and local organizations and those of youth and their communities. The diversity of urban youth experiences with respect to ethnicity, gender, and immigration histories. Case studies illustrate civic-level and grassroots institutions, their structures, networks, and philosophies; historical and contemporary realities of urban youth for policy makers, educators, and researchers. Limited enrollment. Prerequisite: consent of instructor.

Same as: EDUC 279.

**EDUC 179B. Youth Empowerment and Civic Engagement. 2-4 Units.**

Focus is on youth development policies and practices: what makes them effective, and how they operate in broader institutional contexts. Research-based information; conceptual underpinnings; best learning from experience; and the perspective of expert youth workers, policymakers, and youth about what works.  
Same as: EDUC 279B.

**EDUC 180. Directed Reading in Education. 1-15 Units.**

For undergraduates and master's degree students. (All Areas).

**EDUC 180S. Pre-field Course for Alternative Spring Break. 1 Unitss.**

Limited to students participating in the Alternative Spring Break program. See <http://asb.stanford.edu> for more inform.

**EDUC 181. Multicultural Issues in Higher Education. 4 Units.**

The primary social, educational, and political issues that have surfaced in American higher education due to the rapid demographic changes occurring since the early 80s. Research efforts and the policy debates include multicultural communities, the campus racial climate, and student development; affirmative action in college admissions; multiculturalism and the curriculum; and multiculturalism and scholarship.  
Same as: EDUC 381.

**EDUC 185. Master's Thesis. 1-15 Units.**

(all areas).

**EDUC 187X. Math Mentoring: Working in the Zone with Learners. 1-2 Units.**

The course focuses on how the tutorial relationship can help students learn mathematics. The course will provide background theory and knowledge as well as provide practical approaches to tutoring, supports for targeting activities to students, needs, selection of materials and activities, and ways to assess the progress of the students and reflect on your own experience. Topics will include social theories of learning, teaching for understanding, and challenges of students who are English language learners. In addition to attending 4, two-hour workshop classes, 1 hour of tutoring is required each week. The course will meet 4 times during the quarter for workshops and discussions following Friday tutoring sessions. Students will submit assignments on the Coursework site on weeks that the course does not meet. A 1 unit section of the course will run in Winter and Spring quarters.  
Same as: EDUC 397X.

**EDUC 189X. Language and Minority Rights. 3 Units.**

Language as it is implicated in migration and globalization. The effects of globalization processes on languages, the complexity of language use in migrant and indigenous minority contexts, the connectedness of today's societies brought about by the development of communication technologies. Individual and societal multilingualism; preservation and revival of endangered languages.  
Same as: CHILATST 189W, CSRE 189W.

**EDUC 190. Directed Research in Education. 1-15 Units.**

For undergraduates and master's students. May be repeated for credit. (all areas).

**EDUC 191X. Introduction to Survey Research. 3-4 Units.**

Planning tasks, including problem formulation, study design, questionnaire and interview design, pretesting, sampling, interviewer training, and field management. Epistemological and ethical perspectives. Issues of design, refinement, and ethics in research that crosses boundaries of nationality, class, gender, language, and ethnicity.  
Same as: EDUC 291X.

**EDUC 192X. Interpersonal Learning & Leadership: An Introduction to the RA Role. 2 Units.**

Preparing students for roles as Resident and Community Assistants, "Intelligent Leadership" explores research on college student development, leadership and the complex dynamics of our changing society both within and outside the college environment. Participants will engage in course work that builds skills relevant to their positions and allow students to implement these skills in a real world environment. Through reflection, self-examination and engagement in interpersonal dynamics and analysis, students will examine how their peer group develops while at the university.

**EDUC 193A. Listen Up! Core Peer Counseling Skills. 2 Units.**

Topics: verbal and non-verbal skills, open and closed questions, paraphrasing, working with feelings, summarization, and integration. Individual training, group exercises, role play practice with optional video feedback. Sections on relevance to crisis counseling and student life. Guest speakers from University and community agencies. Students develop and apply skills in University settings.

**EDUC 193B. Peer Counseling in the Chicano/Latino Community. 1 Unitss.**

Topics: verbal and non-verbal attending and communication skills, open and closed questions, working with feelings, summarization, and integration. Salient counseling issues including Spanish-English code switching in communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, and Chicana/o student experience in University settings. Individual training, group exercises, role play, and videotape practice.

**EDUC 193C. Psychological Well-Being On Campus: Perspectives Of The Black Diaspora. 1 Unitss.**

Topics: the concept of culture, Black cultural attributes and their effect on reactions to counseling, verbal and non-verbal attending, open and closed questions, working with feelings, summarization, and integration. Reading assignments, guest speakers, role play, and videotaped practice. Students develop and apply skills in the Black community on campus or in other settings that the student chooses.

**EDUC 193F. Psychological Well-Being on Campus: Asian American Perspectives. 1 Unitss.**

Topics: the Asian family structure, and concepts of identity, ethnicity, culture, and racism in terms of their impact on individual development and the counseling process. Emphasis is on empathic understanding of Asians in America. Group exercises.

**EDUC 193G. Psychological Well-Being on Campus: A Focus on Gender and Sexual Identities. 1 Unitss.**

This course examines mental health and psychological well-being across the spectrum of gender and sexual identities. It addresses the unique challenges that face LGBTQ-identified students, and provides tools for supporting peers as they navigate these challenges. Discussion topics include current conceptualizations of gender identity and sexual orientation, including sexual and gender fluidity; the intersection of queer identities with multiple identities such as ethnic/racial identify and faith/spirituality; unpacking stereotypes; queer relationships and sexuality, coming out and disclosure, and mental health issues.

**EDUC 193N. Peer Counseling in the Native American Community. 1 Unitss.**

Verbal and non-verbal communication, strategic use of questions, methods of dealing with strong feelings, and conflict resolution. How elements of counseling apply to Native Americans including client, counselor, and situational variables in counseling, non-verbal communication, the role of ethnic identity in self-understanding, the relationship of culture to personal development, the impact of family on personal development, gender roles, and the experience of Native American students in university settings. Individual skill development, group exercises, and role practice.

**EDUC 193P. Peer Counseling at the Bridge. 1 Unitss.**

Mental health issues such as relationships, substance abuse, sexual assault, depression, eating disorders, academic stressors, suicide, and grief and bereavement. Guest speakers.

**EDUC 193S. Peer Counseling on Comprehensive Sexual Health. 1 Unitss.**

Information on sexually transmitted infections and diseases, and birth control methods. Topics related to sexual health such as communication, societal attitudes and pressures, pregnancy, abortion, and the range of sexual expression. Role-play and peer-education outreach projects.

Required for those wishing to counsel at the Sexual Health Peer Resource Center (SHPRC).

**EDUC 196X. The Design of Technologies for Casual Learning. 3 Units.**

Studio-based, participatory, and user-centered development of casual learning technologies is explored, using the Apple iPhone as a prototype platform. The term "casual" is borrowed from casual gaming to denote that the learning technologies are meant for learners to use in "extreme informal" learning circumstances (while "on the go", "any time and any place"). The class builds on learning about and synthesizing knowledge, theory and development activity in four areas including learning theories, mobile technologies, games and participatory design processes.

Same as: EDUC 396X.

**EDUC 197. Education, Gender, and Development. 4 Units.**

Theories and perspectives from the social sciences relevant to the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of girls and women and the role of development organizations and processes.

Same as: SOC 134.

**EDUC 199A. Undergraduate Honors Seminar. 3 Units.**

Required of juniors and seniors in the honors program in the School of Education. Student involvement and apprenticeships in educational research. Participants share ongoing work on their honors thesis.

Prerequisite: consent of instructor. May be repeated for credit once.

**EDUC 199B. Undergraduate Honors Seminar. 1 Unitss.**

Required of juniors and seniors in the honors program in the School of Education. Student involvement and apprenticeships in educational research. Participants share ongoing work on their honors thesis.

Prerequisite: consent of instructor. May be repeated for credit once.

**EDUC 199C. Undergraduate Honors Seminar. 1 Unitss.**

Required of juniors and seniors in the honors program in the School of Education. Student involvement and apprenticeships in educational research. Participants share ongoing work on their honors thesis.

Prerequisite: consent of instructor. May be repeated for credit once.

**EDUC 200A. Introduction to Data Analysis and Interpretation. 4 Units.**

Primarily for master's students in the School of Education. Focus is on reading literature and interpreting descriptive and inferential statistics, especially those commonly found in education. Topics: basic research design, instrument reliability and validity, description statistics, correlation, t-tests, one-way analysis of variance, and simple and multiple regression.

**EDUC 200B. Introduction to Qualitative Research Methods. 4 Units.**

(Formerly EDUC 151.) Primarily for master's students: An introduction to the core concepts and methods of qualitative research. Through a variety of hands-on learning activities, readings, field experiences, class lectures, and discussions, students will explore the processes and products of qualitative inquiry.

**EDUC 200C. Introduction to Statistical Methods in Education. 3-4 Units.**

(Formerly EDUC 160.) Basic techniques in descriptive and inferential statistics for educational research will be covered with an emphasis on rigorous preparation for intermediate and advanced courses. Topics include central tendency, variance, probability, distributions, confidence interval, t-test, F-test, correlation, regression, and analysis of variance. Non-parametric statistics and graphical principles for data representation will also be addressed. Students will also be introduced to STATA in preparation for subsequent higher level courses.

**EDUC 201. History of Education in the United States. 3-5 Units.**

How education came to its current forms and functions, from the colonial experience to the present. Focus is on the 19th-century invention of the common school system, 20th-century emergence of progressive education reform, and the developments since WW II. The role of gender and race, the development of the high school and university, and school organization, curriculum, and teaching.

Same as: AMSTUD 201, HISTORY 158B.

**EDUC 202. Introduction to Comparative and International Education. 4-5 Units.**

Contemporary theoretical debates about educational change and development, and the international dimension of issues in education. Emphasis is on the development of students' abilities to make cross-national and historical comparisons of educational phenomena.

**EDUC 203. The Anthropology of Education. 3-5 Units.**

Learning across situations, organizations, institutions, and cultures. How and when people learn and where, with whom and for what and how answers to these questions change across the lifespan. Schools in relation to other settings in which learning takes place for children, adolescents, and adults. Apprenticeship, mentorship, and learning through observation and imitation.

**EDUC 203A. Tutoring: Seeing a Child through Literacy. 4 Units.**

Experience tutoring grade school readers in a low income community near Stanford under supervision. Training in tutoring; the role of instruction in developing literacy; challenges facing low income students and those whose first language is not English. How to see school and print through the eyes of a child. Ravenswood Reads tutors encouraged to enroll. Service Learning Course (certified by Haas Center).

Same as: EDUC 103A.

**EDUC 204. Introduction to Philosophy of Education. 3 Units.**

How to think philosophically about educational problems. Recent influential scholarship in philosophy of education. No previous study in philosophy required.

Same as: PHIL 231.

**EDUC 205X. The Impact of Social and Behavioral Science Research on Educational Issues. 3 Units.**

Ways in which research intersects with educational policy and practice. Emphasis is on behavioral, social, and cognitive traditions. Topics include early childhood education, early reading, science education, bilingual education, school desegregation, class size reduction, classroom organization, violence and juvenile crime, and affirmative action in higher education. Policy debates and how research informs or fails to inform deliberations and decisions in these areas.

**EDUC 206A. Applied Research Methods in International and Comparative Education I: Introduction. 1 Unitss.**

Required for M.A. students in ICE and IEAPA. Orientation to the M.A. program and research project; exploration of resources for study and research.

**EDUC 206B. Applied Research Methods in International and Comparative Education II: Master's Paper Proposal. 1-3 Units.**

Required for M.A. students in ICE and IEAPA. Development of research skills through theoretical and methodological issues in comparative and international education. Preparation of a research proposal for the M.A. monograph.

**EDUC 206C. Applied Research Methods in ICE III: Data Collection and Analysis. 1 Unitss.**

Required for M.A. students in ICE and IEAPA. Practice in data collection and analysis. Preparation of the first draft of the M.A. monograph.

**EDUC 206D. Applied Research Methods in International and Comparative Education IV: Master's Paper Workshop. 3 Units.**

Conclusion of the M.A. program in ICE and IEAPA; required of M.A. students. Reviews of students' research in preparation for their master's monograph.

**EDUC 207X. School: What Is It Good For?. 3-4 Units.**

Focus is on authors who establish claims that the purposes, functions, impacts, and social roles of schooling promote human capital, citizenship, social reproduction, values transmission, social mobility, class equality, racial equality, social stratification, disciplinary power, and the pursuit of individual interests. Historical and sociological approaches. Same as: HISTORY 258D.

**EDUC 208B. Curriculum Construction. 3-4 Units.**

The theories and methods of curriculum development and improvement. Topics: curriculum ideologies, perspectives on design, strategies for diverse learners, and the politics of curriculum construction and implementation. Students develop curriculum plans for use in real settings. Service Learning Course (certified by Haas Center).

**EDUC 209A. Policy, Organization, and Leadership Studies Seminar. 1 Unitss.**

This is a required course for all POLS students. The goals of the POLS Seminar (EDUC 209ABC) are to assist students in making the most of their Stanford graduate experience across several dimensions (academic, professional, and social). EDUC 209A is focused on orienting students to the academic and extra-curricular aspects of the experience as quickly as possible, while helping them coalesce as a group and learn how to leverage each other's professional knowledge. Another goal is to help student define their graduate degree goals, so they can plan their year in a very intentional manner that will result in a project or experiences they can highlight during the required Spring quarter POLS Project Forum.

**EDUC 209B. Policy, Organization, and Leadership Studies Seminar. 1 Unitss.**

This is a required course for all POLS students. The goals of the POLS Seminar (EDUC 209ABC) are to assist students in making the most of their Stanford graduate experience across several dimensions (academic, professional, and social). EDUC 209B focuses on building career skills and exposing students to a range of education research, policy, and practice and begins helping students conceptualize and frame their Spring POLS Project.

**EDUC 209C. Policy, Organization, and Leadership Studies Seminar. 1 Unitss.**

This is a required course for POLS students. The goals of the POLS Seminar (EDUC 209ABC) are to assist students in making the most of their Stanford graduate experience across several dimensions (academic, professional, and social). EDUC 209C focuses on developing the POLS Project for the Spring Forum while continuing to develop career skills and expose students to a range of education research, policy, and practice.

**EDUC 210X. Policy, Organization, and Leadership Studies Internship Workshop. 1-3 Units.**

Forum for POLS students to link their academic learning to real world experience through in-class discussions, presentations, and reflective writing. Fall Quarter is focused on understanding the intern's role within the larger organization. Winter Quarter is outward looking with a focus on understanding the broader fields the students' organizations reside within. Spring Quarter focus is on students learning from and being prepared to teach others.

**EDUC 211X. Beyond Bits and Atoms - Lab. 1-3 Units.**

This course is a hands-on lab in the prototyping and fabrication of tangible technologies, with a special focus in learning and education. We will learn how to use state-of-the-art fabrication machines (3D printers, 3D scanners, laser cutters, routers) to design educational toolkits, educational toys, science kits, and tangible user interfaces. A special focus of the course will be to design low-cost technologies, particularly for urban school in the US and abroad. Same as: CS 402L.

**EDUC 212X. Urban Education. 3-4 Units.**

(Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education. Same as: AFRICAAM 112, EDUC 112X, SOC 129X, SOC 229X.

**EDUC 213X. Introduction to Teaching. 3-4 Units.**

Key concepts in teaching and learning. Student prior knowledge and preconceptions; facts, concepts, and the organization of knowledge; active learning; behavior and cognition; constructing knowledge; metacognition; motivation and affect; transfer; goals and objectives; zone of proximal development; input; organizing learning; modeling; feedback; practice; individual and group differences among students; and pedagogical content knowledge.

**EDUC 214X. Social Entrepreneurship. 4 Units.**

(Same as STRAMGT 369.) The efforts of private citizens to create effective responses to social needs and innovative solutions to social problems. New opportunities for applying business skills in the social sector. Concepts, practices, and challenges of social entrepreneurship in the U.S. and around the world. Frameworks and tools to be more effective in socially entrepreneurial.

**EDUC 215X. International Human Rights and Education. 4-5 Units.**

Theory and practice. Focus is on how education may be seen as a human rights issue and a tool to educate citizens about their human rights. The history of human rights and the spread of the international human rights regime in terms of organizations and treaties. Issues include street and working children, language rights, and women's right to education.

**EDUC 216X. Education, Race, and Inequality in African American History, 1880-1990. 3-5 Units.**

Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis. Same as: CSRE 216X, HISTORY 255E.

**EDUC 217. Philosophical and Methodological Issues in Educational Research. 3 Units.**

The role causation in educational phenomena, and how to determine causal factors. Is educational research based on a positivistic paradigm? Randomized controlled experimental designs. Criteria for judging the rigor of qualitative modes of inquiry. Do Popperian or Deweyan approaches hold the key to resolving contentious issues? Does a postpositivist perspective hold promise?.

**EDUC 218. Topics in Cognition and Learning: Induction, Proof, Discovery, and Statistics. 3 Units.**

This year, the topics course will consider how children, adults, and scientists induce pattern across multiple instances. The problem of induction has deep philosophical roots, because there is no guaranteed method of success. It also has implications for instruction; for example, what instances best help students discover important structure, and what psychological and pedagogical processes improve inductive learning? A unique feature of this course is that issues of human learning will be taught in concert with formal statistics, which scientists have developed to aid induction. The course will use an inductive (discovery) approach to learning statistical methods including analysis of variance, correlation, regression, and chi-square. In sum, the course will introduce the philosophy of inductive inference, its psychological process, the instructional applications of inductive learning, and students will learn statistics inductively. No prerequisites. Students who have taken the relevant statistics courses should also benefit from re-learning statistics inductively.

**EDUC 219E. The Creative Arts in Elementary Classrooms. 1 Unitss.**

For STEP Elementary only or for candidates in the Multiple Subjects program. Hands-on exploration of visual arts media and works of art.

**EDUC 220A. Introduction to the Economics of Education. 4 Units.**

The relationship between education and economic analysis. Topics: labor markets for teachers, the economics of child care, the effects of education on earnings and employment, the effects of education on economic growth and distribution of income, and the financing of education. Students who lack training in microeconomics, register for 220Y for 1 additional unit of credit.

**EDUC 220B. Introduction to the Politics of Education. 4 Units.**

(Same as GSBGEN 349.) The relationships between political analysis and policy formulation in education; focus is on alternative models of the political process, the nature of interest groups, political strategies, community power, the external environment of organizations, and the implementations of policy. Applications to policy analysis, implementation, and politics of reform. (APA).

**EDUC 220C. Education and Society. 4-5 Units.**

The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.

Same as: EDUC 120C, SOC 130, SOC 230.

**EDUC 220D. History of School Reform: Origins, Policies, Outcomes, and Explanations. 3-5 Units.**

Required for students in the POLS M.A. program; others welcome. Focus is on 20th-century U.S. Intended and unintended patterns in school change; the paradox of reform that schools are often reforming but never seem to change much; rhetorics of reform and factors that inhibit change. Case studies emphasize the American high school.

Same as: HISTORY 258E.

**EDUC 220Y. Introduction to the Economics of Education: Economics Section. 1-2 Units.**

For those taking 220A who have not had microeconomics before or who need a refresher. Corequisite: 220A.

**EDUC 221A. Policy Analysis in Education. 4-5 Units.**

Major concepts associated with the development, enactment, and execution of educational policy. Issues of policy implementation, agenda setting and problem formulation, politics, and intergovernmental relations. Case studies. Goal is to identify factors that affect how analysts and policy makers learn about and influence education. Limited enrollment. Prerequisite: consent of instructor.

**EDUC 222. Resource Allocation in Education. 4-5 Units.**

Problems of optimization and design, and evaluation of decision experience. Marginal analysis, educational production functions, cost effectiveness and cost-benefit analysis, constrained maximization, program evaluation. Introduction to linear models for large-scale data analysis. Implications to model assumptions.

**EDUC 223. Good Districts and Good Schools: Research, Policy, and Practice. 3-4 Units.**

Recent studies of districts and schools that exceed expectations in producing desired results for students. Research methodologies, findings of studies, theories of change in reforming schools and districts and efforts to implement results. Components of good schools and districts. Required project studies a school or district to determine goodness. (SSPEP/APA, CTE).

**EDUC 224. Social Entrepreneurship and Social Innovation. 2-4 Units.**

(Same as STRAMGT 367). This course examines individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ "entrepreneurial skills," such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur within or across the nonprofit, government or business sectors, has become increasingly prominent. While virtually all enterprises, commercial and social, generate social value, fundamental to this definition is that the primary focus of social entrepreneurship is to achieve social impact above all else. We will study some of the most promising and the best-proven innovations for improving people's lives. We will also examine mature projects that are now tackling the issue of "scale", moving from local innovations to solutions that create deep systemic changes for larger numbers of economically disadvantaged individuals and communities throughout the world. This year we will focus on what are the constraints and opportunities for creating a social enterprise at scale. The process of "scale" poses tremendous challenges. Even when organizations manage to overcome the many obstacles to growth, and achieve appreciable scale, this approach is seldom sufficient to achieve significant social impact on its own. This year our course will pay particular attention to network approaches which require the mobilization of a vast array of actors and resources, but have the potential to generate rapid and sustained social impact.

**EDUC 224A. Social Entrepreneurship and Social Innovation. 4 Units.** (Same as STRAMGT 367). This course examines individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ "entrepreneurial skills", such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur within or across the nonprofit, government, or business sectors, has become increasingly prominent. While virtually all enterprises, commercial and social, generate social value, fundamental to this definition is that the primary focus of social entrepreneurship is to achieve social impact above all else. We will study some of the most promising and the best-proven innovations for improving people's lives. We will also examine mature projects that are now tackling the issue of "scale", moving from local innovations to solutions that create deep systemic changes for larger numbers of economically disadvantaged individuals and communities throughout the world. This year we will focus on what are the constraints and opportunities for creating a social enterprise at scale. The process of "scale" poses tremendous challenges. Even when organizations manage to overcome the many obstacles to growth, and achieve appreciable scale, this approach is seldom sufficient to achieve significant social impact on its own. This year our course will pay particular attention to network approaches which require the mobilization of a vast array of actors and resources, but have the potential to generate rapid and sustained social impact.

**EDUC 224B. Social Entrepreneurship and Social Innovation. 2 Units.** (Same as STRAMGT 367). This course examines individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ "entrepreneurial skills", such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur within or across the nonprofit, government or business sectors, has become increasingly prominent. While virtually all enterprises, commercial and social, generate social value, fundamental to this definition is that the primary focus of social entrepreneurship is to achieve social impact above all else. We will study some of the most promising and the best-proven innovations for improving people's lives. We will also examine mature projects that are now tackling the issue of "scale", moving from local innovations to solutions that create deep systemic changes for larger numbers of economically disadvantaged individuals and communities throughout the world. This year we will focus on what are the constraints and opportunities for creating a social enterprise at scale. The process of "scale" poses tremendous challenges. Even when organizations manage to overcome the many obstacles to growth, and achieve appreciable scale, this approach is seldom sufficient to achieve significant social impact on its own. This year our course will pay particular attention to network approaches which require the mobilization of a vast array of actors and resources, but have the potential to generate rapid and sustained social impact.

**EDUC 225X. Business Skills and Concepts for the Non-Business Student. 3-4 Units.** For non-business students. Knowledge and tools for operating effectively in an organizational management capacity. Focus is on concepts developed for use in the business world in the areas of strategy, organizational behavior, financial accounting, and marketing. Case studies, podcasts, video, guest speakers, and team-based projects.

**EDUC 226X. Empirical Analysis of Education Governance. 3 Units.** Emphasis is on strategies for empirical evaluation. Topics include: school board, superintendent, and principal decision making; the state role in education policy and budgeting; the impact of teacher unionization; and the growing influence of private foundations and parent associations. Students participate in an original data collection effort for an ongoing research project.

**EDUC 228E. Becoming Literate in School I. 2 Units.** First in a three course sequence. Introduction to reading and language arts theory and methodology for candidates STEP Elementary Teacher program. Instructional methods, formats, and materials.

**EDUC 228F. Becoming Literate in School II. 2 Units.** Second in a three-course required sequence of reading and language arts theory and methodology for candidates in the STEP Elementary program. Theories for guiding instruction and curricular choices.

**EDUC 228G. Becoming Literate in School III. 2 Units.** Third in a three-course required sequence of reading and language arts theory and methodology for candidates in STEP Elementary Teacher program. Theories for guiding instruction and curricular choices.

**EDUC 228H. Literacy, History, and Social Science. 1 Unitss.** How elementary school teachers can teach history and social science within a literacy framework. Topics include: historical thinking, reading, and writing; current research; applying nonfiction reading and writing strategies to historical texts; using primary sources with elementary students; adapting instruction to meet student needs; state standards; evaluating curriculum; assessing student knowledge; developing history and social science units; and embedding history and social science into the general literacy curriculum.

**EDUC 229A. Learning Design and Technology Seminar. 1 Unitss.** Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT).

**EDUC 229B. Learning Design and Technology Seminar. 1 Unitss.** Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT).

**EDUC 229C. Learning Design and Technology Seminar. 1 Unitss.** Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT).

**EDUC 229D. Learning Design and Technology Seminar. 2-5 Units.** Four-quarter required seminar for the LDT master's program. Discussions and activities related to designing for learning with technology. Support for internships and Master's project. Theoretical and practical perspectives, hands-on development, and collaborative efforts. (LDT).

**EDUC 230X. Social Enterprise. 4 Units.** (Same as STRAMGT 341.) Approaches for creating social value through a social enterprises including nonprofits, for-profits, and hybrid forms of organization. Perspectives include entrepreneur, CEO, funder, and board member. Topics include undertaking the social entrepreneurship process; mobilizing economic and human resources; achieving social objectives with commercial vehicles; crafting alliances; managing growth; measuring and managing performance; governing for excellence. Case studies. Student teams carry out field-based research in a significant strategic or operational issue of a social enterprise.

**EDUC 231X. Knowing God: Learning Religion in Popular Culture. 4 Units.**

This course will examine how people learn religion outside of school, and in conversation with popular cultural texts and practices. Taking a broad social-constructivist approach to the variety of ways people learn, this course will explore how people assemble ideas about faith, identity, community, and practice, and how those ideas inform individual, communal and global notions of religion. Much of this work takes place in formal educational environments including missionary and parochial schools, Muslim madrasas or Jewish yeshivot. However, even more takes place outside of school, as people develop skills and strategies in conversation with broader social trends. This course takes an interdisciplinary approach to questions that lie at the intersection of religion, popular culture, and education.

Same as: JEWISHST 291X, RELIGST 231X.

**EDUC 233A. Counseling Theories and Interventions from a Multicultural Perspective. 3-5 Units.**

In an era of globalization characterized by widespread migration and cultural contacts, professionals face a unique challenge: How does one practice successfully when working with clients/students from so many different backgrounds? This course focuses upon the need to examine, conceptualize, and work with individuals according to the multiple ways in which they identify themselves. It will systematically examine multicultural counseling concepts, issues, and research. Literature on counselor and client characteristics such as social status or race/ethnicity and their effects on the counseling process and outcome will be reviewed. Issues in consultation with culturally and linguistically diverse parents and students and work with migrant children and their families are but a few of the topics covered in this course.

Same as: AFRICAAM 233A, CSRE 233A.

**EDUC 233B. Adolescent Development and Mentoring in the Urban Context. 3 Units.**

Continuation of 233A. Topics include: developmental psychology and service learning; collaborating with the community; psychological research on altruism and prosocial behavior; volunteers' motivations; attributions about poverty, and the problem of prejudice.

**EDUC 234. Career and Personal Counseling. 3 Units.**

Theories and methods for helping people create more satisfying lives for themselves. Simulated counseling experiences.

Same as: EDUC 134, PSYCH 192.

**EDUC 235X. The Creative Arts in Schools and Classrooms. 2 Units.**

Students work alongside teachers and performing artists to plan and implement classroom activities with elementary school children to prepare them for a Lively Arts performance. Background theory in education and arts education. Students develop a follow-up classroom activity for children in their own art form.

**EDUC 236X. Beyond Bits and Atoms: Designing Technological Tools. 3-5 Units.**

Practicum in designing and building technology-enabled curricula and learning environments. Students use software toolkits and state-of-the-art fabrication machines to design educational software, educational toolkits, and tangible user interfaces. How to design low-cost technologies, particularly for urban school in the US and abroad. The constructionist learning design perspective, critical pedagogy, and the application of complexity sciences in education.

Same as: CS 402.

**EDUC 239X. Educating Young STEM Thinkers. 3-5 Units.**

The course will introduce students to the design thinking process, the national conversations about the future of STEM careers, and provide opportunities to work with middle school students and K-12 teachers in STEM-based after-school activities and intercession camps. The course will be both theory and practice focused. The purpose is twofold; to provide reflection and mentoring opportunities for students to learn about pathways to STEM careers and to introduce mentoring opportunities with young STEM thinkers.

Same as: EDUC 139X, ME 139, ME 231.

**EDUC 240. Adolescent Development and Learning. 5 Units.**

How do adolescents develop their identities, manage their inner and outer worlds, and learn? Presuppositions: that fruitful instruction takes into account the developmental characteristics of learners and the task demands of specific curricula; and that teachers can promote learning and motivation by mediating among the characteristics of students, the curriculum, and the wider social context of the classroom. Prerequisite: STEP student or consent of instructor. (STEP).

**EDUC 241S. Organizational Learning. 2 Units.**

(Same as OB 586.) How firms learn from their experiences and the opportunities created by flawed learning. Common mistakes in learning and barriers to the adoption of effective practices. How to avoid common mistakes and build organizations that learn more effectively to identify possible opportunities in markets. Concepts and findings from organization theory, psychology, decision theory, and statistics.

**EDUC 241X. Organizational Learning. 4 Units.**

Why firms do not learn from their experiences and the opportunities created by flawed learning. Common mistakes in learning and barriers to the adoption of effective practices. How to avoid common mistakes and build organizations that learn more effectively to identify possible opportunities in markets. Concepts and findings from organization theory, psychology, decision theory, and statistics. Readings include teaching notes, papers in psychology and organization theory, HBR articles, and *Moneyball* by Michael Lewis who discusses market-level mistakes in professional baseball.

**EDUC 242. Language Use in the Chicano Community. 3-5 Units.**

The significance and consequences of language diversity in the culture and society of the U.S. Experiences of non-English background individuals through focus on Spanish-English bilingual communities.

Same as: SPANLIT 206.

**EDUC 243. Writing Across Languages and Cultures: Research in Writing and Writing Instruction. 3-5 Units.**

Theoretical perspectives that have dominated the literature on writing research. Reports, articles, and chapters on writing research, theory, and instruction; current and historical perspectives in writing research and research findings relating to teaching and learning in this area.

**EDUC 244. Classroom Management and Leadership. 2 Units.**

Student and teacher roles in developing a classroom community. Strategies for classroom management within a theoretical framework. STEP secondary only.

**EDUC 244E. Elementary Classroom Leadership and Management. 1 Units.**

How to best manage a classroom. Student and teacher roles in developing a classroom community. Strategies for classroom management within a theoretical framework. STEP elementary only.

**EDUC 244F. Elementary Classroom Leadership and Management. 1 Units.**

Skills for developing a positive classroom learning environment. Theoretical issues and opportunities to acquire strategies and make links with practice teaching class. STEP elementary only.

**EDUC 245. Understanding Racial and Ethnic Identity Development. 3-5 Units.**

African American, Native American, Mexican American, and Asian American racial and ethnic identity development; the influence of social, political and psychological forces in shaping the experience of people of color in the U.S. The importance of race in relationship to social identity variables including gender, class, and occupational, generational, and regional identifications. Bi- and multiracial identity status, and types of white racial consciousness.

Same as: AFRICAAM 245, CSRE 245.

**EDUC 246A. Secondary Teaching Seminar. 3 Units.**

Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student.

**EDUC 246B. Secondary Teaching Seminar. 5 Units.**

Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: guided observations, building classroom community, classroom interaction processes, topics in special education portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student.

**EDUC 246C. Secondary Teaching Seminar. 5 Units.**

Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student. (STEP).

**EDUC 246D. Secondary Teaching Seminar. 2-7 Units.**

Preparation and practice in issues and strategies for teaching in classrooms with diverse students. Topics: instruction, curricular planning, classroom interaction processes, portfolio development, teacher professionalism, patterns of school organization, teaching contexts, and government educational policy. Classroom observation and student teaching with accompanying seminars during each quarter of STEP year. 16 units required for completion of the program. Prerequisite: STEP student.

**EDUC 246E. Elementary Teaching Seminar. 3 Units.**

Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

**EDUC 246F. Elementary Teaching Seminar. 5-7 Units.**

Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

**EDUC 246G. Elementary Teaching Seminar. 3 Units.**

Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

**EDUC 246H. Elementary Teaching Seminar. 4 Units.**

Integrating theory and practice in teacher development. Topics include: equity, democracy, and social justice in the context of teaching and learning; teacher reflection, inquiry, and research; parent/teacher relationships; youth development and community engagement; professional growth and development; teacher leadership and school change processes; preparation for the job search, the STEP Elementary Portfolio, and the STEP Elementary Conference. Prerequisite: STEP student.

**EDUC 247. Moral Education. 3 Units.**

Contemporary scholarship and educational practice related to the development of moral beliefs and conduct in young people. The psychology of moral development; major philosophical, sociological, and anthropological approaches. Topics include: natural capacities for moral awareness in the infant; peer and adult influences on moral growth during childhood and adolescence; extraordinary commitment during adulthood; cultural variation in moral judgment; feminist perspectives on morality; the education movement in today's schools; and contending theories concerning the goals of moral education.

**EDUC 248X. Issues of Curriculum and Pedagogy in Multicultural Classrooms. 3-4 Units.**

Debates concerning race, class, gender and sexuality, and ethnicity as they impact curriculum and practice in heterogeneous classrooms. How teachers and students can become agents of educational change. Sources include videos, scholarship, popular press, and voices of practitioners, students, and families.

**EDUC 249. Theory and Issues in the Study of Bilingualism. 3-5 Units.**

Sociolinguistic perspective. Emphasis is on typologies of bilingualism, the acquisition of bilingual ability, description and measurement, and the nature of societal bilingualism. Prepares students to work with bilingual students and their families and to carry out research in bilingual settings. Same as: EDUC 149.

**EDUC 250B. Statistical Analysis in Education: Regression. 4 Units.**

Primarily for doctoral students; part of doctoral research core; prerequisite for advanced statistical methods courses in School of Education. Basic regression, a widely used data-analytic procedure, including multiple and curvilinear regression, regression diagnostics, analysis of residuals and model selection, logistic regression. Proficiency with statistical computer packages.

**EDUC 250C. Qualitative Analysis in Education. 4 Units.**

Primarily for doctoral students; part of doctoral research core. Methods for collecting and interpreting qualitative data including case study, ethnography, discourse analysis, observation, and interview.

**EDUC 251B. Statistical Analysis in Educational Research: Analysis of Variance. 4 Units.**

Primarily for doctoral students. ANOVA models as widely used data analytic procedures, especially in experimental, quasi-experimental, and criterion-group designs. Topics: single-factor ANOVA; factorial between and within subjects and mixed design ANOVA (fixed, random, and mixed models); analysis of covariance; and multiple comparison procedures. Prerequisite: 250A or equivalent. (all areas).



**EDUC 251C. Statistical Analysis in Educational Research: Applied Multivariate Analysis. 1-4 Units.**

Primarily for doctoral students in education, social, and behavioral sciences. Multivariate analysis of variance, discriminant analysis, factor analysis, correlation analysis. Advanced regression methods. Data compression: principal components analysis, clustering. Computer packages for data analysis. Prerequisite: 250B, 257, STATS 200, or equivalent. (all areas).

**EDUC 252. Introduction to Test Theory. 4-5 Units.**

Concepts of reliability and validity; derivation and use of test scales and norms; mathematical models and procedures for test validation, scoring, and interpretation. Prerequisite: STATS 190 or equivalent.

**EDUC 253X. Teaching the Unteachable: Teaching and Representing the Holocaust. 3-5 Units.**

Theodore Adorno asked whether it was possible to write poetry after Auschwitz; whatever the answer, each year witnesses exponential growth in state-sponsored mandates to teach the Holocaust. How and to what end does catastrophe become curriculum? How to assess what students learn from these efforts. The Nazis' efforts to teach for hate, and contemporary parallels. Historical and educational sources, especially films and memoirs. Same as: HISTORY 237B.

**EDUC 254S. Leadership in Diverse Organizations. 2 Units.**

(Same as OB 593) This course is designed to help students improve their capacity to exercise leadership and work effectively with others within the context of culturally diverse groups and organizations. The course is based on the premise that diversity can present unique challenges and opportunities and thereby pushes students to develop crucial leadership skills, many of which are relevant across a variety of situations. The class will address two primary questions: 1) What social and psychological obstacles limit people's ability to work effectively across identity-based differences? 2) What can you do to build the relational and organizational capacity to enable these differences to be a resource for learning and effectiveness within teams and organizations? Students should be prepared to experiment with various conceptual and analytic skills inside and outside of the classroom. While the course focuses on dynamics of race and gender, there will be opportunities for students to explore a variety of other dimensions of identity and difference in organizations, including (but not limited to) sexual orientation, nationality, class, and religion. The course is intended for students who expect to work in culturally diverse groups or organizations and will be equally relevant to those who plan to work in the not-for-profit, public, and for-profit sectors.

**EDUC 254X. Leadership in Diverse Organizations. 4 Units.**

How improve capacity to exercise leadership and work effectively with others within the context of culturally diverse groups and organizations. Premise is that diversity presents challenges and opportunities that push students to develop leadership skills relevant across a variety of situations. What social and psychological obstacles limit people's ability to work effectively across identity-based differences? What can people do to build the relational and organizational capacity to enable these differences to be a resource for learning and effectiveness within teams and organizations? Focus is on dynamics of race and gender; attention to other dimensions of identity and difference in organizations, including sexual orientation, nationality, class, and religion.

**EDUC 255A. Experimental Research Designs in Educational Research. 3-5 Units.**

The course will cover the following topics: a) the logic of causal inference and the Fisher/Neyman/Rubin counterfactual causal model (Fisher, 1935; Heckman, 1979; Holland, 1986; Neyman, 1990; Rubin, 1978); b) randomized experiments; c) complex randomized experiments in education (cluster randomized trials, multi-site trials, staggered implementation via randomization, etc.); d) policy experiments with randomization; e) meta-analysis; and f) power in randomized experiments; g) the ethics and politics of randomized experiments.

**EDUC 255B. Causal Inference in Quantitative Educational and Social Science Research. 3-5 Units.**

Quantitative methods to make causal inferences in the absence of randomized experiment including the use of natural and quasi-experiments, instrumental variables, regression discontinuity, matching estimators, longitudinal methods, fixed effects estimators, and selection modeling. Assumptions implicit in these approaches, and appropriateness in research situations. Students develop research proposals relying on these methods. Prerequisites: exposure to quantitative research methods; multivariate regression. Same as: SOC 257.

**EDUC 255C. Applied Quasi-Experimental Research in Education. 3-5 Units.**

Course will provide hands-on practice in analysis of data from experimental and quasi-experimental research designs, including a) instrumental variables estimators; b) regression discontinuity estimators; c) difference-in-difference estimators; d) matching estimators; e) fixed effects estimators; and f) panel data methods (including individual fixed effects models, lagged covariate adjustment models, growth models, etc.). Prerequisites: satisfactory completion of EDUC 255B, EDUC 257C or SOC 257. Same as: SOC 258.

**EDUC 256. Psychological and Educational Resilience Among Children and Youth. 4 Units.**

Theoretical, methodological, and empirical issues pertaining to the psychological and educational resilience of children and adolescents. Overview of the resilience framework, including current terminology and conceptual and measurement issues. Adaptive systems that enable some children to achieve successful adaptation despite high levels of adversity exposure. How resilience can be studied across multiple levels of analysis, ranging from cell to society. Individual, family, school, and community risk and protective factors that influence children's development and adaptation. Intervention programs designed to foster resilient adaptation in disadvantaged children's populations. Same as: HUMBIO 149.

**EDUC 257A. Statistical Methods for Behavioral and Social Sciences. 3 Units.**

For students with experience in empirical research. Analysis of data from experimental studies through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through log-linear models, logistic regression. Integrated with the use of statistical computing packages. Prerequisite: analysis of variance and regression at the level of STATS 161.

**EDUC 257B. Statistical Methods for Behavioral and Social Sciences. 3 Units.**

For students with experience in empirical research. Analysis of data from experimental studies through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through log-linear models, logistic regression. Integrated with the use of statistical computing packages. Prerequisite: analysis of variance and regression at the level of STATS 161.

**EDUC 258. Literacy Development and Instruction. 3-5 Units.**

Literacy acquisition as a developmental and educational process. Problems that may be encountered as children learn to read. How to disentangle home, community, and school instruction from development.

**EDUC 259X. Application of Hierarchical Linear Models in Behavioral and Social Research. 4 Units.**

The fundamental phenomenon of interest in educational research is the growth in knowledge and skills of individual students. Two facts - that children's growth is typically the object of inquiry and that such growth occurs in organizational settings - correspond to two of the most troublesome and persistent methodological problems in the social sciences: the measurement of change and the assessment of multi-level effects (also referred to as the unit of analysis problem). Although these two methodological problems have distinct, long-standing, and non-overlapping literatures, these problems, in fact, share a common cause - the inadequacy of traditional statistical techniques for the modeling of hierarchy.

**EDUC 260X. Understanding Statistical Models and their Social Science Applications. 3 Units.**

Critical examination of statistical methods in social science applications, especially for cause and effect determinations. Topics: path analysis, multilevel models, matching and propensity score methods, analysis of covariance, instrumental variables, compliance, longitudinal data, mediating and moderating variables. See <http://www-stat.stanford.edu/~rag/stat209>.

Prerequisite: intermediate-level statistical methods  
Same as: HRP 239, STATS 209.

**EDUC 262A. Curriculum and Instruction in English. 2 Units.**

Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. (STEP).

**EDUC 262B. Curriculum and Instruction in English. 3 Units.**

Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. STEP secondary only.

**EDUC 262C. Curriculum and Instruction in English. 3 Units.**

Approaches to teaching English in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. (STEP).

**EDUC 263A. Curriculum and Instruction in Mathematics. 2 Units.**

The purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP) 263A. Sum, 263B. Aut, 263C. Win.

**EDUC 263B. Curriculum and Instruction in Mathematics. 3 Units.**

The purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP) 263A. Sum, 263B. Aut, 263C. Win.

**EDUC 263C. Curriculum and Instruction in Mathematics. 3 Units.**

The purposes and programs of mathematics in the secondary curriculum; teaching materials, methods. Prerequisite: STEP student or consent of instructor. (STEP) 263A. Sum, 263B. Aut, 263C. Win.

**EDUC 263E. Quantitative Reasoning in Mathematics I. 2 Units.**

First of a three-course sequence in mathematics for STEP elementary teacher candidates. Content, pedagogy, and context. Mathematics subject matter; the orchestration of teaching and learning of elementary mathematics including curriculum, classroom and lesson design, and cases studies. Sociocultural and linguistic diversity, equity, differentiation of instruction, the impact of state and national standards, and home/community connections.

**EDUC 263F. Quantitative Reasoning in Mathematics II. 2-3 Units.**

Second of a three-course sequence in mathematics for STEP elementary teacher candidates. Content, pedagogy, and context. Mathematics subject matter; the orchestration of teaching and learning of elementary mathematics including curriculum, classroom and lesson design, and cases studies. Sociocultural and linguistic diversity, equity, differentiation of instruction, the impact of state and national standards, and home/community connections.

**EDUC 263G. Quantitative Reasoning in Mathematics III. 2 Units.**

Third of a three-course sequence in mathematics for STEP elementary teacher candidates. Content, pedagogy, and context. Mathematics subject matter; the orchestration of teaching and learning of elementary mathematics including curriculum, classroom and lesson design, and cases studies. Sociocultural and linguistic diversity, equity, differentiation of instruction, the impact of state and national standards, and home/community connections.

**EDUC 264C. Curriculum and Instruction in World Languages. 3 Units.**

Approaches to teaching foreign languages in the secondary school, including goals for instruction, teaching techniques, and methods of evaluation. Prerequisite: STEP student. (STEP).

**EDUC 264E. Methods and Materials in Bilingual Classrooms. 2 Units.**

Restricted to STEP elementary teacher candidates in the BCLAD program. Theories, research, and methods related to instruction of Spanish-English bilingual children, grades K-8. Approaches to dual language instruction, and pedagogical and curricular strategies for the instruction of reading, language arts, science, history, social science, and math in Spanish. Assessment issues and practices with bilingual students. In Spanish.

**EDUC 265. History of Higher Education in the U.S.. 3-5 Units.**

Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities.

Same as: AMSTUD 165, EDUC 165, HISTORY 158C.

**EDUC 266X. Workshop in Practical Quantitative Research on Educational Policy and Inequality. 3 Units.**

Conceptual and technical skills for analyzing data concerning educational policy and inequality. How to design analytic strategies using available data sources. Interpreting and presenting results. Prerequisite: 250A.

**EDUC 267A. Curriculum and Instruction in Science. 2 Units.**

Possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP).

**EDUC 267B. Curriculum and Instruction in Science. 3 Units.**

Possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP).

**EDUC 267C. Curriculum and Instruction in Science. 3 Units.**

Possible objectives of secondary science teaching and related methods: selection and organization of content and instructional materials; lab and demonstration techniques; evaluation, tests; curricular changes; ties with other subject areas. Prerequisite: STEP student or consent of instructor. (STEP).

**EDUC 267E. Development of Scientific Reasoning and Knowledge. 2 Units.**

For STEP elementary teacher candidates. Theories and methods of teaching and learning science. How to develop curricula and criteria for critiquing curricula. Students design a science curriculum plan for a real setting. State and national science frameworks and content standards. Alternative teaching approaches; how to select approaches that are compatible with learner experience and lesson objectives. Focus is on the linguistic and cultural diversity of California public school students.

**EDUC 267F. Development of Scientific Reasoning and Knowledge II. 2 Units.**

Continuation of 267E. Scientific knowledge and pedagogical skills for supporting science instruction. Topics include: how children build scientific understandings and what that understanding might look and sound like in young children; what school science is and how concepts are connected to the doing of it; physical, life, and earth science constructs.

**EDUC 267G. Integrating the Garden into the Elementary Curriculum. 1 Unitss.**

This mini-course uses the garden and kitchen environments to provide teacher candidates with real-world contexts in which to explore some of the key issues that children face in health, nutrition, and sustainability. Teacher candidates will gain an understanding of how to integrate the various themes with content areas and standards and an appreciation for the importance of addressing children's health needs in an era when the country is facing increased obesity and other health problems.

**EDUC 268A. Curriculum and Instruction in History and Social Science. 2 Units.**

The methodology of history instruction: teaching for historical thinking and reasoning; linking the goals of teaching history with literacy; curriculum trends; and opportunities to develop teaching and resource units. Prerequisite: STEP student.

**EDUC 268B. Curriculum and Instruction in History and Social Science. 3 Units.**

The methodology of history instruction: teaching for historical thinking and reasoning; linking the goals of teaching history with literacy; curriculum trends; and opportunities to develop teaching and resource units. Prerequisite: STEP student.

**EDUC 268C. Curriculum and Instruction in History and Social Science. 3 Units.**

The methodology of history instruction: teaching for historical thinking and reasoning; linking the goals of teaching history with literacy; curriculum trends; and opportunities to develop teaching and resource units. Prerequisite: STEP student.

**EDUC 268E. Elementary History and Social Science. 3-4 Units.**

Teaching and learning history and social science in the elementary grades. What is included in the discipline and why it is important to teach. The development of historical thinking among children. How students learn and understand content in these disciplines.

**EDUC 269. Analysis of Teaching. 3 Units.**

Student learning and the epistemology of school subjects as related to the planning and implementation of teaching, analysis of curriculum, and evaluation of performance and understanding. Readings and activities are coordinated with student teaching activities of participants. Prerequisite: STEP student or consent of instructor.

**EDUC 269X. The Ethics in Teaching. 1 Unitss.**

Goal is to prepare for the ethical problems teachers confront in their professional lives. Skills of ethical reasoning, familiarity with ethical concepts, and how to apply these skills and concepts in the analysis of case studies. Topics: ethical responsibility in teaching, freedom of speech and academic freedom, equality and difference, indoctrination, and the teaching of values.

**EDUC 270A. Learning to Lead in Public Service Organizations. 3-5 Units.**

For Haas Center student service organization leaders. (Davis).

**EDUC 271X. Education Policy in the United States. 5 Units.**

The course will provide students from different disciplines with an understanding of the broad educational policy context. The course will cover topics including a) school finance systems; b) an overview of policies defining and shaping the sectors and institutional forms of schooling, c) an overview of school governance, d) educational human-resource policy, e) school accountability policies at the federal and state levels; and f) school assignment policies and law, including intra- and inter-district choice policies, desegregation law and policy.

**EDUC 272X. Understanding and Creating Value-Added Measures of Teacher Effectiveness. 3 Units.**

This seminar will explore a variety of approaches to measuring teacher effectiveness using student performance on state standardized tests. We will read the recent research literature on value-added estimation, addressing issues such as bias and measurement error. We also will use administrative data from two large districts to create and compare multiple value-added measures. The class assumes a comfort with OLS regression and basic programming in Stata.

**EDUC 273. Gender and Higher Education: National and International Perspectives. 4 Units.**

This course examines the ways in which higher education structures and policies affect females, males, and students in relation to each other and how changes in those structures and policies improve experiences for females and males similarly or differently. Students are expected to gain an understanding of theories and perspectives from the social sciences relevant to an understanding of the role of higher education in relation to structures of gender differentiation and hierarchy. Topics include undergraduate and graduate education; identity and sexuality; gender and science; gender and faculty; and the development of feminist scholarship and pedagogy. Attention is paid to how these issues are experienced by women and men in the United States, including people of color, and by academics throughout the world, and how these have changed over time. Same as: EDUC 173, SOC 173, SOC 273.

**EDUC 274X. School Choice: The Role of Charter Schools. 3 Units.**

(Formerly EDUC 153X.) Is school choice, including vouchers, charter schools, contract schools, magnet schools, district options, and virtual schools, a threat or an opportunity for public education? Focus is on the charter school movement nationally and in California as reform strategy. Roles and responsibilities of charter schools emphasizing issues of governance, finance, curriculum, standards, and accountability.

**EDUC 276. Educational Assessment. 3 Units.**

Reliability, validity, bias, fairness, and properties of test scores. Uses of tests to monitor, manage, and reform instruction. Testing and competition, meritocracy, achievement gaps, and explanations for group differences.

**EDUC 277. Education of Immigrant Students: Psychological Perspectives. 4 Units.**

Historical and contemporary approaches to educating immigrant students. Case study approach focuses on urban centers to demonstrate how stressed urban educational agencies serve immigrants and native-born U.S. students when confronted with overcrowded classrooms, controversy over curriculum, current school reform movements, and government policies regarding equal educational opportunity.

**EDUC 278. Introduction to Issues in Evaluation. 3-4 Units.**

Open to master's and doctoral students with priority to students in the School of Education. Focus is on the basic literature and major theoretical and practical issues in the field of program evaluation. Topics include: defining purpose, obtaining credible evidence, the role of the evaluator, working with stakeholder, values in evaluation, utilization, and professional standards. The course project is to design an evaluation for a complex national or international program selected by the instructor.

**EDUC 279. Urban Youth and Their Institutions: Research and Practice. 4-5 Units.**

The determinants and consequences of urban life for youth, emphasizing disciplinary and methodological approaches, and the gap between the perspectives of state and local organizations and those of youth and their communities. The diversity of urban youth experiences with respect to ethnicity, gender, and immigration histories. Case studies illustrate civic-level and grassroots institutions, their structures, networks, and philosophies; historical and contemporary realities of urban youth for policy makers, educators, and researchers. Limited enrollment. Prerequisite: consent of instructor.

Same as: EDUC 179.

**EDUC 279B. Youth Empowerment and Civic Engagement. 2-4 Units.**

Focus is on youth development policies and practices: what makes them effective, and how they operate in broader institutional contexts. Research-based information; conceptual underpinnings; best learning from experience; and the perspective of expert youth workers, policymakers, and youth about what works.

Same as: EDUC 179B.

**EDUC 282X. The Politics of Knowledge in the Twentieth Century United States. 3-5 Units.**

This course examines the relationship between social scientific knowledge and power in the modern United States. Topics include the emergence of social scientific disciplines, debates over objectivity, and professionalization. The course examines both how universities, philanthropic foundations, and the federal government have shaped knowledge production and how social science has influenced law, social and educational policy, and popular social thought.

**EDUC 283. Child Development In and Beyond Schools. 2 Units.**

(Formerly EDUC 144). How schools form a context for children's social and cognitive development. Focus is on early and middle childhood. Transactional processes between children and learning opportunities in classroom contexts. Topics include: alternative theoretical perspectives on the nature of child development; early experience and fit with traditional school contexts; assessment practices and implications for developing identities as learners; psychological conceptions of motivational processes and alternative perspectives; the role of peer relationships in schools; and new designs for learning environments. Readings address social science and methodological issues. STEP Elementary only.

**EDUC 284. Teaching and Learning in Heterogeneous Classrooms. 3 Units.**

Teaching in academically and linguistically heterogeneous classrooms requires a repertoire of pedagogical strategies. Focus is on how to provide access to intellectually challenging curriculum and equal-status interaction for students in diverse classrooms. Emphasis is on group work and its cognitive, social, and linguistic benefits for students. How to prepare for group work, equalize participation, and design learning tasks that support conceptual understanding, mastery of content and language growth. How to assess group products and individual contributions. (STEP).

**EDUC 285. Supporting Students with Special Needs. 2-3 Units.**

For STEP teacher candidates. Needs of exceptional learners, identification of learning differences and disabilities, and adaptations in the regular inclusion classroom. Legal requirements of special education, testing procedures, development of individualized education plans, and support systems and services. Students follow a special needs learner to understand diagnosis, student needs, and types of services.

**EDUC 286B. Second Language Acquisition Research. 4 Units.**

Major research findings and theories in second language acquisition. Second language research and theories in formal and informal settings where a second language is learned.

**EDUC 287X. Graduate Research Workshop on Psychological Interventions. 3 Units.**

Psychological research has the potential to create novel interventions that promote the public good. This workshop will expose students to psychologically 'wise' intervention research and to support their efforts to conduct such interventions, especially in the context of education, broadly conceived, as well as other areas. The first part of the class will address classic interventions and important topics in intervention research, including effective delivery mechanisms, sensitive behavioral outcomes, the role of theory and psychological process, and considerations of the role of time and of mechanisms that can sustain treatment effects over time. In the second part of the class, students will present and receive feedback on their own ongoing and/or future intervention research. Prerequisite: Graduate standing in Psychology or Education, or consent of instructor.

Same as: PSYCH 274.

**EDUC 288. Organizational Analysis. 4-5 Units.**

Principles of organizational behavior and analysis; theories of group and individual behavior; organizational culture; and applications to school organization and design. Case studies.

Same as: SOC 366.

**EDUC 289. The Centrality of Literacies in Teaching and Learning. 3 Units.**

(Formerly EDUC 166.) Focus is on principles in understanding, assessing, and supporting the reading and writing processes, and the acquisition of content area literacies in secondary schools. Literacy demands within particular disciplines and how to use oral language, reading, and writing to teach content area materials more effectively to all students. (STEP).

**EDUC 290. Instructional Leadership: Building Capacity for Excellent Teaching. 3-4 Units.**

This course focuses on the role of leaders in designing, supporting and sustaining excellent teaching. How do leaders create the organizational conditions to focus attention on the technical core of instruction, curriculum and assessment. Course goals: 1) explore a variety of educational leadership approaches, 2) investigate the theory of action underlying these approaches to leadership and consider the implications for instructional practice and 3) develop understanding of the relationship between the leadership approach and the learning environment.

**EDUC 291. Learning Sciences and Technology Design Research Seminar and Colloquium. 1-3 Units.**

Students and faculty present and critique new and original research relevant to the Learning Sciences and Technology Design doctoral program. Goal is to develop a community of scholars who become familiar with each other's work. Practice of the arts of presentation and scholarly dialogue while introducing seminal issues and fundamental works in the field.

**EDUC 291X. Introduction to Survey Research. 3-4 Units.**

Planning tasks, including problem formulation, study design, questionnaire and interview design, pretesting, sampling, interviewer training, and field management. Epistemological and ethical perspectives. Issues of design, refinement, and ethics in research that crosses boundaries of nationality, class, gender, language, and ethnicity.

Same as: EDUC 191X.

**EDUC 292X. Academic Writing for Clarity and Grace. 2-4 Units.**

Students will acquire helpful writing strategies, habits, and critical faculties; increase their sense of writing as revision; and leave them with resources that will support them in their own lifelong pursuit of good writing. Students will work on revising their own papers and editing papers of other students. Class will focus on exercises in a variety of critical writing skills: framing, concision, clarity, emphasis, rhythm, action, actors, argument, data, quotations, and usage.

**EDUC 293X. Religion and Education. 4 Units.**

This course will examine interactions between religion and education, focusing on both formal and experiential sites in which people and communities explore, articulate, encounter, and perform religious ideologies and identities. The class will focus on different religious traditions and their encounters the institutions and structures of education in American culture, both in the United States and as it manifests in American culture transnationally.

Same as: JEWISHST 293X, RELIGST 293X.

**EDUC 294X. History of the Learned Book. 3-5 Units.**

The course takes full advantage of the university library's Special Collections to examine the key historic works contributing to the advancement of learning and the organization of knowledge. Beginning with medieval manuscripts and progressing through all areas of human inquiry during the age of print, the course explores the economic and educational history of learned publishing in the West, while examining what these historic artifacts reveal about developments in the structure and authority, production and circulation, technology and aesthetics, of learning and knowledge.

**EDUC 295. Learning and Cognition in Activity. 3 Units.**

Methods and results of research on learning, understanding, reasoning, problem solving, and remembering, as aspects of participation in social organized activity. Principles of coordination that support cognitive achievements and learning in activity settings in work and school environments.

Same as: PSYCH 261A.

**EDUC 296X. School Leadership. 3 Units.**

Can one person really make a difference for all the students in a school? Accurate or not, that's the expectation faced by school principals. This course will give students practice in translating school improvement ideas into practice and also help them develop a personal vision for school improvement. For students in POLS or MA/MBA program in School of Education.

**EDUC 297X. Teaching and Learning in Higher Education. 3-4 Units.**

Open to master's and doctoral students in all disciplines. How teachers can promote lasting learning and ask which pedagogies are most effective in today's college classrooms. Readings analyze teaching and learning in diverse disciplines and institutional types. Students observe the instruction of a Stanford master teacher. Students write a paper about the instruction of the teacher they observe or prepare a syllabus and commentary for a course of their design.

Same as: CTL 297X.

**EDUC 298. Learning in a Networked World: Learning Analytics in Technology-Enhanced Education. 3 Units.**

Foundations, theories and empirical studies for interdisciplinary advances in how we conceive of the potentials and challenges associated with lifelong, lifewide and life-deep learning in a networked world given the growth of always-on cyberinfrastructure for supporting information and social networks across space and time with personal computers, netbooks, and mobiles.

Same as: CS 377L.

**EDUC 299. Educating for Equity and Democracy. 2 Units.**

(Formerly EDUC 167.) Introduction to the theories and practices of equity and democracy in education. How to think about teaching and schooling in new ways; the individual moral and political reasons for becoming a teacher. (STEP).

**EDUC 302X. Incentives In Education. 1-4 Units.**

Seminar. Theoretical and empirical literatures from psychology and economics that focus on group and individual incentives and their potential effects. Emphasis is on seminal experiments in psychology and the recent wave of economic field experiments that test the how individual incentives affect educational outcomes and intrinsic motivation.

**EDUC 303X. Designing Learning Spaces. 3-4 Units.**

Project-based. How space shapes personal interactions and affords learning opportunities in formal and informal settings. How to integrate learning principles into the design of spaces and develop a rubric to assess the impact on learning.

**EDUC 306A. Economics of Education in the Global Economy. 5 Units.**

Case material considers development problems in the U.S. and abroad. Discussion sections on economic aspects of educational development.

**EDUC 306B. Politics, Policy Making, and Schooling Around the World. 3-5 Units.**

Education policy, politics, and development. Topics include: politics, interests, institutions, policy, and civil society; how schools and school systems operate as political systems; how policy making occurs in educational systems; and theories of development.

**EDUC 306D. World, Societal, and Educational Change: Comparative Perspectives. 4-5 Units.**

Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture.

Same as: EDUC 136, SOC 231.

**EDUC 306Y. Economic Support Seminar for Education and Economic Development. 1 Unitss.**

Core economic concepts that address issues in education in developing and developed countries. Supply and demand, elasticity, discount rates, rate of return analysis, utility functions, and production functions. Corequisite: 306A. (Carnoy).

**EDUC 307X. Organizing for Diversity: Opportunities and Obstacles in Groups and Organizations. 3-4 Units.**

Obstacles in organizations and groups that prevent people from participating, working effectively, and developing relationships in the context of diversity. How to create conditions in which diversity enhances learning and effectiveness? Experiential exercises; students experiment with conceptual and analytic skills inside and outside of the classroom.

**EDUC 308X. Mobile Learning Technology for the Marginalized. 1-3 Units.**

Learning design principles as a basis for developing and evaluating mobile learning systems to address educational inequalities in underserved communities. Students analyze mobile learning scenarios, prototypes, and authoring tools while collaborating with research teams to develop a small-scale mobile empowerment scenario addressing education needs such as language, math, health, and civic and life skills in developing countries.

**EDUC 309X. Educational Issues in Contemporary China. 3-4 Units.**

Reforms such as the decentralization of school finance, emergence of private schools, expansion of higher education, and reframing of educational policy to focus on issues of quality. Have these reforms exacerbated educational inequality.

Same as: EDUC 109X.

**EDUC 310. Sociology of Education: The Social Organization of Schools. 4 Units.**

Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy.

Same as: EDUC 110, SOC 132, SOC 332.

**EDUC 311X. Designing Learning for Development: Learning Theories, Technology Design and Social Change. 3 Units.**

Perspectives on learning and human development as they relate to prior technological interventions in the development sphere. Case studies in the international development context; historical perspective on learning and development. Methods of inquiry useful in a design process engaging technology within a development framework.

**EDUC 312B. Microsociology: Social Structure and Interaction. 4 Units.**

How to interpret interpersonal situations using microsociological theories. Focuses on the role of intention, identity, routines, scripts, rituals, conceptual frameworks, talk and emotions in social interaction. Processes by which interactions reverberate outward to transform groups and social structures. Special consideration will be placed on organizational contexts like schools, workplaces and policy decision arenas.

Same as: SOC 224B.

**EDUC 313X. The Education of American Jews. 4 Units.**

This course will take an interdisciplinary approach to the question of how American Jews negotiate the desire to retain a unique ethnic sensibility without excluding themselves from American culture more broadly. Students will examine the various ways in which people debate, deliberate, and determine what it means to be an "American Jew". This includes an investigation of how American Jewish relationships to formal and informal educational encounters through school, popular culture, religious ritual, and politics.

Same as: JEWISHST 393X, RELIGST 313X.

**EDUC 315X. Race and Ethnicity in Society and Institutions. 1-5 Units.**

Primarily for doctoral students. Major theories and empirical research. Emphasis is on schooling and race, racial identity, urban issues, and the impact of immigration on race relations.

Same as: SOC 347.

**EDUC 317X. Workshop: Networks, Histories, and Theories of Action. 1-2 Units.**

Yearlong workshop where doctoral students are encouraged to collaborate with peers and faculty who share an interest in researching the network dynamics, histories and theories of action that help explain particular social phenomena. Students present their own research and provide helpful feedback on others' work. Presentations may concern dissertation proposals, grants, article submissions, book proposals, datasets, methodologies and other texts. Repeatable for credit.

Same as: SOC 317W.

**EDUC 318X. The Discourses of Teaching Reading. 3-5 Units.**

Students examine language, social relationships, and students' textual sense-making to further develop their conceptions of reading comprehension and their pedagogical practice as reading teachers. What it means to comprehend text; how classroom discourse matters in the development of textual understanding; and what understandings, purposes, and relationships should matter in classroom talk about text. Field work in which students facilitate small group text discussions for the duration of the quarter at a location of their choice.

**EDUC 321. Analysis of Social Interaction. 4 Units.**

Practicum on discourse, interactional, and cultural analysis of videotaped data. Analysis of interactional data, and the basis on which analytic claims can be founded. The transcription of speech and movement in social interaction, and how to identify the patterns which participants use to display and interpret cultural meanings. The theoretical assumptions hidden in transcription systems. Prerequisite: first- or second-year graduate student.

**EDUC 321X. Leading Social Change: Educational and Social Entrepreneurship. 4 Units.**

(Same as OB 385) The course provides an overview of different approaches to leading change in the social sector, drawing primarily, but not exclusively, on case examples in education. While there is a substantial need for innovation and visionary leadership in sectors such as education, social entrepreneurs who want to drive change must appreciate the significant barriers and unique opportunities presented by non-market forces in these sectors. The course will equip students with an appreciation for different mechanisms of change and theories of action as well as some of the challenges of initiating and sustaining meaningful change in social sectors such as education. The course will draw on readings and case studies, and we will benefit from the wisdom of an inspirational group of guest lecturers. While the course will benefit any student concerned with making a positive impact in the world, it is particularly (although not exclusively) appropriate for students in the joint MA/MBA program as well as those who will lead social change through nonprofit consulting or entrepreneurship.

Same as: OB 385.

**EDUC 322. Discourse of Liberation and Equity in Communities and Classrooms. 3-5 Units.**

Issues and strategies for studying oral and written discourse as a means for understanding classrooms, students, and teachers, and teaching and learning in educational contexts. The forms and functions of oral and written language in the classroom, emphasizing teacher-student and peer interaction, and student-produced texts. Individual projects utilize discourse analytic techniques. Prerequisite: graduate status or consent of instructor.

Same as: AFRICAAM 130.

**EDUC 323A. The Practice of Education Policy Analysis. 3-5 Units.**

Key issues in the K-12 education policy. Modern theories about the making of policy and its implementation. Preparation to do policy analysis in education.

**EDUC 324X. The Ecology of Equality. 1-4 Units.**

A biweekly, one-hour workshop that meets throughout the full academic year. Designed for doctoral students and explores a range of issues pertaining to equity and equality in the United States and globally. Takes an interdisciplinary approach and intended for those who desire a deeper exploration of humanistic, social science and philosophical explanations for existing conditions, crises, and policies in society, as they pertain to various forms of social inequality--with a particular focus on race, ethnicity, class, gender, and sexuality.

**EDUC 325A. Proseminar 1. 3 Units.**

Required of and limited to first-year Education doctoral students. Core questions in education: what is taught, to whom, and why; how do people learn; how do teachers teach and how do they learn to teach; how are schools organized; how are educational systems organized; and what are the roles of education in society?.

**EDUC 325B. Proseminar 2. 3 Units.**

Required of and limited to first-year Education doctoral students. Core questions in education: what is taught, to whom, and why; how do people learn; how do teachers teach and how do they learn to teach; how are schools organized; how are educational systems organized; and what are the roles of education in society?.

**EDUC 325C. Proseminar 3. 2-4 Units.**

Required of and limited to first-year Education doctoral students. Core questions in education: what is taught, to whom, and why; how do people learn; how do teachers teach and how do they learn to teach; how are schools organized; how are educational systems organized; and what are the roles of education in society?.

**EDUC 326. Law, Litigation, and Educational Policy. 3 Units.**

Same as LAW 364. Restricted to Education graduate students and Law students. Interplay among educational law and policy, administrative decision making, and practice. Issues include the relationship between schooling and the state, nature and scope of students' substantive and procedural rights inside the schoolhouse, and how law and litigation have advanced or stymied the goal of equality of educational opportunity.

**EDUC 327A. The Conduct of Qualitative Inquiry. 3-4 Units.**

Two quarter sequence for doctoral students to engage in research that anticipates, is a pilot study for, or feeds into their dissertations. Prior approval for dissertation study not required. Students engage in common research processes including: developing interview questions; interviewing; coding, analyzing, and interpreting data; theorizing; and writing up results. Participant observation as needed. Preference to students who intend to enroll in 327C.

Same as: SOC 331.

**EDUC 327C. The Conduct of Qualitative Inquiry. 1-4 Units.**

For doctoral students. Students bring research data for analysis and writing. Preference to those who have completed 327A.

**EDUC 328A. Topics in Learning and Technology: d.compress - Designing Calm. 2-3 Units.**

Contents of the course change each year. The course can be repeated. Stress silently but steadily damages physical and emotional well-being, relationships, productivity, and our ability to learn and remember. This highly experiential and project-oriented class will focus on designing interactive technologies to enable calm states of cognition, emotion, and physiology for better human health, learning, creativity and productivity. Same as: CS 377D.

**EDUC 328X. Topics in Learning and Technology: Core Mechanics for Learning. 3 Units.**

Contents of the course change each year. The course can be repeated. In game play, core mechanics refers to the rules of interaction that drive the game forward. This class will consider whether there are core mechanics that can drive learning forward, and if so, how to build them into learning environments.

**EDUC 329X. Seminar on Teacher Professional Development. 1-4 Units.**

For master's and doctoral students. Theories, principles, and models of professional development. Issues include: different conceptions of teaching, practice, and development; what gets developed in professional development; pedagogies of professional development; structures to support teacher learning; evaluating professional development; and policy issues.

**EDUC 330X. Teaching English Language Learners: Issues in Policy, Leadership, and Instruction. 3-4 Units.**

Current perspectives and research on issues facing educators serving the English language learner population. Issues include federal education legislation, civil rights law, national Common Core Standards, content and language proficiency standards assessment and accountability, school improvement models, school structure, community engagement, addressing issues of long-term English learners, programming for newcomer ELLs, early childhood education, and promoting bilingualism.

**EDUC 332X. Theory and Practice of Environmental Education. 3 Units.**

Foundational understanding of the history, theoretical underpinnings, and practice of environmental education as a tool for addressing today's pressing environmental issues. The purpose, design, and implementation of environmental education in formal and nonformal settings with youth and adult audiences. Field trip and community-based project offer opportunities for experiencing and engaging with environmental education initiatives.

**EDUC 333A. Understanding Learning Environments. 3 Units.**

Advanced seminar. Theoretical approaches to learning used to analyze learning environments and develop goals for designing resources and activities to support effective learning practices.

**EDUC 333B. Imagining the Future of Learning. 3 Units.**

How to understand and forecast social, educational, technological trends; how to develop concepts and ideas for engaging learning and technology. Presentations of scenarios for future learning concepts from education, government, technology, business and leisure sectors. Experiments with the research and visioning processes.

**EDUC 334A. Youth and Education Law Project: Clinical Practice. 4 Units.**

(Same as LAW 660A). The Youth and Education Law Project offers students the opportunity to participate in a wide variety of educational rights and reform work, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. All students have an opportunity to represent elementary and high school students with disabilities in special education proceedings, to represent students in school discipline proceedings, or to work with community groups in advocating for the provision of better and more equitable educational opportunities to their children. In addition, the clinic may pursue a specific policy research and advocacy project that will result in a written policy brief and policy proposal. Students working on special education matters have the opportunity to handle all aspects of their clients' cases. Students working in this area interview and counsel clients, investigate and develop facts, work with medical and mental health professionals and experts, conduct legal and educational research, create case plans, and represent clients at individual education program (IEP) team meetings, mediation or special education due process hearings. This work offers students a chance to study the relationship between individual special education advocacy and system-wide reform efforts such as impact litigation. Students working on school discipline matters interview and counsel clients, investigate and develop facts, interview witnesses, conduct legal and educational research, create case plan, and represent clients at school discipline hearings such as expulsion hearings. Such hearings provide the opportunity to present oral and written argument, examine witnesses, and present evidence before a hearing officer. If appropriate and necessary, such proceedings also present the opportunity to represent students on appeal before the school district board of trustees or the county board of education. The education clinic includes two or three mandatory training sessions to be held at the beginning of the term, a weekly seminar that focuses on legal skills and issues in law and education policy, regular case review, and a one hour weekly meeting with the clinic instructor. Admission is by consent of instructor. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**EDUC 334B. Youth and Education Law Project: Clinical Methods. 4 Units.**

(Same as LAW 660B). The Youth and Education Law Project offers students the opportunity to participate in a wide variety of educational rights and reform work, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. All students have an opportunity to represent elementary and high school students with disabilities in special education proceedings, to represent students in school discipline proceedings, or to work with community groups in advocating for the provision of better and more equitable educational opportunities to their children. In addition, the clinic may pursue a specific policy research and advocacy project that will result in a written policy brief and policy proposal. Students working on special education matters have the opportunity to handle all aspects of their clients' cases. Students working in this area interview and counsel clients, investigate and develop facts, work with medical and mental health professionals and experts, conduct legal and educational research, create case plans, and represent clients at individual education program (IEP) team meetings, mediation, or special education due process hearings. This work offers students a chance to study the relationship between individual special education advocacy and system-wide reform efforts such as impact litigation. Students working on school discipline matters interview and counsel clients, investigate and develop facts, interview witnesses, conduct legal and educational research, create case plan, and represent clients at school discipline hearings such as expulsion hearings. Such hearings provide the opportunity to present oral and written argument, examine witnesses, and present evidence before a hearing officer. If appropriate and necessary, such proceedings also present the opportunity to represent students on appeal before the school district board of trustees or the county board of education. The education clinic includes two or three mandatory training sessions to be held at the beginning of the term, a weekly seminar that focuses on legal skills and issues in law and education policy, regular case review, and a one hour weekly meeting with the clinic instructor. Admission is by consent of instructor. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**EDUC 334C. Youth and Education Law Project: Clinical Coursework. 4 Units.**

(Same as LAW 660C). The Youth and Education Law Project offers students the opportunity to participate in a wide variety of educational rights and reform work, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. All students have an opportunity to represent elementary and high school students with disabilities in special education proceedings, to represent students in school discipline proceedings, or to work with community groups in advocating for the provision of better and more equitable educational opportunities to their children. In addition, the clinic may pursue a specific policy research and advocacy project that will result in a written policy brief and policy proposal. Students working on special education matters have the opportunity to handle all aspects of their clients' cases. Students working in this area interview and counsel clients, investigate and develop facts, work with medical and mental health professionals and experts, conduct legal and educational research, create case plans, and represent clients at individual education program (IEP) team meetings, mediation, or special education due process hearings. This work offers students a chance to study the relationship between individual special education advocacy and system-wide reform efforts such as impact litigation. Students working on school discipline matters interview and counsel clients, investigate and develop facts, interview witnesses, conduct legal and educational research, create case plan, and represent clients at school discipline hearings such as expulsion hearings. Such hearings provide the opportunity to present oral and written argument, examine witnesses, and present evidence before a hearing officer. If appropriate and necessary, such proceedings also present the opportunity to represent students on appeal before the school district board of trustees or the county board of education. The education clinic includes two or three mandatory training sessions to be held at the beginning of the term, a weekly seminar that focuses on legal skills and issues in law and education policy, regular case review, and a one hour weekly meeting with the clinic instructor. Admission is by consent of instructor. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**EDUC 334X. Education Advocacy Clinic. 2-10 Units.**

(Same as LAW 660.) For students enrolled in the Education (M.A.) and Law (J.D.) joint degree program and those who already possess Law degrees only. Students participate in educational rights and reform work with clients and communities, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. May be repeated for credit. Prerequisite: consent of instructor.

**EDUC 336. Language, Identity, and Classroom Learning. 1-3 Units.**

As contemporary research focuses on how people act and recognize each other, analyzing interaction while acknowledging identity allows for a dynamic examination of cultural interaction. Broad cultural categorization can be overly expansive in identifying the characteristics of large groups of individuals.



**EDUC 336A. Law and Public Policy: Issues in Implementation. 3 Units.** (Same as LAW 636.) This seminar will focus on issues related to achieving successful implementation of the goals of legislation. It is widely recognized that the goals of legislation often are not realized and that the failure frequently rests in breakdowns in the implementation process by the agencies and organizations charged with implementing the legislation. In response to problems in implementation, the institutional context of public policy implementation is changing. One category of innovations, known by names such as "management-based regulation" and "evidence-based" social service delivery, gives broad discretion to street-level service providers but subjects them to intensive monitoring and disciplined performance comparison. Another category applies market concepts to regulation or social services, for example, by creating tradable rights (e.g. pollution allowances) or vouchers (for schools, housing, or healthcare). These, and other, new approaches are affecting both the contours of public law doctrine and the nature of lawyering in the public sector. Lawyers in the public sector are increasingly drawing on skills of institutional design and monitoring of the kind associated with private sector transactional practice. This seminar will examine some of the emerging general themes of innovative policy implementation and look at a range of case studies. Topics will include the conditions under which financial and other rewards and sanctions are useful in bringing about desired behaviors, the pluses and minuses of the creation of markets as alternatives to government run programs, and efforts at improving implementation by improving management activities. Examples will be taken from both regulation and social services, and are likely to include environmental protection, education, child protective services, healthcare, food and workplace safety, nuclear power safety, and regulation of financial institutions. We will invite presentations by academics and practitioners.

**EDUC 337. Race, Ethnicity, and Linguistic Diversity in Classrooms: Sociocultural Theory and Practices. 3-5 Units.**

Focus is on classrooms with students from diverse racial, ethnic and linguistic backgrounds. Studies, writing, and media representation of urban and diverse school settings; implications for transforming teaching and learning. Issues related to developing teachers with attitudes, dispositions, and skills necessary to teach diverse students.

Same as: AFRICAAM 106, CSRE 103B, EDUC 103B.

**EDUC 338X. Innovations in Education: Designing the teaching experience. 3-4 Units.**

A hands-on class about teaching online. Each year students in this course explore a new design challenge related to teaching. Teaching online presents a unique set of challenges and opportunities. From amateur hobbyist to college professor, how might we give every individual the tools to be the best teacher they can be? We welcome graduate students from a wide range of disciplines. Admission by application. Please see more information at <http://dschool.stanford.edu>.

Same as: CS 438X.

**EDUC 339. Advanced Topics in Quantitative Policy Analysis. 1-2 Units.**

For doctoral students. How to develop a researchable question and research design, identify data sources, construct conceptual frameworks, and interpret empirical results. Presentation by student participants and scholars in the field. May be repeated for credit.

**EDUC 340. Psychology and American Indian Mental Health. 3-5 Units.**

Western medicine's definition of health as the absence of sickness, disease, or pathology; Native American cultures' definition of health as the beauty of physical, spiritual, emotional, and social things, and sickness as something out of balance. Topics include: historical trauma; spirituality and healing; cultural identity; values and acculturation; and individual, school, and community-based interventions. Prerequisite: experience working with American Indian communities.

Same as: NATIVEAM 240.

**EDUC 341X. Urban School System Reform. 4 Units.**

Strategies for large-scale reform of complex school systems. Case studies of urban school systems. Sources include approaches developed in management studies, organizational behavior, and school reform. Political and community contexts; the role of urban superintendents and administrators in creating reform strategies. Factors such as labor relations and the regulatory environment. Guest speakers.

**EDUC 342. Child Development and New Technologies. 1-3 Units.**

Focus is on the experiences computing technologies afford children and how these experiences might influence development. Sociocultural theories of development as a conceptual framework for understanding how computing technologies interact with the social ecology of the child and how children actively use technology to meet their own goals. Emphasis is on influences of interactive technology on cognitive development, identity, and social development equity.

**EDUC 343X. Navigating the Academic Profession. 1-2 Units.**

For DARE doctoral fellows only. The roles and responsibilities of faculty members in American colleges and universities in the 21st century. How to become productive faculty members within the higher education enterprise.

**EDUC 345X. Adolescent Development and Schooling. 3-5 Units.**

How the context of school and its relationship to other major context developments (family, peer group, and neighborhood) influence the social, emotional, and cognitive development of secondary school-aged youths. Metatheoretical approaches (mechanistic, organismic, developmental contextualist metamodels) and methods of conducting research on schooling and development (laboratory, survey, ethnographic, intervention). Topics: school transitions during adolescence; the role of school functioning in broader patterns of competence or distress; and how the organization of academic tasks, classrooms, and school environments as a whole can influence adolescent development. Focus is on middle and high school years. (PSE).

**EDUC 346. Research Seminar in Higher Education. 4 Units.**

Required for higher education students. Major issues, current structural features of the system, the historical context that shaped it, and theoretical frameworks. The purposes of higher education in light of interest groups including students, faculty, administrators, and external constituents. Issues such as diversity, stratification, decentralization, and changes that cut across these groups.

**EDUC 347. The Economics of Higher Education. 4 Units.**

Topics: the worth of college and graduate degrees, and the utilization of highly educated graduates; faculty labor markets, careers, and workload; costs and pricing; discounting, merit aid, and access to higher education; sponsored research; academic medical centers; and technology and productivity. Emphasis is on theoretical frameworks, policy matters, and the concept of higher education as a public good. Stratification by gender, race, and social class.

**EDUC 348X. Policy and Practice in Science Education. 3-4 Units.**

Values and beliefs that dominate contemporary thinking about the role and practice of science education, what the distinctive features of science are, and the arguments for its value as part of compulsory education. Research on the conceptual and affective outcomes of formal science education, how the changing nature of contemporary society challenges current practice, and the rationale for an alternative pedagogy, curriculum and assessment.

**EDUC 351A. Statistical Methods for Longitudinal Data. 2-3 Units.**  
Research designs and statistical procedures for time-ordered (repeated-measures) data. The analysis of longitudinal panel data is central to empirical research on learning and development. Topics: measurement of change, growth curve models, analysis of durations including survival analysis, experimental and non-experimental group comparisons, reciprocal effects, stability. See <http://www-stat.stanford.edu/~rag/stat222/>.  
Prerequisite: intermediate statistical methods.  
Same as: STATS 222.

**EDUC 351B. Statistical Issues in Testing and Assessment. 2-3 Units.**  
The new book by Howard Wainer, "Uneducated Guesses: Using Evidence to Uncover Misguided Education Policies" is the basis for this seminar. Also included will be supporting research literature and data analysis activities for topics such as college admissions, methods for missing data, assessment of achievement gaps, and the use of value-added analysis. See <http://www-stat.stanford.edu/~rag/ed351B/>.

**EDUC 351C. Workshop in Technical Quality of Educational Assessments and Accountability. 3 Units.**  
Topics include: determinations of accuracy for individual scores and group summaries; design and reporting of educational assessments; achievement instruments in state-level accountability systems; and policy implications of statistical properties. See <http://www.stanford.edu/~rag/>.

**EDUC 353C. Problems in Measurement: Generalizability Theory. 3 Units.**  
Application to analysis of educational achievement data, including performance assessments. Fundamental concepts, computer programs, and actual applications.

**EDUC 354X. School-Based Decision Making. 3-4 Units.**  
Leadership and organizational issues. Leadership as it plays out in the pragmatic demands and tensions of site-level decision processes. Interdependence of several factors critical to school achievement and equity outcomes: governance, culture, instruction, resource alignment, data/inquiry, community engagement. School decision-making as a capacity-building process.

**EDUC 355X. Higher Education and Society. 3 Units.**  
For undergraduates and graduate students interested in what colleges and universities do, and what society expects of them. The relationship between higher education and society in the U.S. from a sociological perspective. The nature of reform and conflict in colleges and universities, and tensions in the design of higher education systems and organizations.

**EDUC 356. Street History: Learning the Past in School and Out. 3-5 Units.**  
Interdisciplinary. Since Herodotus, history and memory have competed to shape minds: history cultivates doubt and demands interpretation; memory seeks certainty and detests that which thwarts its aims. History and memory collide in modern society, often violently. How do young people become historical amidst these forces; how do school, family, nation, and mass media contribute to the process?  
Same as: HISTORY 337C.

**EDUC 357X. Science and Environmental Education in Informal Contexts. 3-4 Units.**  
There are ever-expanding opportunities to learn science in contexts outside the formal classroom, in settings such as zoos, museums, and science centers. How are issues around science and the environment presented in these contexts, how do people behave and learn in these contexts, and what messages do they take away? This course will cover the learning theories and empirical research that has been conducted in these settings. Case studies of nearby science centers will add an experiential dimension.

**EDUC 358X. Learning, Sharing, Publishing, and Intellectual Property. 1-4 Units.**

This course explores the legalities and economics entailed in sharing intellectual property (books, websites, games, journals, etc.) associated with learning at all age levels in the digital era. It assesses the implications of historical, contemporary, and innovative approaches to intellectual property in designing for learning and teaching, as well as for the place of knowledge in the society at large. The course considers new licensing agreements and economic models that apply to learning resources, software systems, research, archives, and data. And the course publishes its own open access and open source journal as a demonstration project: <http://accesscourse.stanford.edu>.

**EDUC 359B. Science Learning. 2-3 Units.**  
For doctoral students interested in science education and literacy in school subjects.

**EDUC 359C. Science Literacy. 2-3 Units.**  
The changing debate over conceptions of the nature of science and the calls to broaden it. Themes, directions, limitations, and epistemological foundations of the body of research on the nature of science.

**EDUC 359F. Research in Mathematics Education: Conducting Inquiry. 2-4 Units.**  
The focus of this seminar is an exploration of relationships between theory, research, and practice. At the center will be the participants' own research studies in mathematics education that they will conduct throughout the 10 weeks of the course. These will be accompanied by focused readings that illustrate various issues within the research enterprise as well as give participants a broad perspective on the field of mathematics education.

**EDUC 360X. Developmental Psychopathology and Resilience. 3-4 Units.**  
In this course students will learn about theoretical, methodological, and empirical issues pertaining to developmental psychopathology and resilience of children and adolescents. The course focuses on (1) current conceptual and empirical issues; (2) cognitive, affective, and motivational processes that underlie some of the most salient childhood mental health symptoms and disorders; (3) family, school, and cultural factors that contribute to developmental psychopathology and resilience; and (4) cutting-edge analytic methods that are currently employed in studies of developmental psychopathology and resilience.

**EDUC 362X. The Science Curriculum: Values and Ideology in a Contested Terrain. 2-4 Units.**  
The issue of what should be taught in schools is a site of contestation where issues of beliefs, values and ideologies emerge. This course will use the school science curriculum and the history of its development to explore the common positions adopted and argued for in approaching curriculum development. Course will help students develop a knowledge of curriculum reform in school science and a deeper understanding of the arguments that have shaped its present form and their historical antecedents.

**EDUC 364. Cognition and Learning. 3-4 Units.**  
Cognitive psychology is the study of human thought including topics including the nature of expertise, creativity, and memory. Emphasis is on learning. The role of cognitive psychology in helping people learn, and determining the most desirable type of learning and whether people have learned. Students design and conduct their own learning study.

**EDUC 365. Social, Emotional, and Personality Development. 3 Units.**  
Limited to doctoral students in DAPS and those with a background in child and adolescent development. Developmental processes that account for psychological adaptation in social relationships, schools, and other interpersonal settings. Theoretical models of social, personality, and emotional development. Topics such as self-concept, empathy, motivation, aggression, and personality formation.

**EDUC 367. Cultural Psychology. 3-5 Units.**

(Formerly 292.) The relationship between culture and psychological processes; how culture becomes an integral part of cognitive, social, and moral development. Both historical and contemporary treatments of cultural psychology, including deficit models, crosscultural psychology, ecological niches, culturally specific versus universal development, sociocultural frameworks, and minority child development. The role of race and power in research on cultural psychology.

**EDUC 368. Cognitive Development in Childhood and Adolescence. 3-4 Units.**

This course aims to broaden and deepen students' understanding of cognitive development from the prenatal period through adolescence. It will examine various theoretical, methodological, and empirical issues pertaining to different domains of cognitive development, such as neurobiological plasticity, infant cognition, theory of mind, memory, language, and executive functions. Throughout the course, as we survey research findings, we will discuss (1) methods that researchers have employed in their study of cognitive development; (2) limitations of current research and directions for future research; and (3) translation of research findings for practitioners and policymakers.

**EDUC 370X. Theories of Cognitive Development. 3 Units.**

The contributions of Jean Piaget and Lev Vygotsky to the study of the developing mind of the child. Their theories, concepts, perspectives, empirical work, and lives. Topics: Piaget's genetic epistemology, constructivism, and idea of sensorimotor through formal operational stages; Vygotsky's cultural-historical approach, egocentric speech, and the relation between learning and development.

**EDUC 371X. Social Psychology and Social Change. 2-3 Units.**

The course is intended an exploration of the major ideas, theories, and findings of social psychology and their applied status. Special attention will be given to historical issues, classic experiments, and seminal theories, and their implications for topics relevant to education. Contemporary research will also be discussed. Advanced undergraduates and graduate students from other disciplines are welcome.  
Same as: PSYCH 265.

**EDUC 373X. Teaching in the Humanities-Research into Adolescent Literacy. 3-5 Units.**

Relatively little attention has been paid to the role of humanities courses in teaching both general and disciplinary skills in reading and writing. With the growth of small schools, more middle and high school teachers find themselves teaching 'Humanities' courses. This seminar will explore what it means to teach the humanities, with special attention to how such courses can develop disciplinary reading and writing skills. Course will investigate how we develop tools to assess teaching and learning in the humanities.

**EDUC 374. Philanthropy and Civil Society. 1-3 Units.**

Associated with the Center for Philanthropy and Civil Society (PACS). Year-long workshop for doctoral students and advanced undergraduates writing senior theses on the nature of civil society or philanthropy. Focus is on pursuit of progressive research and writing contributing to the current scholarly knowledge of the nonprofit sector and philanthropy. Accomplished in a large part through peer review. Readings include recent scholarship in aforementioned fields. May be repeated for credit for a maximum of 9 units.  
Same as: POLISCI 334, SOC 374.

**EDUC 375A. Seminar on Organizational Theory. 5 Units.**

The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.  
Same as: MSE 389, SOC 363A.

**EDUC 375B. Seminar on Organizations: Institutional Analysis. 3-5 Units.**

Seminar. Key lines of inquiry on organizational change, emphasizing network, institutional, and evolutionary arguments.  
Same as: SOC 363B.

**EDUC 376. State Theory and Educational Policy. 4 Units.**

The relationship between political system structures and educational change by analyzing theories and interpretations of how political systems function, and the implications of these theories for understanding education. Classical and Marxist interpretations.

**EDUC 377. Comparing Institutional Forms: Public, Private, and Nonprofit. 4 Units.**

For students interested in the nonprofit sector, those in the joint Business and Education program, and for Public Policy MA students. The focus is on the missions, functions, and capabilities of nonprofit, public, and private organizations, and the managerial challenges inherent in the different sectors. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials.  
Same as: GSBGEN 346, PUBLPOL 317, SOC 377.

**EDUC 377B. Strategic Management of Nonprofits. 4 Units.**

(Same as STRAMGT 368). Strategic, governance, and management issues facing nonprofit organizations and their leaders in the era of venture philanthropy and social entrepreneurship. Development and fundraising, investment management, performance management, and nonprofit finance. Case studies include smaller, social entrepreneurial and larger, more traditional organizations, including education, social service, environment, health care, religion, NGOs, and performing arts.

**EDUC 377C. Strategic Issues in Philanthropy. 4 Units.**

(Also GSBGEN 381). Appropriate for any student driven to effect positive social change from either the for-profit or nonprofit sector, Strategic Philanthropy (GSBGEN 381/ EDUC 377C) will challenge students to expand their own strategic thinking about philanthropic aspiration and action. In recent decades, philanthropy has become an industry in itself - amounting to nearly \$300 billion in the year 2011. Additionally, the last decade has seen unprecedented innovation in both philanthropy and social change. This course explores the key operational and strategic distinctions between traditional philanthropic entities, such as community foundations, private foundations, and corporate foundations; and innovative models, including funding intermediaries, open-source platforms, technology-driven philanthropies, and venture philanthropy partnerships. Course work will include readings and case discussions that encourage students to analyze both domestic and global philanthropic strategies as they relate to foundation mission, grant making, evaluation, financial management, infrastructure, knowledge management, policy change, and board governance. Guest speakers will consist of high profile philanthropists, foundation presidents, social entrepreneurs and Silicon Valley business leaders creating new philanthropic models. The course will culminate in an individual project in which students will complete a business plan for a \$10 million private foundation.

**EDUC 377D. Strategic Leadership of Nonprofits. 4 Units.**

Formulating, evaluating, and implementing mission and strategy. Case studies from nonprofits in social services, health care, education, and arts and culture. The interaction of strategy and mission, industry structure and evolution, strategic change, growth and replication, corporate strategy, governance, commercialization, alliances, capacity building, and leadership.  
Same as: STRAMGT 378.

**EDUC 378X. Seminar on Social Change Processes and Organizations. 3-4 Units.**

Theories of social change and influence processes within and through organizations. Social change organizations. The interaction of philanthropic institutions and other social change organizations within civil society. Meso-level theories of change.

**EDUC 379X. Educational Inequality: Legal and Social Science Perspectives. 3-5 Units.**

This class will examine the issue of inequality in primary and secondary education, particularly with respect to race and socioeconomic status, from the perspectives of both law and social science. The course will distinguish between inequality in terms of inputs versus outputs, presenting the empirical evidence about each and the relationship between the two. The course will explore the history of legal and policy responses to persistent inequality, and consider the challenge of contemporary educational inequality and survey the competing policy approaches, from desegregation to increased and redistributed funding to efforts to improve instructional quality, to centralized accountability and testing to market-based solutions. Same as: LAW 505.

**EDUC 380. Supervised Internship. 1-15 Units.****EDUC 381. Multicultural Issues in Higher Education. 4 Units.**

The primary social, educational, and political issues that have surfaced in American higher education due to the rapid demographic changes occurring since the early 80s. Research efforts and the policy debates include multicultural communities, the campus racial climate, and student development; affirmative action in college admissions; multiculturalism and the curriculum; and multiculturalism and scholarship. Same as: EDUC 181.

**EDUC 382. Student Development and the Study of College Impact. 4 Units.**

The philosophies, theories, and methods that undergird most research in higher education. How college affects students. Student development theories, models of college impact, and issues surrounding data collection, national databases, and secondary data analysis.

**EDUC 386X. Leadership and Administration in Higher Education. 3-4 Units.**

Definitions of leadership and leadership roles within colleges and universities. Leadership models and organizational concepts. Case study analysis of the problems and challenges facing today's higher education administrators.

**EDUC 387A. Workshop: Comparative Studies of Educational and Political Systems. 1-5 Units.**

Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. Same as: SOC 311A.

**EDUC 387B. Workshop: Comparative Systems of Educational and Political Systems. 1-5 Units.**

Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. Same as: SOC 311B.

**EDUC 387C. Workshop: Comparative Studies of Educational and Political Systems. 1-5 Units.**

Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor. May be repeated for credit. Same as: SOC 311C.

**EDUC 388A. Language Policies and Practices. 2 Units.**

For STEP teacher candidates seeking to meet requirements for the English Learner Authorization on their preliminary credential. Historical, political, and legal foundations of education programs for English learners. Theories of second language learning, and research on the effectiveness of bilingual education. Theory-based methods to facilitate and measure English learners' growth in language and literacy acquisition, and create environments which promote English language development and content area learning through specially designed academic instruction in English. (STEP).

**EDUC 388F. Introduction to Academic Language. 1 Units.**

This course will provide opportunities for pre-service teachers to begin to develop an understanding of language uses, forms, and mechanics through application of a functional approach to academic language. By exploring language structures (phonology, morphology, syntax, semantics) as well as language-in-use (pragmatics and discourse), teacher candidates will be able to better recognize linguistic demands and challenges of students in the classroom.

**EDUC 389X. Race, Ethnicity, and Language. 3-4 Units.**

This seminar explores the linguistic construction of race and ethnicity across a wide variety of contexts and communities. Throughout the course, we will take a comparative perspective and highlight how different racial/ethnic formations participate in similar, yet different, ways of "doing race" though language, interaction and culture. Readings draw heavily from perspectives in (linguistic) anthropology and sociolinguistics. Prerequisite: consent of instructor.

Same as: ANTHRO 320A, LINGUIST 253.

**EDUC 390X. Computational Modeling in Cognitive and Social Science. 3-4 Units.**

Computational modeling and data-mining are dramatically changing the physical sciences, and more recently also the social and behavioral sciences. Traditional analysis techniques are insufficient to investigate complex dynamic social phenomena as social networks, online gaming, diffusion of innovation, opinion dynamics, classroom behavior, and other complex adaptive systems. In this course, we will learn about how modeling, network theory, and basic data-mining can support research in cognitive, and social sciences, in particular around issues of learning, cognitive development, and educational policy.

Same as: CS 424M.

**EDUC 391X. Web-Based Technologies in Teaching and Learning. 3 Units.**

Project-based. Overview of instructional design theories and educational technologies to evaluate and develop a web-based educational application or system. Web-based applications and technologies designed for online interactions and collaborations. Instructional systems strategies to develop online environments that support and facilitate interactive learning. Students create a small-scale, web-based learning system.

**EDUC 392X. The Political Economy of Global Higher Education. 3-4 Units.**

The course is intended to introduce students to the analysis of higher education and higher educational change in an international context, reviewing critically the current literature and showing how social scientists study higher education using quantitative and qualitative tools. The course will present a model of studying change, review political, sociological, and economic theories applied to higher education, and focus on four important case studies of higher education in the developing world: Brazil, Russia, India, and China, known also as the BRIC countries.

**EDUC 393. Proseminar on Research in Education. 2 Units.**

Overview of the field of education for joint degree (M.B.A./M.A.) students.

**EDUC 394X. Research in Progress Seminar. 1 Unitss.**

This seminar will provide a forum where graduate students could discuss prospective research ideas, present ongoing research, and consider theoretical issues of broad interest to the field. In this research in progress seminar students are expected to present ongoing research and have a discussion about it -- or a specific research article related to it --, with the purpose of eliciting feedback from the instructor and other seminar participants.

**EDUC 396X. The Design of Technologies for Casual Learning. 3 Units.**

Studio-based, participatory, and user-centered development of casual learning technologies is explored, using the Apple iPhone as a prototype platform. The term "casual" is borrowed from casual gaming to denote that the learning technologies are meant for learners to use in "extreme informal" learning circumstances (while "on the go", "any time and any place"). The class builds on learning about and synthesizing knowledge, theory and development activity in four areas including learning theories, mobile technologies, games and participatory design processes. Same as: EDUC 196X.

**EDUC 397X. Math Mentoring: Working in the Zone with Learners. 1-2 Units.**

The course focuses on how the tutorial relationship can help students learn mathematics. The course will provide background theory and knowledge as well as provide practical approaches to tutoring, supports for targeting activities to students; needs, selection of materials and activities, and ways to assess the progress of the students and reflect on your own experience. Topics will include social theories of learning, teaching for understanding, and challenges of students who are English language learners. In addition to attending 4, two-hour workshop classes, 1 hour of tutoring is required each week. The course will meet 4 times during the quarter for workshops and discussions following Friday tutoring sessions. Students will submit assignments on the Coursework site on weeks that the course does not meet. A 1 unit section of the course will run in Winter and Spring quarters. Same as: EDUC 187X.

**EDUC 398X. Market-Based Education Reforms. 2 Units.**

(Same as GSBGEN 577). This seminar course examines market-based education reforms and evidence on their impacts. Topics considered in depth will include public school choice, charter schools, vouchers, incentives for students and teachers, and accountability. We will pay special attention to the design and operation of education markets, the politics and legal challenges of market-based school reform, and methods for evaluating reform initiatives. The course will draw on cases both within the United States and internationally.

**EDUC 399A. Designing Surveys. 1-2 Units.**

This workshop/course is designed for students who are designing a survey for use in a research project. The workshop content draws on relevant cognitive processing theories and research (on comprehension, retrieval, judgment, and reporting). In addition to some readings and a few lectures, this workshop is designed to be highly interactive and practical. By the end of the course students will have designed and pilot tested their survey instrument. Course may be repeated for credit.

**EDUC 399X. Mixed Methods Research. 3 Units.**

This advanced course will address the theory and practice of mixing inquiry methodologies in social inquiry. The course will cover: 1) selected roots of the contemporary interest in mixing methods, 2) conceptualizations of mixed methods design and analysis, and 3) challenges of mixed methods practice.

**EDUC 401A. Mini Courses in Methodology: Statistical Packages for the Social Sciences. 1 Unitss.**

Statistical analysis using SPSS, including generating descriptive statistics, drawing graphs, calculating correlation coefficients, conducting t-tests, analysis of variance, and linear regression. Building up datasets, preparing datasets for analysis, conducting statistical analysis, and interpreting results.

**EDUC 401B. Mini Courses in Methodology: Stata. 1 Unitss.**

The computer as research tool. Statistical software Stata for data analysis, including t-tests, correlation, ANOVA, and multivariate linear regression.

**EDUC 403X. Education's Digital Future. 1 Unitss.**

This course provides an intellectual framework for understanding the revolution in digital learning. It has three broad themes: the evolving state of knowledge on digital learning; the roles of education in modern societies; and the digital transformation of modern life generally. The course will convene over three quarters. All three themes will be addressed during each quarter. Students may enroll for a single quarter and/or participate in all three quarters for the most comprehensive overview.

**EDUC 404X. Topics in Brazilian Education: Public Policy and Innovation for the 21st Century. 1-2 Units.**

The objective of this seminar is to provide students from different backgrounds an opportunity to learn about current issues and debates on Brazilian education. The seminar will cover topics on the history of Brazilian education; an overview of current school reforms at the federal level; educational assessments; education and economic growth; educational equity; teacher labor market; technology and education; early childhood; and higher education to Brazil.

**EDUC 405X. The Teaching of Literature: How We Teach & Why. 2-4 Units.**

This course is designed for graduate students in English and English Education who are interested in questions surrounding the teaching of literature at both the secondary and collegiate level. The course weaves together theoretical considerations of the purposes for teaching literature, including assumptions about the kinds of readings and readers literature teachers are trying to create, with investigation of pedagogical practices. Same as: ENGLISH 397X.

**EDUC 406X. Perspectives on Teacher Learning and Lesson Study. 2-4 Units.**

Seminar. Based on peer collaboration, lesson study helps to create professional communities among teachers and support their learning. Research literature, teacher thinking and beliefs, teacher professional development, and conceptual frameworks.

**EDUC 409X. Managing to Outcomes in Education and Other Sectors. 2 Units.**

Whether as students, taxpayers, or philanthropists, we share an interest that schools, government agencies, and nonprofit organizations effectively achieve their intended outcomes. This course asks how stakeholders and managers can assess these institutions' performance and commitment to continuous improvement. This seemingly technocratic question is often the center of political controversy, as it is today in criticisms of the student assessments required by No Child Left Behind and of "value-added" assessments of teacher performance. Ever mindful that performance management is a graveyard of good intentions, we will study the practical aspects of institutional change - including leadership, accountability, learning, and culture - that often account for the difference between success and failure. We start with the presumption that you can't manage what you can't measure, but managers can usually measure only proxies rather than ultimate outcomes. In addition to the inevitable slippage between the proxies and ultimate outcomes, there is a tension between using assessments for learning and improvement, on the one hand, and for accountability, incentives, and penalties, on the other. Moreover, people have incentives to "game" any performance evaluation system. We will examine the challenges of managing to outcomes in various contexts, focusing particularly on students' and teachers' performance, but also including the performance of selected government agencies (e.g., police and welfare departments), nonprofit organizations, and foundations. We will focus on the interconnections among strategic planning, performance budgeting, and performance management. We will also look at experiments with new funding vehicles that depend on measuring outcomes, such as social impact bonds, conditional cash transfers, and pay for performance schemes in healthcare and other sectors.

**EDUC 411X. Early Childhood Education. 3-4 Units.**

This course addresses a broad set of topics that have implications for developmentally appropriate and effective early childhood education. It begins with children's social, emotional and cognitive development and issues related to poverty, culture and language. We will also examine research evidence on effective instruction for young children, evaluations of preschool interventions, and several current policy debates.

**EDUC 412X. Organization Studies Research Workshop. 1-2 Units.**

For graduate students whose research is rooted in organization theory. Participants to present and receive feedback on their work including paper drafts, proposals and dissertation chapter. Sources include recent scholarship. May be repeated for credit.

**EDUC 417. Research and Policy on Postsecondary Access. 3 Units.**

The transition from high school to college. K-16 course focusing on high school preparation, college choice, remediation, pathways to college, and first-year adjustment. The role of educational policy in postsecondary access. Service Learning Course (certified by Haas Center). Same as: EDUC 117.

**EDUC 419X. Academic Achievement of Language Minority Students. 3-5 Units.**

Emphasis is on the current state of knowledge in the research literature and comparisons to students' experiences and observations in bilingual education, English as a second language, reading instruction, cultural issues in education, and research methods.

**EDUC 424. Introduction to Research in Curriculum and Teacher Education. 2-5 Units.**

Required for first-year CTE doctoral students. How to conceptualize, design, and interpret research. How to read, interpret, and critique research; formulate meaningful research questions; evaluate and conduct a literature review; and conceptualize a study. Readings include studies from different research paradigms. Required literature review in an area students expect to explore for their qualifying paper.

**EDUC 453. Doctoral Dissertation. 1-15 Units.**

For doctoral students only. (all areas).

**EDUC 465. Seminar in the Pedagogy of Teacher Education. 3 Units.**

For doctoral students interested in working in teacher education. Pedagogical approaches, including the use of modeling and simulations and hypermedia materials. Theoretical considerations of how teachers learn to teach.

**EDUC 466. Doctoral Seminar in Curriculum Research. 2-4 Units.**

Required of all doctoral students in CTE, normally during their second year in the program. Students present their ideas regarding a dissertation or other research project, and prepare a short research proposal that often satisfies their second-year review.

**EDUC 470. Practicum. 1-15 Units.**

For advanced graduate students. (all areas).

**EDUC 480. Directed Reading. 1-15 Units.**

For advanced graduate students. (all areas).

**EDUC 490. Directed Research. 1-15 Units.**

For advanced graduate students. (all areas).

**EDUC 493. Workshop in Design and Analysis of Comparative Studies. 1-3 Units.**

A workshop for second-year and later students with data analysis or research design activities including dissertation planning or analysis. Readings and exercises developed around participating student research. Topics have included: multilevel data analysis, within-subjects designs, and implementation of matching methods for comparing non-equivalent groups. Various computing customs accommodated. See <http://www-stat.stanford.edu/~rag/ed493/>. Prerequisite: intermediate statistical methods course work.

**EDUC 496. Research in History and Social Science Education. 3-5 Units.**

For doctoral students. Literature on historical learning and teaching and corresponding social sciences research designs, assessment, and curriculum evaluation. Same as: HISTORY 464E.

**EDUC 801. TGR Project. 0 Unit.**

For advanced graduate students. Instructor consent required. (all areas).

**EDUC 802. TGR Dissertation. 0 Unit.**

For advanced graduate students. Instructor consent required. (all areas).

## Electrical Engineering Courses

**EE 15N. The Art and Science of Engineering Design. 3 Units.**

The goal of this seminar is to introduce freshmen to the design process associated with an engineering project. The seminar will consist of a series of lectures. The first part of each lecture will focus on the different design aspects of an engineering project, including formation of the design team, developing a project statement, generating design ideas and specifications, finalizing the design, and reporting the outcome. Students will form teams to follow these procedures in designing a term project of their choice over the quarter. The second part of each lecture will consist of outside speakers, including founders of some of the most exciting companies in Silicon Valley, who will share their experiences about engineering design. On-site visits to Silicon Valley companies to showcase their design processes will also be part of the course. The seminar serves three purposes: (1) it introduces students to the design process of turning an idea into a final design, (2) it presents the different functions that people play in a project, and (3) it gives students a chance to consider what role in a project would be best suited to their interests and skills.

**EE 17N. Engineering the Micro and Nano Worlds: From Chips to Genes. 3 Units.**

Preference to freshmen. The first part is hands-on micro- and nano-fabrication including the Stanford Nanofabrication Facility (SNF) and the Stanford Nanocharacterization Laboratory (SNL) and field trips to local companies and other research centers to illustrate the many applications; these include semiconductor integrated circuits ('chips'), DNA microarrays, microfluidic bio-sensors and microelectromechanical systems (MEMS). The second part is to create, design, propose and execute a project. Most of the grade will be based on the project. By the end of the course you will, of course, be able to read critically a New York Times article on nanotechnology. More importantly you will have experienced the challenge (and fun) of designing, carrying out and presenting your own experimental project. As a result you will be better equipped to choose your major. This course can complement (and differs from) the seminars offered by Profs Philip Wong and Hari Manoharan in that it emphasizes laboratory work and an experimental student-designed project. Prerequisites: high-school physics.

**EE 21N. What is Nanotechnology?. 3 Units.**

Nanotechnology is an often used word and it means many things to different people. Scientists and Engineers have some notion of what nanotechnology is, societal perception may be entirely different. In this course, we start with the classic paper by Richard Feynman ("There's Plenty of Room at the Bottom"), which laid down the challenge to the nanotechnologists. Then we discuss two classic books that offer a glimpse of what nanotechnology is: Engines of Creation: The Coming Era of Nanotechnology by Eric Drexler, and Prey by Michael Crichton. Drexler's thesis sparked the imagination of what nano machinery might do, whereas Crichton's popular novel channeled the public's attention to this subject by portraying a disastrous scenario of a technology gone astray. We will use the scientific knowledge to analyze the assumptions and predictions of these classic works. We will draw upon the latest research advances to illustrate the possibilities and impossibilities of nanotechnology.

**EE 23N. Imaging: From the Atom to the Universe. 3 Units.**

Preference to freshmen. Forms of imaging including human and animal vision systems, atomic force microscope, microscope, digital camera, holography and three-dimensional imaging, telescope, synthetic aperture radar imaging, nuclear magnetic imaging, sonar and gravitational wave imaging, and the Hubble Space telescope. Physical principles and exposure to real imaging devices and systems.

**EE 27N. Electronics Rocks. 3 Units.**

Electronics pervades our lives, yet we often feel obliged to let a device function as it was intended. This course is about not being intimidated by voiding a warranty and modding some commercial gadget and about being confident enough to build something cool from scratch. To get there, we will study the basics of "how things work" and learn how to hack/mod and scratch build. Students will be mentored and encouraged to work, in teams, to play with interesting electronics and ultimately to develop a creative final project.

**EE 41. Physics of Electrical Engineering. 5 Units.**

How everything from electrostatics to quantum mechanics is used in common high-technology products. Electrostatics are critical in micro-mechanical systems used in many sensors and displays, and Electromagnetic waves are essential in all high-speed communication systems. How to propagate energy on transmission lines, optical fibers, and in free space. Which aspects of modern physics are needed to generate light for the operation of a DVD player or TV. Introduction to semiconductors, solid-state light bulbs, and laser pointers. Hands-on labs to connect physics to everyday experience. Prerequisites: Physics 43  
Same as: ENGR 40P.

**EE 46. Engineering For Good: Save the World and Have Fun Doing It. 3 Units.**

Projects that provide immediate and positive impact on the world. Focus is on global health by learning from experts in this field. Students work on real-world projects with help from members of NGOs and social entrepreneurial companies as part of the hand-on learning experience. Prerequisite: ENGR 40 or EE 122A or CS 106B or consent of instructor.

**EE 47. Press Play: Interactive Device Design. 3 Units.**

Introduction to the human-centered and technical workings behind interactive devices ranging from cellphones and video controllers to smart cars and appliances. Students build a working MP3 player prototype of their own design, using embedded microcontrollers, digital audio decoders and component sensors, and other electronic hardware. Topics include electronics prototyping, interface prototyping, sensors and actuators, micro-controller development, physical prototyping, and user testing. Prerequisite: CS106A and X or consent of instructor.

**EE 60N. Man versus Nature: Coping with Disasters Using Space Technology. 4 Units.**

Preference to freshman. Natural hazards, earthquakes, volcanoes, floods, hurricanes, and fires, and how they affect people and society; great disasters such as asteroid impacts that periodically obliterate many species of life. Scientific issues, political and social consequences, costs of disaster mitigation, and how scientific knowledge affects policy. How spaceborne imaging technology makes it possible to respond quickly and mitigate consequences; how it is applied to natural disasters; and remote sensing data manipulation and analysis. GER:DB-EngrAppSci  
Same as: GEOPHYS 60N.

**EE 92A. Making and Breaking Things. 1 Unitss.**

This course will feature weekly visiting speakers who will guide class members through the hands-on process of assembling or dissection novel interactive devices and products. The course is meant to provide students hands-on experience with component sensing and computing technologies, a working knowledge of different materials and methods used in modern-day prototyping and manufacture, and exposure to people engaged in designing novel devices within the field of interactive device design. Activities will feature a wide and evolving range of domains such as textile sensors, hacking wireless radio, making LED light sculptures, taking apart toys, shape deposition modeling and more.

**EE 100. The Electrical Engineering Profession. 1-2 Units.**

Lectures/discussions on topics of importance to the electrical engineering professional. Continuing education, professional societies, intellectual property and patents, ethics, entrepreneurial engineering, and engineering management.

**EE 101A. Circuits I. 4 Units.**

First of two-course sequence. Introduction to circuit modeling and analysis. Topics include creating the models of typical components in electronic circuits and simplifying non-linear models for restricted ranges of operation (small signal model); and using network theory to solve linear and non-linear circuits under static and dynamic operations. Prerequisite: Physics 43.

**EE 101B. Circuits II. 4 Units.**

Second of two-course sequence. MOS large-signal and small-signal models. MOS amplifier design including DC bias, small signal performance, multistage amplifiers, frequency response, and feedback. Prerequisite: 101A.

**EE 102A. Signal Processing and Linear Systems I. 4 Units.**

Concepts and mathematical tools in continuous-time signal processing and linear systems analysis, illustrated with examples from signal processing, communications, and control. Mathematical representation of signals and systems. Linearity and time-invariance. System impulse and step response. Frequency domain representations: Fourier series and Fourier transforms. Filtering and signal distortion. Time/frequency sampling and interpolation. Continuous-discrete time signal conversion and quantization. Stability and causality in linear systems. Laplace transforms and Bode plots. Feedback and control system design. Examples from filter design and linear control. Prerequisite: MATH 53 or ENGR 155A.

**EE 102B. Signal Processing and Linear Systems II. 4 Units.**

Concepts and mathematical tools in discrete-time signal processing and linear systems analysis with examples from digital signal processing, communications, and control. Discrete-time signal models. Continuous-discrete-continuous signal conversion. Discrete-time impulse and step response. Frequency domain representations: Fourier series and transforms. Connection between continuous and discrete time frequency representations. Discrete Fourier transform (DFT) and fast Fourier transform (FFT). Digital filter and signal processing examples. Discrete-time and hybrid linear systems. Stability and causality. Z transforms and their connection to Laplace transforms. Frequency response of discrete-time systems. Discrete-time control. Prerequisite: 102A.

**EE 108A. Digital Systems I. 3-4 Units.**

Digital circuit, logic, and system design. Digital representation of information. CMOS logic circuits. Combinational logic design. Logic building blocks, idioms, and structured design. Sequential logic design and timing analysis. Clocks and synchronization. Finite state machines. Microcode control. Digital system design. Control and datapath partitioning. Undergraduates must enroll for 4 units.

**EE 108B. Digital Systems II. 3-4 Units.**

The design of processor-based digital systems. Instruction sets, addressing modes, data types. Assembly language programming, low-level data structures, introduction to operating systems and compilers. Processor microarchitecture, microprogramming, pipelining. Memory systems and caches. Input/output, interrupts, buses and DMA. System design implementation alternatives, software/hardware tradeoffs. Labs involve the design of processor subsystems and processor-based embedded systems. Prerequisite: 108A, CS 106B.

**EE 109. Digital Systems Design Lab. 4 Units.**

The design of integrated digital systems encompassing both customized software and hardware. Software/hardware design tradeoffs. Algorithm design for pipelining and parallelism. System latency and throughput tradeoffs. FPGA optimization techniques. Integration with external systems and smart devices. Firmware configuration and embedded system considerations. Enrollment limited to 25; preference to graduating seniors. Prerequisites: 108B, and CS 106B or X.

**EE 114. Fundamentals of Analog Integrated Circuit Design. 3 Units.**

Analysis and simulation of elementary transistor stages, current mirrors, supply- and temperature-independent bias, and reference circuits. Overview of integrated circuit technologies, circuit components, component variations and practical design paradigms. Performance evaluation using computer-aided design tools. Prerequisite: 101B.GER:DB-EngrAppSci Same as: EE 214A.

**EE 116. Semiconductor Device Physics. 3 Units.**

The fundamental operation of semiconductor devices and overview of applications. The physical principles of semiconductors, both silicon and compound materials; operating principles and device equations for junction devices (diodes, bipolar transistor, photo-detectors). Introduction to quantum effects and band theory of solids. Prerequisite: ENGR 40. Corequisite: 101B.

**EE 122A. Analog Circuits Laboratory. 3 Units.**

Practical applications of analog circuits, including simple amplifiers, filters, oscillators, power supplies, and sensors. Design skills, computer-aided design, and circuit fabrication and debugging. The design process through proposing, designing, simulating, building, debugging, and demonstrating a project. Radio frequency and largely digital projects not suitable for EE 122. Prerequisite: ENGR 40 or equivalent.

**EE 122B. Introduction to Biomedical Electronics. 3 Units.**

Key components of modern systems, their application in physiology measurements, and reduction to practice in labs. Fundamentals of analog/digital conversion and filtering techniques for biosignals, typical transducers (biopotential, electrochemical, temperature, pressure, acoustic, movement), and interfacing circuits. Issues of biomedical electronics (safety, noise). Prerequisite: EE122A or equivalent.

**EE 124. Introduction to Neuroelectrical Engineering. 3 Units.**

Fundamental properties of electrical activity in neurons, technology for measuring and altering neural activity, and operating principles of modern neurological and neural prosthetic medical systems. Topics: action potential generation and propagation, neuro-MEMS and measurement systems, experimental design and statistical data analysis, information encoding and decoding, clinical diagnostic systems, and fully-implantable neural prosthetic systems design. Prerequisite: EE 101B and EE 102B.

**EE 133. Analog Communications Design Laboratory. 3-4 Units.**

Design, testing, and applications. Amplitude modulation (AM) using multiplier circuits. Frequency modulation (FM) based on discrete oscillator and integrated modulator circuits such as voltage-controlled oscillators (VCOs). Phased-lock loop (PLL) techniques, characterization of key parameters, and their applications. Practical aspects of circuit implementations. Labs involve building and characterization of AM and FM modulation/demodulation circuits and subsystems. Enrollment limited to 30 undergraduates and coterminial EE students. Prerequisite: EE101B. Undergraduate students enroll in EE133 and Graduate students enroll in EE233. Recommended: EE114/214A. Same as: EE 233.

**EE 134. Introduction to Photonics. 4 Units.**

Photonics, optical components, and fiber optics. Conceptual and mathematical tools for design and analysis of optical communication, sensor and imaging systems. Experimental characterization of semiconductor lasers, optical fibers, photodetectors, receiver circuitry, fiber optic links, optical amplifiers, and optical sensors. Class project on confocal microscopy or other method of sensing or analyzing biometric data. Laboratory experiments. Prerequisite: 41 or equivalent.

**EE 136. Introduction to Nanophotonics and Nanostructures. 3 Units.**

Electromagnetic and quantum mechanical waves and semiconductors. Confining these waves, and devices employing such confinement. Localization of light and applications: metallic mirrors, photonic crystals, optical waveguides, microresonators, plasmonics. Localization of quantum mechanical waves: quantum wells, wires, and dots. Generation of light in semiconductors: spontaneous and stimulated emission, lasers, and light emitting diodes. Devices incorporating localization of both electromagnetic and quantum mechanical waves such as resonant cavity quantum well lasers and microcavity-based single photon sources. System-level applications such as optical communications, biochemical sensing, and quantum cryptography. Prerequisite: basic familiarity with electromagnetic and quantum mechanical waves and semiconductors at the level of EE 41 or equivalent.



**EE 141. Engineering Electromagnetics. 3 Units.**

Lumped versus distributed circuits. Transient response of transmission lines with resistive and reactive loads. Reflection, transmission, attenuation and dispersion. Steady-state waves on transmission lines. Standing wave ratio, impedance matching, and power flow. Coulomb's law, electrostatic field, potential and gradient, electric flux and Gauss's Law and divergence. Metallic conductors, Poisson's and Laplace's equations, capacitance, dielectric materials. Electrostatic energy and forces. Steady electric currents, Ohm's Law, Kirchoff's Laws, charge conservation and the continuity equation, Joule's Law. Biot-Savart's law and the static magnetic field. Ampere's Law and curl. Vector magnetic potential and magnetic dipole. Magnetic materials, forces and torques. Faraday's Law, magnetic energy, displacement current and Maxwell's equations. Uniform plane waves. Prerequisites: 102A, MATH 52.

**EE 152. Green Electronics. 4 Units.**

Many green technologies including hybrid cars, photovoltaic energy systems, efficient power supplies, and energy-conserving control systems have at their heart intelligent, high-power electronics. This course examines this technology and uses green-tech examples to teach the engineering principles of modeling, optimization, analysis, simulation, and design. Topics include power converter topologies, periodic steady-state analysis, control, motors and drives, photovol-taic systems, and design of magnetic components. The course involves a hands-on laboratory and a substantial final project. Required: EE101B, EE102A, EE108A. Recommended: ENGR40 or EE122A.

**EE 168. Introduction to Digital Image Processing. 3-4 Units.**

Computer processing of digital 2-D and 3-D data, combining theoretical material with implementation of computer algorithms. Topics: properties of digital images, design of display systems and algorithms, time and frequency representations, filters, image formation and enhancement, imaging systems, perspective, morphing, and animation applications. Instructional computer lab exercises implement practical algorithms. Final project consists of computer animations incorporating techniques learned in class. Prerequisite: Matlab programming.

**EE 169. Introduction to Bioimaging. 3 Units.**

Bioimaging is important for both clinical medicine, and medical research. This course will provide a introduction to several of the major imaging modalities, using a signal processing perspective. The course will start with an introduction to multi-dimensional Fourier transforms, and image quality metrics. It will then study projection imaging systems (projection X-Ray), backprojection based systems (CT, PET, and SPECT), systems that use beam forming (ultrasound), and systems that use Fourier encoding (MRI). Prerequisites: 102A, 102B.

**EE 178. Probabilistic Systems Analysis. 3-4 Units.**

Introduction to probability and statistics and their role in modeling and analyzing real world phenomena. Events, sample space, and probability. Discrete random variables, probability mass functions, independence and conditional probability, expectation and conditional expectation. Continuous random variables, probability density functions, independence and expectation, derived densities. Transforms, moments, sums of independent random variables. Simple random processes. Limit theorems. Introduction to statistics: significance, estimation and detection. Prerequisites: basic calculus and linear algebra. Same as: EE 278A.

**EE 179. Analog and Digital Communication Systems. 3 Units.**

This course covers the fundamental principles underlying the analysis, design and optimization of analog and digital communication systems. Design examples will be taken from the most prevalent communication systems today: cell phones, Wifi, radio and TV broadcasting, satellites, and computer networks. Analysis techniques based on Fourier transforms and energy/power spectral density will be developed. Mathematical models for random variables and random (noise) signals will be presented, which are used to characterize filtering and modulation of random noise. These techniques will then be used to design analog (AM and FM) and digital (PSK and FSK) communication systems and determine their performance over channels with noise and interference. Prerequisite: 102A.

**EE 190. Special Studies or Projects in Electrical Engineering. 1-15 Units.**

Independent work under the direction of a faculty member. Individual or team activities involve lab experimentation, design of devices or systems, or directed reading. Course may be repeated for credit.

**EE 191. Special Studies and Reports in Electrical Engineering. 1-15 Units.**

Independent work under the direction of a faculty member given for a letter grade only. If a letter grade given on the basis of required written report or examination is not appropriate, enroll in 190. Course may be repeated for credit.

**EE 191A. Special Studies and Reports in Electrical Engineering. 1 Units.**

EE191A is part of the Accelerated Calculus for Engineers program. Independent work under the direction of a faculty member given for a letter grade only. EE 191A counts as a Math one unit seminar course: it is this unit that constitutes the ACE program.

**EE 191W. Special Studies and Reports in Electrical Engineering. 3-10 Units.**

WIM-version of EE 191. For EE students using special studies (e.g., honors project, independent research project) to satisfy the writing-in-major requirement. A written report that has gone through revision with an advisor is required. An advisor from the Writing Center is recommended. Same as: WIM.

**EE 202. Electrical Engineering in Biology and Medicine. 3 Units.**

Open to all. Primarily biological in nature, introduction to the physiological and anatomic aspects of medical instrumentation. Areas include patient monitoring, imaging, medical transducers, the unique aspects of medical electronic systems, the socio-economic impact of technology on medical care, and the constraints unique to medicine. Prerequisite: familiarity with circuit instrumentation techniques as in 101B.

**EE 203. The Entrepreneurial Engineer. 1 Units.**

Seminar. For prospective entrepreneurs with an engineering background. Contributions made to the business world by engineering graduates. Speakers include Stanford and other engineering and M.B.A. graduates who have founded large and small companies in nearby communities. Contributions from EE faculty and other departments including Law, Business, and MS&E. May be repeated for credit.

**EE 204. Business Management for Electrical Engineers and Computer Scientists. 3 Units.**

For graduate students with little or no business experience. Leading computer, high-tech, and Silicon Valley companies and their best practices. Tools and frameworks for analyzing decisions these companies face. Corporate strategy, new product development, marketing, sales, distribution, customer service, financial accounting, outsourcing, and human behavior in business organizations. Case studies. Prerequisite: graduate standing.

**EE 204S. Business Management for Electrical Engineers and Computer Scientists. 3 Units.**

For SCPD students; see EE204.

**EE 212. Integrated Circuit Fabrication Processes. 3 Units.**

For students interested in the physical bases and practical methods of silicon VLSI chip fabrication, or the impact of technology on device and circuit design, or intending to pursue doctoral research involving the use of Stanford's Nanofabrication laboratory. Process simulators illustrate concepts. Topics: principles of integrated circuit fabrication processes, physical and chemical models for crystal growth, oxidation, ion implantation, etching, deposition, lithography, and back-end processing. Required for 410.

**EE 214A. Fundamentals of Analog Integrated Circuit Design. 3 Units.**

Analysis and simulation of elementary transistor stages, current mirrors, supply- and temperature-independent bias, and reference circuits. Overview of integrated circuit technologies, circuit components, component variations and practical design paradigms. Performance evaluation using computer-aided design tools. Prerequisite: 101B.GER:DB-EngrAppSci  
Same as: EE 114.

**EE 214B. Advanced Analog Integrated Circuit Design. 3 Units.**

Analysis and design of analog integrated circuits in advanced MOS and bipolar technologies. Device operation and compact modeling in support of circuit simulations needed for design. Emphasis on quantitative evaluations of performance using hand calculations and circuit simulations; intuitive approaches to design. Analytical and approximate treatments of noise and distortion; analysis and design of feedback circuits. Design of archetypal analog blocks for networking and communications such as broadband gain stages and transimpedance amplifiers. Prerequisites: EE114/214A.

**EE 216. Principles and Models of Semiconductor Devices. 3 Units.**

Carrier generation, transport, recombination, and storage in semiconductors. Physical principles of operation of the p-n junction, heterojunction, metal semiconductor contact, bipolar junction transistor, MOS capacitor, MOS and junction field-effect transistors, and related optoelectronic devices such as CCDs, solar cells, LEDs, and detectors. First-order device models that reflect physical principles and are useful for integrated-circuit analysis and design. Prerequisite: 116 or equivalent.

**EE 222. Applied Quantum Mechanics I. 3 Units.**

Emphasis is on applications in modern devices and systems. Topics include: Schrödinger's equation, eigenfunctions and eigenvalues, solutions of simple problems including quantum wells and tunneling, quantum harmonic oscillator, coherent states, operator approach to quantum mechanics, Dirac notation, angular momentum, hydrogen atom, calculation techniques including matrix diagonalization, perturbation theory, variational method, and time-dependent perturbation theory with applications to optical absorption, nonlinear optical coefficients, and Fermi's golden rule. Prerequisites: MATH 52 and 53, PHYSICS 65 (or PHYSICS 43 and 45).

**EE 223. Applied Quantum Mechanics II. 3 Units.**

Continuation of 222, including more advanced topics: quantum mechanics of crystalline materials, methods for one-dimensional problems, spin, systems of identical particles (bosons and fermions), introductory quantum optics (electromagnetic field quantization, coherent states), fermion annihilation and creation operators, interaction of different kinds of particles (spontaneous emission, optical absorption, and stimulated emission). Quantum information and interpretation of quantum mechanics. Other topics in electronics, optoelectronics, optics, and quantum information science. Prerequisite: 222.

**EE 225. Bio-chips, Imaging and Nanomedicine. 3 Units.**

The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies.

Same as: MATSCI 382, SBIO 225.

**EE 228. Basic Physics for Solid State Electronics. 3 Units.**

Topics: energy band theory of solids, energy bandgap engineering, classical kinetic theory, statistical mechanics, and equilibrium and non-equilibrium semiconductor statistics. Prerequisite: course in modern physics.

**EE 231. Introduction to Lasers. 3 Units.**

How lasers work, including quantum transitions in atoms, stimulated emission and amplification, rate equations, saturation, feedback, coherent optical oscillation, laser resonators, and optical beams. Limited primarily to steady-state behavior; classical models for atomic transitions with little quantum mechanics background required. Prerequisites: electromagnetic theory to the level of 142, preferably 241, and some atomic or modern physics such as PHYSICS 70 or 130, 131.

**EE 232. Laser Dynamics. 3 Units.**

Continuation of 231, emphasizing dynamic and transient effects including spiking, Q-switching, mode locking, frequency modulation, frequency and spatial mode competition, linear and nonlinear pulse propagation, short pulse expansion, and compression. Prerequisite: 231.

**EE 233. Analog Communications Design Laboratory. 3-4 Units.**

Design, testing, and applications. Amplitude modulation (AM) using multiplier circuits. Frequency modulation (FM) based on discrete oscillator and integrated modulator circuits such as voltage-controlled oscillators (VCOs). Phased-lock loop (PLL) techniques, characterization of key parameters, and their applications. Practical aspects of circuit implementations. Labs involve building and characterization of AM and FM modulation/demodulation circuits and subsystems. Enrollment limited to 30 undergraduates and coterminal EE students. Prerequisite: EE101B. Undergraduate students enroll in EE133 and Graduate students enroll in EE233. Recommended: EE114/214A.  
Same as: EE 133.

**EE 234. Photonics Laboratory. 3 Units.**

Photonics and fiber optics with a focus on communication and sensing. Experimental characterization of semiconductor lasers, optical fibers, photodetectors, receiver circuitry, fiber optic links, optical amplifiers, and optical sensors and photonic crystals. Prerequisite: EE 142 or equivalent.

**EE 235. Guided Wave Optical Devices. 3 Units.**

Guided wave optics, optical waveguide devices, and integrated optics. Wave propagation in layered media, slab waveguides, and optical fibers. Rectangular waveguides. Optical waveguide technology. Coupled-mode theory. Numerical analysis of complex waveguides. Photonic crystals and surface plasmon optics. Physics and design of waveguide devices. Fiber sensors, waveguide gratings, waveguide modulators, directional couplers, ring filters. Prerequisite: electromagnetic theory to the level of 142 or equivalent.

**EE 242. Electromagnetic Waves. 3 Units.**

Continuation of 141. Maxwell's equations. Plane waves in lossless and lossy media. Skin effect. Flow of electromagnetic power (Poynting's theorem). Reflection and refraction of waves at planar boundaries. Snell's law and total internal reflection. Reflection and refraction from lossy media. Guided waves. Parallel-plate and dielectric-slab waveguides. Hollow wave-guides, cavity resonators, microstrip waveguides, optical fibers. Interaction of fields with matter and particles. Antennas and radiation of electromagnetic energy. Prerequisite: 141 or PHYSICS 120.

**EE 243. Semiconductor Optoelectronic Devices. 3 Units.**

Semiconductor physics and optical processes in semiconductors. Operating principles and practical device features of semiconductor optoelectronic materials and heterostructures. Devices include: optical detectors (p-i-n, avalanche, and MSM); light emitting diodes; electroabsorptive modulators (Franz-Keldysh and QCSE), electrorefractive (directional couplers, Mach-Zehnder), switches (SEEDs); and lasers (waveguide and vertical cavity surface emitting). Prerequisites: semiconductor devices and solid state physics such as EE 216 or equivalent.

**EE 247. Introduction to Optical Fiber Communications. 3 Units.**

Fibers: single- and multi-mode, attenuation, modal dispersion, group-velocity dispersion, polarization-mode dispersion. Nonlinear effects in fibers: Raman, Brillouin, Kerr. Self- and cross-phase modulation, four-wave mixing. Sources: light-emitting diodes, laser diodes, transverse and longitudinal mode control, modulation, chirp, linewidth, intensity noise. Modulators: electro-optic, electro-absorption. Photodiodes: p-i-n, avalanche, responsivity, capacitance, transit time. Receivers: high-impedance, transimpedance, bandwidth, noise. Digital intensity modulation formats: non-return-to-zero, return-to-zero. Receiver performance: Q factor, bit-error ratio, sensitivity, quantum limit. Sensitivity degradations: extinction ratio, intensity noise, jitter, dispersion. Wavelength-division multiplexing. System architectures: local-area, access, metropolitan-area, long-haul. Prerequisites: 102A, 242 or consent of instructor.

**EE 248. Fundamentals of Noise Processes. 3 Units.**

Fundamentals of statistic, Fourier analysis, statistical and quantum mechanics, and linear and nonlinear circuit theory. Thermal, quantum and 1/f noise in resistors, pn junctions, lasers, and parametric amplifiers. Energy efficiency (bit/photon) and spectral efficiency (bit/s/Hz) in coherent and single photon optical communications. Protocols and security in quantum cryptography. Decoherence of qubits in quantum computation. Prerequisites: elementary device, circuit, and electromagnetic waves to the level of 101A,B and 242.

**EE 252. Antenna Theory. 3 Units.**

Fundamental properties. Dipoles, loops, reflectors, Yagis, helices, slots, horns, micro-strips. Antennas as transitions between guided and free radiation, ultrasound analogue. Famous antennas. Pattern measurements. Friis and radar equations. Feeds, matching, baluns. Broadbanding. Arrays, aperture synthesis, interferometry, very-long-baseline interferometry. Thermal radiation, antenna temperature, microwave passive remote sensing. Prerequisite: EE 141 or Physics 120. Enrollment capacity limited to 25 students.

**EE 256. Numerical Electromagnetics. 3 Units.**

Principles and applications of numerical techniques for solving practical electromagnetics problems. Time domain solutions of Maxwell's equations. Finite difference time domain (FDTD) methods. Numerical stability, dispersion, and dissipation. Absorbing boundary conditions. Perfectly matched layer methods. Explicit and implicit methods. FDTD modeling of propagation and scattering in dispersive and anisotropic media. Near-to-far-zone transformations. Computational problems require programming and use of MATLAB and other tools. Prerequisite: EE 242 or equivalent.

**EE 257. Applied Optimization Laboratory (Geophys 258). 3-4 Units.**

Application of optimization and estimation methods to the analysis and modeling of large observational data sets. Laboratory exercises using inverse theory and applied linear algebra to solve problems of indirect and noisy measurements. Emphasis on practical solution of scientific and engineering problems, especially those requiring large amounts of data, on digital computers using scientific languages. Also addresses advantages of large-scale computing, including hardware architectures, input/output and data bus bandwidth, programming efficiency, parallel programming techniques. Student projects involve analyzing real data by implementing observational systems such as tomography for medical and Earth observation uses, radar and matched filtering, multispectral/multitemporal studies, or migration processing. Prerequisites: Programming with high level language. Recommended: EE261, EE263, EE178/278A, ME300 or equivalent. Same as: GEOPHYS 258.

**EE 261. The Fourier Transform and Its Applications. 3 Units.**

The Fourier transform as a tool for solving physical problems. Fourier series, the Fourier transform of continuous and discrete signals and its properties. The Dirac delta, distributions, and generalized transforms. Convolutions and correlations and applications; probability distributions, sampling theory, filters, and analysis of linear systems. The discrete Fourier transform and the FFT algorithm. Multidimensional Fourier transform and use in imaging. Further applications to optics, crystallography. Emphasis is on relating the theoretical principles to solving practical engineering and science problems. Prerequisites: Math through ODEs, basic linear algebra, Comfort with sums and discrete signals, Fourier series at the level of 102A.

**EE 262. Two-Dimensional Imaging. 3 Units.**

Time and frequency representations, two-dimensional auto- and cross-correlation, Fourier spectra, diffraction and antennas, coordinate systems and the Hankel and Abel transforms, line integrals, impulses and sampling, restoration in the presence of noise, reconstruction and tomography, imaging radar. Tomographic reconstruction using projection-slice and layergarm methods. Students create software to form images using these techniques with actual data. Final project consists of design and simulation of an advanced imaging system. Prerequisite: EE261. Recommended: EE278B, EE279.

**EE 263. Introduction to Linear Dynamical Systems. 3 Units.**

Applied linear algebra and linear dynamical systems with application to circuits, signal processing, communications, and control systems. Topics: least-squares approximations of over-determined equations and least-norm solutions of underdetermined equations. Symmetric matrices, matrix norm, and singular value decomposition. Eigenvalues, left and right eigenvectors, with dynamical interpretation. Matrix exponential, stability, and asymptotic behavior. Multi-input/multi-output systems, impulse and step matrices; convolution and transfer matrix descriptions. Control, reachability, and state transfer; observability and least-squares state estimation. Prerequisites: linear algebra and matrices as in MATH 103; differential equations and Laplace transforms as in EE 102A. Same as: CME 263.

**EE 264. Digital Signal Processing. 3 Units.**

The fundamentals of digital signal processing techniques and their applications. Topics include review of two sided Z-transform, linear time invariant discrete-time systems, and sampling theory; A/D and D/A conversion, rate conversion, and oversampling techniques for ADC and DAC; filter design; quantization in digital filter implementation; discrete Fourier analysis; and parametric signal modeling. Prerequisite: EE102A and EE102B . Recommended: EE261, EE278B.

**EE 265. Digital Signal Processing Laboratory. 3-4 Units.**

Applying 102A,B to real-world signal processing applications. Lab exercises use a programmable DSP to implement signal processing tasks. Topics: A/D conversion and quantization, sampling theorem, Z-transform, discrete-time Fourier transform, digital filter design and implementation, spectral analysis, rate conversion, wireless data communication, and OFDM receiver design. Prerequisites: 102A,B. Recommended: 261.

**EE 268. Introduction to Modern Optics. 3 Units.**

Geometrical optics: ray matrices, Gaussian beams, optical instruments, and radiometry. Wave nature of light: Maxwell's equations, propagation through media with varying index of refraction (e.g., fibers). Interferometry: basic principles, practical systems, and applications.

**EE 271. Introduction to VLSI Systems. 3 Units.**

Provides a quick introduction to MOS transistors and IC fabrication and then creates abstractions to allow you to create and reason about complex digital systems. It uses a switch resistor model of a transistor, uses it to model gates, and then shows how gates and physical layout can be synthesized from Verilog or SystemVerilog descriptions. Most of the class will be spent on providing techniques to create designs that can be validated, are low power, provide good performance, and can be completed in finite time. Prerequisites: 101A, 108A and 108B; familiarity with transistors, logic design, Verilog and digital system organization.

**EE 272. Design Projects in VLSI Systems. 3-4 Units.**

Mixed signal design. Student teams create a small mixed-signal VLSI design using a modern design flow and CAD tools. The project involves writing a Verilog model of the chip, creating a testing/debug strategy for the chip, wrapping custom layout to fit into a std cell system, using synthesis and place and route tools to create the layout of your chip, and understanding all the stuff you need to do to tape-out a chip. Useful for those who plan to build a chip in their Ph.D. work. Prerequisites: EE 271 and experience in digital/analog circuit design.

**EE 273. Digital Systems Engineering. 3 Units.**

Electrical issues in the design of high-performance digital systems, including signaling, timing, synchronization, noise, and power distribution. High-speed signaling methods; noise in digital systems, its effect on signaling, and methods for noise reduction; timing conventions; timing noise (skew and jitter), its effect on systems, and methods for mitigating timing noise; synchronization issues and synchronizer design; clock and power distribution problems and techniques; impact of electrical issues on system architecture and design. Prerequisites: EE101A and EE108A. Recommended: EE114/214A.

**EE 276. Introduction to Wireless Personal Communications. 3 Units.**

Frequency reuse, cellular concepts, cochannel interference, handoff. Radio propagation in and around buildings: Friis equation, multipath, narrow-band and wide-band channels, small scale and large-scale statistics, space and time signal variation. Diversity. Receiver sensitivity, sources of noise, range. Performance statistics: coverage, margin, digital modulation, adjacent channel interference, and digital error rates. Wide band channels: maximum transmission rates. Multi-server queuing and traffic: Erlang formulas. Multiple access: FDMA, TDMA, CDMA; Duplexing: TDD, FDD. Prerequisites: 242 and 278B or equivalent. Corequisite: 279 or equivalent.

**EE 278A. Probabilistic Systems Analysis. 3-4 Units.**

Introduction to probability and statistics and their role in modeling and analyzing real world phenomena. Events, sample space, and probability. Discrete random variables, probability mass functions, independence and conditional probability, expectation and conditional expectation. Continuous random variables, probability density functions, independence and expectation, derived densities. Transforms, moments, sums of independent random variables. Simple random processes. Limit theorems. Introduction to statistics: significance, estimation and detection. Prerequisites: basic calculus and linear algebra. Same as: EE 178.

**EE 278B. Introduction to Statistical Signal Processing. 3 Units.**

Review of basic probability and random variables. Random vectors and processes; convergence and limit theorems; IID, independent increment, Markov, and Gaussian random processes; stationary random processes; autocorrelation and power spectral density; mean square error estimation, detection, and linear estimation. Prerequisites: EE178/278A and linear systems and Fourier transforms at the level of EE102A,B or EE261.

**EE 279. Introduction to Digital Communication. 3 Units.**

Digital communication is a rather unique field in engineering in which theoretical ideas have had an extraordinary impact on the design of actual systems. The course provides a basic understanding of the analysis and design of digital communication systems, building on various ideas from probability theory, stochastic processes, linear algebra and Fourier analysis. Topics include: detection and probability of error for binary and M-ary signals (PAM, QAM, PSK), receiver design and sufficient statistics, controlling the spectrum and the Nyquist criterion, bandpass communication and up/down conversion, design trade-offs: rate, bandwidth, power and error probability, coding and decoding (block codes, convolutional coding and Viterbi decoding). Prerequisites: 179 or 261, and 178 or 278.

**EE 282. Computer Systems Architecture. 3 Units.**

Course focuses on how to build modern computing systems, namely notebooks, smartphones, and data centers, covering primarily their hardware architecture and certain system software aspects. For each system class, we cover the system architecture, processor technology, advanced memory hierarchy and I/O organization, power and energy management, and reliability. We will also cover topics such as interactions with system software, virtualization, solid state storage, and security. The programming assignments allow students to explore performance/energy tradeoffs when using heterogeneous hardware resources on smartphone devices. Prerequisite: EE108B. Recommended: CS 140.

**EE 284. Introduction to Computer Networks. 3 Units.**

Structure and components of computer networks; functions and services; packet switching; layered architectures; OSI reference model; physical layer; data link layer; error control; window flow control; media access control protocols used in local area networks (Ethernet, Token Ring, FDDI) and satellite networks; network layer (datagram service, virtual circuit service, routing, congestion control, Internet Protocol); transport layer (UDP, TCP); application layer.

**EE 290A. Curricular Practical Training for Electrical Engineers. 1 Unitss.**

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

**EE 290B. Curricular Practical Training for Electrical Engineers. 1 Unitss.**

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

**EE 290C. Curricular Practical Training for Electrical Engineers. 1 Unitss.**

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

**EE 290D. Curricular Practical Training for Electrical Engineers. 1 Unitss.**

For EE majors who need work experience as part of their program of study. Final report required. Prerequisites: for 290B, candidacy for Engineer or Ph.D. in Electrical Engineering; for 290C, candidacy for Ph.D. degree in Electrical Engineering; for 290D, consent of instructor.

**EE 292H. Engineering and Climate Change. 1 Unitss.**

The purpose of this seminar course is to help equip students and professionals with the tools to apply the engineering mindset to some of the problems that stem from climate change, in order to consider and evaluate possible interventional, remedial and adaptive approaches. This course focuses on some of the climate problems and engineering challenges that seem most critical in addressing climate change. Come join us for fascinating lectures and share ideas as to what engineering approaches maybe of most promise in this area. Very short weekly assignments (half page) to prepare for discussions with the lecturers; suggestions for further readings; and short optional student presentations on topics of interest will round out the class. May be repeated for credit.

**EE 292I. Insanely Great Products: How do they get built?. 1 Unitss.**

Great products emerge from a sometimes conflict-laden process of collaboration between different functions within companies. This Seminar seeks to demystify this process via case-studies of successful products and companies. Engineering management and businesspeople will share their experiences in discussion with students. Previous companies profiled: Apple, Intel, Facebook, and Genentech -- to name a few. Previous guests include: Jon Rubinstein (NeXT, Apple, Palm), Ariel Braunstein (Flip Video), and Charlie Cheever (Facebook, Quora). Pre-requisites: None.

**EE 292J. Power Electronics. 3 Units.**

All electronics need power from somewhere, which means the applications of power electronics are everywhere. In this practical introduction to power electronics we discuss both power conversion topologies--rectifiers, switching converters, and inverters; and the details needed to get power circuits to work--magnetic design, thermal management, and control. Includes guest lectures from industry, and a field trip to the SLAC National Accelerator Laboratory to demonstrate some truly inspiring power converters. Prerequisites: EE 114.

**EE 292K. Intelligent Energy Projects. 3 Units.**

This course will investigate new ideas in intelligent energy systems, such as problems in Demand Response, energy management systems (EMS) in transmission or distribution systems, Locational Marginal Pricing, V2G, asset management, and grid optimization, or others. Projects will focus on analytical or algorithmic approaches, using techniques from convex optimization, control, reinforcement learning, and modern Big Data programming techniques, etc. Students are expected to present their results in oral and written form. To provide sufficient instructor/student interaction, class size is limited and consent of the instructor will be required for the class enrollment.

**EE 292L. Nanomanufacturing. 3 Units.**

Fundamentals of nanomanufacturing technology and applications. Topics include recent developments in process technology, lithography and patterning. Technology for FinFET transistors, NAND flash and 3D chips. Manufacturing of LEDs, thin film and crystalline solar cells. Flip classroom model is used supplementing classroom lectures with short videos. Guest speakers include distinguished engineers, entrepreneurs and venture capitalists actively engaged in nanomanufacturing. Prerequisite: background in device physics and process technology. Recommended: EE116, EE216, EE212.

**EE 292M. Parallel Processors Beyond Multi-Core Processing. 2 Units.**

The current parallel computing research emphasizes multi-cores, but there are alternative array processors with significant potential. This hands-on seminar focuses on SIMD (Single-Instruction, Multiple-Data) massively parallel processors, with weekly programming assignments. Topics: Flynn's Taxonomy, parallel architectures, the K-SIMD simulator, principles of SIMD programming, parallel sorting with sorting networks, string comparison with dynamic programming (edit distance, Smith-Waterman), arbitrary-precision operations with fixed-point numbers, reductions, vector and matrix multiplication, asynchronous algorithms on SIMD ("SIMD Phase Programming Model"), Mandelbrot set, analysis of parallel performance. Prerequisites: EE108B and EE282. Recommended: CS140.

**EE 293A. Fundamentals of Energy Processes. 3-4 Units.**

For seniors and graduate students. Thermodynamics, heat engines, thermoelectrics, biomass. Recommended: MATH 41, 43; PHYSICS 41, 43, 45  
Same as: ENERGY 293A.

**EE 293B. Fundamentals of Energy Processes. 3 Units.**

For seniors and graduate students. Fuel cells. Production of hydrogen: electrolytic, chemical, thermolytic, photolytic. Hydrogen storage: hydrides. Photoelectric converters; photo-thermovoltaic converters. Wind turbines. Recommended: EE 293A; MATH 41; PHYSICS 41, 43, 45  
Same as: ENERGY 293B.

**EE 300. Master's Thesis and Thesis Research. 1-15 Units.**

Independent work under the direction of a department faculty. Written thesis required for final letter grade. The continuing grade 'N' is given in quarters prior to thesis submission. See 390 if a letter grade is not appropriate. Course may be repeated for credit.

**EE 309. Semiconductor Memory Devices and Technology. 3 Units.**

Focus is on the device physics and operation principles of nanoelectric devices. Topics identified by the International Technology Roadmap for Semiconductors, emerging research devices section; see <http://www.itrs.net>. Non-silicon-based devices such as carbon nanotubes, grapheme, semiconductor nanowires, and molecular devices; and non-FET based devices such as single electron transistors (SET) and resonant tunneling diodes (RTD). Logic and memory devices are covered. Prerequisite: undergraduate device physics, EE 222, EE 216. Recommended: EE 212, EE 223, EE 228, EE 311, and EE 316 Offered Alternate years.

**EE 310. Integrated Circuits Technology and Design Seminar. 1 Unitss.**

State-of-the-art micro- and nanoelectronics, nanotechnology, advanced materials, and nanoscience for device applications. Prerequisites: EE216, EE316. May be repeated for credit.

**EE 311. Advanced Integrated Circuits Technology. 3 Units.**

What are the practical and fundamental limits to the evolution of the technology of modern MOS devices and interconnects? How are modern devices and circuits fabricated and what future changes are likely? Advanced techniques and models of MOS devices and back-end (interconnect and contact) processing. What are future device structures and materials to maintain progress in integrated electronics? MOS front-end and back-end process integration. Prerequisites: EE212, EE216 or equivalent.

**EE 313. Digital MOS Integrated Circuits. 3 Units.**

Looks a little more deeply at how digital circuits operate, what makes a gate digital, and how to "cheat" to improve performance or power. To aid this analysis we create a number of different models for MOS transistors and choose the simplest one that can explain our the circuit's operation, using both hand and computer analysis. We explore static, dynamic, pulse-mode, and current mode logic, and show how they are used in SRAM design. Topics include sizing for min delay, noise and noise margins, power dissipation. The class uses memory design (SRAM) as a motivating example. DRAM and EEPROM design issues are also covered. Prerequisites: 101B, 108A. Recommended: 271.

**EE 314A. RF Integrated Circuit Design. 3 Units.**

Design of RF integrated circuits for communications systems, primarily in CMOS. Topics: the design of matching networks and low-noise amplifiers at RF, mixers, modulators, and demodulators; review of classical control concepts necessary for oscillator design including PLLs and PLL-based frequency synthesizers. Design of low phase noise oscillators. Design of high-efficiency (e.g., class E, F) RF power amplifiers, coupling networks. Behavior and modeling of passive and active components at RF. Narrowband and broadband amplifiers; noise and distortion measures and mitigation methods. Overview of transceiver architectures. Prerequisite: EE214B.

**EE 314B. Advanced RF Integrated Circuit Design. 3 Units.**

Analysis and design of modern communication circuits and systems with emphasize on design techniques for high-frequency (into mm-wave) ICs. Topics include MOS, bipolar, and BiCMOS high-frequency integrated circuits, including power amplifiers, extremely wideband amplifiers, advanced oscillators, phase-locked loops and frequency-translation circuits. Design techniques for mm-wave silicon ICs (on-chip low-loss transmission lines, unilateralization techniques, in-tegrated antennas, harmonic generation, etc) will also be studied. Prerequisite: EE314.

**EE 315A. VLSI Signal Conditioning Circuits. 3 Units.**

Design and analysis of integrated circuits for active filters, precision gain stages, and sensor interfaces in CMOS VLSI technology. Operational transconductance amplifiers; sampled-data and continuous-time analog filters. Analysis of noise and amplifier imperfections; compensation techniques such as correlated double sampling. Sensor interfaces for micro-electromechanical and biomedical applications. Layout techniques for analog integrated circuits. Prerequisites: EE214B.

**EE 315B. VLSI Data Conversion Circuits. 3 Units.**

Architectural and circuit level design and analysis of integrated analog-to-digital and digital-to-analog interfaces in CMOS VLSI technology. Fundamental circuit elements such as sampling circuits and voltage comparators. Circuits and architectures for Nyquist-rate and oversampling analog-to-digital and digital-to-analog conversion; digital decimation and interpolation filters. Examples of calibration and digital enhancement techniques. Prerequisite: EE 214B. Recommended: EE 315A.

**EE 316. Advanced VLSI Devices. 3 Units.**

In modern VLSI technologies, device electrical characteristics are sensitive to structural details and therefore to fabrication techniques. How are advanced VLSI devices designed and what future changes are likely? What are the implications for device electrical performance caused by fabrication techniques? Physical models for nanometer scale structures, control of electrical characteristics (threshold voltage, short channel effects, ballistic transport) in small structures, and alternative device structures for VLSI. Prerequisites: 212 and 216, or equivalent.

**EE 319. Advanced Nanoelectronic Devices and Technology. 3 Units.**

Recent advances in materials science, device physics and structures, and processing technology, to extend VLSI device scaling towards atomistic and quantum-mechanical physics boundaries. Topics include: mobility-enhancement techniques; nanomaterial structures including tube, wire, beam, and crystal; conducting polymer; 3D FET; gate-wraparound FET; nonvolatile memory phenomena and devices; self-assembly; flash annealing; plasma doping; and nano patterning. Prerequisites: 216, 316.

**EE 320. Nanoelectronics. 3 Units.**

Focus is on the device physics and operation principles of nanoelectronic devices. Topics identified by the International Technology Roadmap for Semiconductors, emerging research devices section; see <http://www.itrs.net>. Non-silicon-based devices such as carbon nanotubes, grapheme, semiconductor nanowires, and molecular devices; and non-FET based devices such as single electron transistors (SET) and resonant tunneling diodes (RTD). Logic and memory devices. Offered alternative years. Prerequisites: undergraduate device physics, EE 222, 216. Recommended: EE 223, 228, or 316.

**EE 327. Properties of Semiconductor Materials. 3 Units.**

Modern semiconductor devices and integrated circuits are based on unique energy band, carrier transport, and optical properties of semiconductor materials. How to choose these properties for operation of semiconductor devices. Emphasis is on quantum mechanical foundations of the properties of solids, energy bandgap engineering, semi-classical transport theory, semi-conductor statistics, carrier scattering, electro-magneto transport effects, high field ballistic transport, Boltzmann transport equation, quantum mechanical transitions, optical absorption, and radiative and non-radiative recombination that are the foundations of modern transistors and optoelectronic devices. Prerequisites: EE216 or equivalent.

**EE 331. Biophotonics: Light in Medicine and Biology. 3 Units.**

Current topics and trends in the use of light in medicine and for advanced microscopy. Course begins with a review of relevant optical principles (basic physics required). Key topics include: light-tissue interactions; sensing and spectroscopy; contrast-enhanced imaging; super-resolution and label-free microscopy; medical applications of light for diagnostics, in-vivo imaging, and therapy; nanophotonics and array technologies. Open to non-majors; programming experience (Matlab and/or C) required.

**EE 334. Micro and Nano Optical Device Design. 3 Units.**

Lecture and project course on design and analysis of optical devices with emphasis on opportunities and challenges created by scaling to the micrometer and nanometer ranges. The emphasis is on fundamentals, combined with some coverage of practical implementations. Prerequisite: EE 242 or equivalent.

**EE 336. Nanophotonics. 3 Units.**

Recent developments in micro- and nanophotonic materials and devices. Basic concepts of photonic crystals. Integrated photonic circuits. Photonic crystal fibers. Superprism effects. Optical properties of metallic nanostructures. Sub-wavelength phenomena and plasmonic excitations. Meta-materials. Prerequisite: Electromagnetic theory at the level of 242. Same as: MATSCI 346.

**EE 340. Optical Micro- and Nano-Cavities. 3 Units.**

Optical micro- and nano-cavities and their device applications. Types of optical cavities (microdisks, microspheres, photonic crystal cavities, plasmonic cavities), and their electromagnetic properties, design, and fabrication techniques. Cavity quantum electrodynamics: strong and weak-coupling regime, Purcell factor, spontaneous emission control. Applications of optical cavities, including low-threshold lasers, optical modulators, quantum information processing devices, and bio-chemical sensors.

**EE 345. Optical Fiber Communication Laboratory. 3 Units.**

Experimental techniques in optical fiber communications and networking. Experimental investigation of key optical communications components including fibers, lasers, modulators, photodiodes, optical amplifiers, and WDM multiplexers and demultiplexers. Fundamental optical communications systems techniques: eye diagrams, BER measurements, experimental evaluation of nonlinearities. Prerequisites: Undergraduate physics and optics.

**EE 346. Introduction to Nonlinear Optics. 3 Units.**

Wave propagation in anisotropic, nonlinear, and time-varying media. Microscopic and macroscopic description of electric dipole susceptibilities. Free and forced waves-phasematching; slowly varying envelope approximation-dispersion, diffraction, space-time analogy; harmonic generation; frequency conversion; parametric amplification and oscillation; electro-optic light modulation; nonlinear processes in optical fibers. Prerequisites: EE 141, EE 242.

**EE 348. Advanced Optical Fiber Communications. 3 Units.**

Optical amplifiers: gain, saturation, noise. Semiconductor amplifiers. Erbium-doped fiber amplifiers. System applications: preamplified receiver performance, amplifier chains. Raman amplifiers, lumped vs. distributed amplification. Group-velocity dispersion management: dispersion-compensating fibers, filters, gratings. Interaction of dispersion and nonlinearity, dispersion maps. Multichannel systems. Wavelength-division multiplexing components: filters, multiplexers. WDM systems, crosstalk. Time, subcarrier, code and polarization-division multiplexing. Comparison of modulation techniques: differential phase-shift keying, phase-shift keying, quadrature-amplitude modulation. Comparison of detection techniques: noncoherent, differentially coherent, coherent. Prerequisite: 247.

**EE 355. Imaging Radar and Applications. 3 Units.**

Radar remote sensing, radar image characteristics, viewing geometry, range coding, synthetic aperture processing, correlation, range migration, range/Doppler algorithms, wave domain algorithms, polar algorithm, polarimetric processing, interferometric measurements. Applications: surface deformation, polarimetry and target discrimination, topographic mapping surface displacements, velocities of ice fields. Prerequisites: EE261. Recommended: EE254, EE278B, EE279. Same as: GEOPHYS 265.

**EE 359. Wireless Communications. 3-4 Units.**

This course will cover advanced topics in wireless communications for voice, data, and multimedia. Topics include: an overview of current and future wireless systems; wireless channel models including path loss, shadowing, and statistical multipath channel models; fundamental capacity limits of wireless channels; digital modulation and its performance in fading and intersymbol interference; techniques to combat fading including adaptive modulation, diversity, and multiple antenna systems (MIMO); techniques to combat intersymbol interference including equalization, multicarrier modulation (OFDM), and spread spectrum; and an overview of wireless network design. Prerequisite: 279 or instructor consent.

**EE 360. Multiuser Wireless Systems and Networks. 3 Units.**

Design, analysis, and fundamental limits. Topics include multiuser channel capacity, multiple and random access techniques, interference mitigation, cellular system design, ad hoc wireless network design, sensor networks, "green" wireless networks, cognitive radios, and cross-layer design. Prerequisite: EE 359.

**EE 361. Principles of Cooperation in Wireless Networks. 3 Units.**

Information theory forms the basis for the design of all modern day communication systems. The original theory was primarily point-to-point, studying how fast information can flow across an isolated noisy communication channel. Until recently, there has been only limited success in extending the theory to a network of interacting nodes. Progress has been made in the past decade driven by engineering interest in wireless networks. The course provides a unified overview of this recent progress made in information theory of wireless networks. Starting with an overview of the capacity of fading and multiple-antenna wireless channels, we aim to answer questions such as: What is the optimal way for users to cooperate and exchange information in a wireless network? How much benefit can optimal cooperation provide over traditional communication architectures? How can cooperation help to deal with interference between multiple wireless transmissions? Prerequisites: 376A.

**EE 364A. Convex Optimization I. 3 Units.**

Convex sets, functions, and optimization problems. The basics of convex analysis and theory of convex programming: optimality conditions, duality theory, theorems of alternative, and applications. Least-squares, linear and quadratic programs, semidefinite programming, and geometric programming. Numerical algorithms for smooth and equality constrained problems; interior-point methods for inequality constrained problems. Applications to signal processing, communications, control, analog and digital circuit design, computational geometry, statistics, machine learning, and mechanical engineering. Prerequisite: linear algebra such as EE263, EE178/278A. Same as: CME 364A, CS 334A.

**EE 364B. Convex Optimization II. 3 Units.**

Continuation of 364. Subgradient, cutting-plane, and ellipsoid methods. Decentralized convex optimization via primal and dual decomposition. Exploiting problem structure in implementation. Convex relaxations of hard problems. Global optimization via branch and bound. Robust and stochastic optimization. Applications in areas such as control, circuit design, signal processing, and communications. Substantial project. Prerequisite: 364A. Same as: CME 364B.

**EE 365. Stochastic Decision Models. 3 Units.**

Efficient formulation and computational solution of sequential decision problems under uncertainty. Markov decision chains and stochastic programming. Maximum expected present value and rate of return. Optimality of simple policies: myopic, linear, index, acceptance limit, and (s,S). Optimal stationary and periodic infinite-horizon policies. Applications to investment, options, overbooking, inventory, production, purchasing, selling, quality, repair, sequencing, queues, capacity, transportation. MATLAB is used. Prerequisites: probability, linear programming. Same as: MSE 251.

**EE 365. Stochastic Decision Models. 3 Units.**

Efficient formulation and computational solution of sequential decision problems under uncertainty. Markov decision chains and stochastic programming. Maximum expected present value and rate of return. Optimality of simple policies: myopic, linear, index, acceptance limit, and (s,S). Optimal stationary and periodic infinite-horizon policies. Applications to investment, options, overbooking, inventory, production, purchasing, selling, quality, repair, sequencing, queues, capacity, transportation. MATLAB is used. Prerequisites: probability, linear programming. Same as: MSE 251.

**EE 368. Digital Image Processing. 3 Units.**

Image sampling and quantization color, point operations, segmentation, morphological image processing, linear image filtering and correlation, image transforms, eigenimages, multiresolution image processing, wavelets, noise reduction and restoration, feature extraction and recognition tasks, image registration. Emphasis is on the general principles of image processing. Students write and investigate image processing algorithms in Matlab. Term project. Prerequisites: EE261, EE278B. Same as: CS 232.

**EE 369A. Medical Imaging Systems I. 3 Units.**

Imaging internal structures within the body using high-energy radiation studied from a systems viewpoint. Modalities covered: x-ray, computed tomography, and nuclear medicine. Analysis of existing and proposed systems in terms of resolution, frequency response, detection sensitivity, noise, and potential for improved diagnosis. Prerequisite: EE 261.

**EE 369B. Medical Imaging Systems II. 3 Units.**

Imaging internal structures within the body using non-ionizing radiation studied from a systems viewpoint. Modalities include ultrasound and magnetic resonance. Analysis of ultrasonic systems including diffraction and noise. Analysis of magnetic resonance systems including physics, Fourier properties of image formation, and noise. Prerequisite: EE 261.

**EE 371. Advanced VLSI Circuit Design. 3 Units.**

Design of high-performance digital systems, the things that cause them to fail, and how to avoid these problems. Topics will focus on current issues including: wiring resistance and how to deal with it, power and Gnd noise and regulation, clock (or asynchronous) system design and how to minimize clocking overhead, high-speed I/O design, energy minimization including leakage control, and structuring your Verilog code to result in high-performance, low energy systems. Extensive use of modern CAD tools. Prerequisites: 271 and 313, or consent of instructor.

**EE 373A. Adaptive Signal Processing. 3 Units.**

Learning algorithms for adaptive digital filters. Self optimization. Wiener filter theory. Quadratic performance functions, their eigenvectors and eigenvalues. Speed of convergence. Asymptotic performance versus convergence rate. Applications of adaptive filters to statistical prediction, process modeling, adaptive noise canceling, adaptive antenna arrays, adaptive inverse control, and equalization and echo cancelling in modems. Theoretical and experimental research projects in adaptive filter theory, communications, and audio systems. Biomedical research projects, supervised jointly by EE and Medical School faculty. Recommended: EE263, EE264, EE278B.

**EE 376A. Information Theory. 3 Units.**

The fundamental ideas of information theory. Entropy and intrinsic randomness. Data compression to the entropy limit. Huffman coding. Arithmetic coding. Channel capacity, the communication limit. Gaussian channels. Kolmogorov complexity. Asymptotic equipartition property. Information theory and Kelly gambling. Applications to communication and data compression. Prerequisite: EE178/278A or STATS 116, or equivalent. Same as: STATS 376A.

**EE 378A. Statistical Signal Processing. 3 Units.**

Random signals in electrical engineering. Discrete-time random processes: stationarity and ergodicity, covariance sequences, power spectral density, parametric models for stationary processes. Fundamentals of linear estimation: minimum mean squared error estimation, optimum linear estimation, orthogonality principle, the Wold decomposition. Causal linear estimation of stationary processes: the causal Wiener filter, Kalman filtering. Parameter estimation: criteria of goodness of estimators, Fisher information, Cramer-Rao inequality, Chapman-Robbins inequality, maximum likelihood estimation, method of moments, consistency, efficiency. ARMA parameter estimation: Yule-Walker equations, Levinson-Durbin algorithm, least squares estimation, moving average parameter estimation, modified Yule-Walker method for model order selection. Spectrum estimation: sample covariances, covariance estimation, Bartlett formula, periodogram, periodogram averaging, windowed periodograms. Prerequisites: EE 278B.

**EE 378B. Inference, Estimation, and Information Processing. 3 Units.**

Techniques and models for signal, data and information processing, with emphasis on incomplete data, non-ordered index sets and robust low-complexity methods. Linear models; regularization and shrinkage; dimensionality reduction; streaming algorithms; sketching; clustering, search in high dimension; low-rank models; principal component analysis. Applications include: positioning from pairwise distances; distributed sensing; measurement/traffic monitoring in networks; finding communities/clusters in networks; recommendation systems; inverse problems. Prerequisites: EE278B and EE263 or equivalent. Recommended but not required: EE378A.

**EE 379. Digital Communication. 3 Units.**

Modulation methods and bandwidth requirements, baseband and passband system analysis, minimum-probability-of-error and maximum-likelihood detection, error-probability analysis, intersymbol interference, maximum-likelihood sequence detection, equalization methods, orthogonal frequency-division multiplexing. Prerequisite: EE102B, EE278B.

**EE 380. Colloquium on Computer Systems. 1 Unit.**

Live presentations of current research in the design, implementation, analysis, and applications of computer systems. Topics range over a wide range and are different every quarter. Topics may include fundamental science, mathematics, cryptography, device physics, integrated circuits, computer architecture, programming, programming languages, optimization, applications, simulation, graphics, social implications, venture capital, patent and copyright law, networks, computer security, and other topics of related to computer systems. May be repeated for credit.

**EE 382C. Interconnection Networks. 3 Units.**

The architecture and design of interconnection networks used to communicate from processor to memory, from processor to processor, and in switches and routers. Topics: network topology, routing methods, flow control, router microarchitecture, and performance analysis. Enrollment limited to 30. Prerequisite: 282.

**EE 382E. Advanced Multi-Core Systems. 3 Units.**

In-depth coverage of the architectural techniques used in modern, multi-core chips for mobile and server systems. Advanced processor design techniques (superscalar cores, VLIW cores, multi-threaded cores, energy-efficient cores), cache coherence, memory consistency, vector processors, graphics processors, heterogeneous processors, and hardware support for security and parallel programming. Students will become familiar with complex trade-offs between performance-power-complexity and hardware-software interactions. A central part of CS316 is a project on an open research question on multi-core technologies. Prerequisites: EE 108B. Recommended: CS 149, EE 282. Same as: CS 316.



**EE 384A. Internet Routing Protocols and Standards. 3 Units.**

Local area networks addressing and switching; IEEE 802.1 bridging protocols (transparent bridging, virtual LANs). Internet routing protocols: interior gateways (RIP, OSPF) and exterior gateways (BGP); multicast routing; multiprotocol label switching (MPLS). Routing in mobile networks: Mobile IP, Mobile Ad Hoc Networks (MANET), Wireless Mesh Networks. Prerequisite: EE 284 or CS 144.

**EE 384C. Wireless Local and Wide Area Networks. 3 Units.**

Characteristics of wireless communication: multipath, noise, and interference. Communications techniques: spread-spectrum, CDMA, and OFDM. IEEE 802.11 physical layer specifications: FHSS, DSSS, IEEE 802.11b (CCK), and 802.11a/g (OFDM). IEEE 802.11 media access control protocols: carrier sense multiple access with collision avoidance (CSMA/CA), point coordination function (PCF), IEEE802.11e for differentiated services. IEEE 802.11 network architecture: ad hoc and infrastructure modes, access point functionality. Management functions: synchronization, power management and association. IEEE 802.11s Mesh Networks. IEEE 802.16 (WiMAX) network architecture and protocols: Physical Layer (OFDMA) and Media Access Control Layer. Current research papers in the open literature. Prerequisite: EE 284 or CS 244A.

**EE 384E. Networked Wireless Systems. 3 Units.**

Design and implementation of wireless networks and mobile systems. The course will commence with a short retrospective of wireless communication and initially touch on some of the fundamental physical layer properties of various wireless communication technologies. The focus will then shift to design of media access control and routing layers for various wireless systems. The course will also examine adaptations necessary at transport and higher layers to cope with node mobility and error-prone nature of the wireless medium. Finally, it will conclude with a brief overview of other related issues including emerging wireless/mobile applications. Prerequisites: EE 284  
Same as: CS 244E.

**EE 384M. Network Science. 3 Units.**

Modern large-scale networks consist of (i) Information Networks, such as the Web and Social Networks, and (ii) Data Centers, which are networks interconnecting computing and storage elements for servicing the users of an Information Network. This course is concerned with the mathematical models and the algorithms used in Information Networks and Data Centers. Prerequisite: EE178/278A or CS365.

**EE 384S. Performance Engineering of Computer Systems & Networks. 3 Units.**

Modeling and control methodologies for high-performance network engineering, including: Markov chains and stochastic modeling, queueing networks and congestion management, dynamic programming and task/processor scheduling, network dimensioning and optimization, and simulation methods. Applications for design of high-performance architectures for wireline/wireless networks and the Internet, including: traffic modeling, admission and congestion control, quality of service support, power control in wireless networks, packet scheduling in switches, video streaming over wireless links, and virus/worm propagation dynamics and countermeasures. Enrollment limited to 30. Prerequisites: basic networking technologies and probability.

**EE 384X. Packet Switch Architectures. 3 Units.**

The theory and practice of designing packet switches, such as Internet routers, and Ethernet switches. Introduction: evolution of switches and routers. Output queued switches: motivation and methods for providing bandwidth and delay guarantees. Switching: output queueing, parallelism in switches, distributed shared memory switches, input-queued switches, combined input-output queued switches, how to make fast packet buffers, buffered crossbar switches. Scheduling input queued crossbars: connections with bipartite graph matching, algorithms for 100% throughput, practical algorithms and heuristics. Looking forward: Architectures and switches for data center networks. Prerequisites: EE284 or CS 244A. Recommended: EE 178/278A or EE 278B or STAT 116.

**EE 385A. Robust and Testable Systems Seminar. 1-4 Units.**

Student/faculty discussions of research problems in the design of reliable digital systems. Areas: fault-tolerant systems, design for testability, production testing, and system reliability. Emphasis is on student presentations and Ph.D. thesis research. May be repeated for credit. Prerequisite: consent of instructor.

**EE 386. Robust System Design. 3 Units.**

Causes of system malfunctions; techniques for building robust systems that avoid or are resilient to such malfunctions through built-in error detection and correction, prediction, self-test, self-recovery, and self-repair; case studies and new research problems. Prerequisites: 108A,B, 282.

**EE 387. Algebraic Error Control Codes. 3 Units.**

Theory and implementation of algebraic codes for detection and correction of random and burst errors. Introduction to finite fields. Linear block codes, cyclic codes, Hamming codes, BCH codes, Reed-Solomon codes. Decoding algorithms for BCH and Reed-Solomon codes. Prerequisites: elementary probability, linear algebra.

**EE 390. Special Studies or Projects in Electrical Engineering. 1-15 Units.**

Independent work under the direction of a faculty member. Individual or team activities may involve lab experimentation, design of devices or systems, or directed reading. May be repeated for credit.

**EE 391. Special Studies and Reports in Electrical Engineering. 1-15 Units.**

Independent work under the direction of a faculty member; written report or written examination required. Letter grade given on the basis of the report; if not appropriate, student should enroll in 390. May be repeated for credit.

**EE 392F. Logic Synthesis of VLSI Circuits. 3 Units.**

Similar to former 318. Solving logic design problems with CAD tools for VLSI circuits. Exact and heuristic algorithms for logic synthesis. Representation and optimization of combinational logic functions (encoding problems, binary decision diagrams) and of multiple-level networks (algebraic and Boolean methods, don't-care set computation, timing verification, and optimization); and modeling and optimization of sequential functions and networks (retiming), semicustom libraries, and library binding. Prerequisites: familiarity with logic design, algorithm development, and programming.

**EE 392N. INTELLIGENT ENERGY SYSTEMS. 1 Unitss.**

The key systems engineering steps for design of automated systems in application to of existing and future intelligent energy systems. Existing design approaches and practices for the energy systems. Every second lecture of the course will be a guest lecture discussing the communication system design for a certain type of energy system. They will alternate with guest lectures discuss-ing the on-line analytical functions.

**EE 392P. Nanoscale Device Physics. 3 Units.**

The course develops an understanding of nanoscale devices relevant to information manipulation: electronic drawing on ballistic, single electron, quantum confinement, and phase transitions such as ferroelectric, metal-insulator, and structural; magnetic employing field-switching, spin-torque and spin Hall; photonic using photonic bandgaps and non-linearities; and mechanical employing deflection, torsion and resonance. The physical phenomena that these connect to are electron-phonon effects in dielectrics, mesoscopic and single-electron phenomena, phase transitions, magnetic switching, spin-torque effect, Casimir effect, plasmonics, and their coupled interactions. Prerequisites: EE 216 or equivalent. Recommended: EE 222.

**EE 392T. Seminar in Chip Test and Debug. 1 Unitss.**

Seminars by industry professionals in digital IC manufacturing test and silicon debug. Topics include yield and binsplit modeling, defect types and detection, debug hardware, physical analysis, and design for test/debug circuits. Case studies of silicon failures. Prerequisite: basic digital IC design (271 or 371).

**EE 395. Electrical Engineering Instruction: Practice Teaching. 1-15 Units.**

Open to advanced EE graduate students who plan to make teaching their career. Students conduct a section of an established course taught in parallel by an experienced instructor. Enrollment limited.

**EE 398A. Image and Video Compression. 3 Units.**

Replaces EE398. The principles of source coding for the efficient storage and transmission of still and moving images. Entropy and lossless coding techniques. Run-length coding and fax compression. Arithmetic coding. Rate-distortion limits and quantization. Lossless and lossy predictive coding. Transform coding, JPEG. Subband coding, wavelets, JPEG2000. Motion-compensated coding, MPEG. Students investigate image and video compression algorithms in Matlab or C. Term project. Prerequisites: EE261, EE278B.

**EE 400. Thesis and Thesis Research. 1-15 Units.**

Limited to candidates for the degree of Engineer or Ph.D. May be repeated for credit.

**EE 402A. Topics in International Technology Management. 1 Unitss.**

Theme for Autumn 2012 is "Green Technologies in Transportation: Recent Developments from Asia." Technology and business trends, innovations, and opportunities in Asia and Japan, e.g. new materials, fuels, and energy storage for vehicles; automobile and aircraft design; smart grids and intelligent transportation systems; mobile mesh networks, etc.. Implications for US firms and researchers. Distinguished speakers from industry and government. May be repeated for credit.

**EE 402T. Entrepreneurship in Asian High-Tech Industries. 1 Unitss.**

Distinctive patterns and challenges of entrepreneurship in Asia; update of business and technology issues in the creation and growth of start-up companies in major Asian economies. Distinguished speakers from industry, government, and academia. Course may be repeated for credit.

**EE 410. Integrated Circuit Fabrication Laboratory. 3-4 Units.**

Fabrication, simulation, and testing of a submicron CMOS process. Practical aspects of IC fabrication including silicon wafer cleaning, photolithography, etching, oxidation, diffusion, ion implantation, chemical vapor deposition, physical sputtering, and electrical testing. Students also simulate the CMOS process using process simulator TSUPREM4 of the structures and electrical parameters that should result from the process flow. Taught in the Stanford Nanofabrication Facility (SNF). Preference to students pursuing doctoral research program requiring SNF facilities. Enrollment limited to 20. Prerequisites: EE 212, EE 216, consent of instructor.

**EE 412. Advanced Nanofabrication Laboratory. 3 Units.**

Experimental projects and seminars on integrated circuit fabrication using epitaxial, oxidation, diffusion, evaporation, sputtering, and photolithographic processes with emphasis on techniques for achieving advanced device performance. May be repeated for additional credit. Prerequisites: ENGR341 or EE410 or consent of instructor.

**EE 414. RF Transceiver Design Laboratory. 3 Units.**

Students design, build, and test GHz transceivers using microstrip construction techniques and discrete components. The design, construction, and experimental characterization of representative transceiver building blocks: low noise amplifiers (LNAs), diode ring mixers, PLL-based frequency synthesizers, voltage-controlled oscillators (VCOs), power amplifiers (PAs), and microstrip filters and patch antennas. The characteristics of passive microstrip components (including interconnect). Emphasis is on a quantitative reconciliation of theoretical predictions and extensive experimental measurements performed with spectrum and network analyzers, time-domain reflectometers (TDRs), noise figure meter and phase noise analyzers. Prerequisites: EE 314, EE 344.

**EE 418. Topics in Neuroengineering. 3 Units.**

Neuroscience and electrical engineering, focusing on principles and theory in modern neural prosthetic systems (brain-computer or brain-machine interfaces). Electrical properties of neurons, information encoding, neural measurement techniques and technology, processing electronics, information decoding and estimators, and statistical data analysis. Prerequisites: EE 214B, EE 278B.

**EE 464. Semidefinite Optimization and Algebraic Techniques. 3 Units.**

This course focuses on recent developments in optimization, specifically on the use of convex optimization to address problems involving polynomial equations and inequalities. The course covers approaches for finding both exact and approximate solutions to such problems. We will discuss the use of duality and algebraic methods to find feasible points and certificates of infeasibility, and the solution of polynomial optimization problems using semidefinite programming. The course covers theoretical foundations as well as algorithms and their complexity. Prerequisites: EE364A or equivalent course on convex optimization.

**EE 469B. RF Pulse Design for Magnetic Resonance Imaging. 3 Units.**

Magnetic resonance imaging (MRI) and spectroscopy (MRS) based on the use of radio frequency pulses to manipulate magnetization. Analysis and design of major types of RF pulses in one and multiple dimensions, analysis and design of sequences of RF pulses for fast imaging, and use of RF pulses for the creation of image contrast in MRI. Prerequisite: 369B.

**EE 476. Network Information Theory. 3 Units.**

Network information theory deals with the fundamental limits on information flow in networks and the optimal coding schemes that achieve these limits. It aims to extend Shannon's point-to-point information theory and the Ford-Fulkerson max-flow min-cut theorem to networks with multiple sources and destinations. The course presents the basic results and tools in the field in a simple and unified manner. Topics covered include: multiple access channels, broadcast channels, interference channels, channels with state, distributed source coding, multiple description coding, network coding, relay channels, interactive communication, and noisy network coding. Prerequisites: EE376A.

**EE 801. TGR Project. 0 Unit.****EE 802. TGR Dissertation. 0 Unit.**

May be repeated for credit.

# Energy Resources Engineering Courses

## **ENERGY 24. Making Molehills out of Mountains: Energy and Development in Appalachia. 1 Unitss.**

Preparation for Alternative Spring Break trip to examine the past, present, and future role of energy in Appalachia. Positive and negative impacts of energy production; meetings with energy industry leaders, community groups, and policymakers. The larger role of energy development and energy issues in society. May be repeated for credit.

## **ENERGY 101. Energy and the Environment. 3 Units.**

Energy use in modern society and the consequences of current and future energy use patterns. Case studies illustrate resource estimation, engineering analysis of energy systems, and options for managing carbon emissions. Focus is on energy definitions, use patterns, resource estimation, pollution. Recommended: MATH 21 or 42. Same as: EARTHSYS 101.

## **ENERGY 101A. Energizing California. 1 Unitss.**

A weekend field trip featuring renewable and nonrenewable energy installations in Northern California. Tour geothermal, bioenergy, and natural gas field sites with expert guides from the Department of Energy Resources Engineering. Requirements: One campus meeting and weekend field trip. Enrollment limited to 25. Freshman have first choice.

## **ENERGY 102. Renewable Energy Sources and Greener Energy Processes. 3 Units.**

The energy sources that power society are rooted in fossil energy although energy from the core of the Earth and the sun is almost inexhaustible; but the rate at which energy can be drawn from them with today's technology is limited. The renewable energy resource base, its conversion to useful forms, and practical methods of energy storage. Geothermal, wind, solar, biomass, and tidal energies; resource extraction and its consequences. Recommended: MATH 21 or 42. Same as: EARTHSYS 102.

## **ENERGY 104. Transition to sustainable energy systems. 3 Units.**

This course explores the transition to a sustainable energy system at large scales (national and global), and over long time periods (decades). Explores the drivers of global energy demand and the fundamentals of technologies that can meet this demand sustainably. Focuses on constraints affecting large-scale deployment of technologies, as well as inertial factors affecting this transition. Problems will involve modeling global energy demand, deployment rates for sustainable technologies, technological learning and economics of technical change. Recommended: ENERGY 101, 102.

## **ENERGY 120. Fundamentals of Petroleum Engineering. 3 Units.**

Lectures, problems, field trip. Engineering topics in petroleum recovery; origin, discovery, and development of oil and gas. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations. Gas laws. Single phase and multiphase flow through porous media. Same as: ENGR 120.

## **ENERGY 120A. Flow Through Porous Media Laboratory. 1 Unitss.**

Laboratory measurements of permeability and porosity in rocks. Applications to subsurface fluid mechanics. Course is intended as an accompaniment to Energy 120.

## **ENERGY 121. Fundamentals of Multiphase Flow. 3 Units.**

Multiphase flow in porous media. Wettability, capillary pressure, imbibition and drainage, Leverett J-function, transition zone, vertical equilibrium. Relative permeabilities, Darcy's law for multiphase flow, fractional flow equation, effects of gravity, Buckley-Leverett theory, recovery predictions, volumetric linear scaling, JBN and Jones-Rozelle determination of relative permeability. Frontal advance equation, Buckley-Leverett equation as frontal advance solution, tracers in multiphase flow, adsorption, three-phase relative permeabilities. Same as: ENERGY 221.

## **ENERGY 125. Modeling and Simulation for Geoscientists and Engineers. 3 Units.**

Hands-on. Topics include deterministic and statistical modeling applied to problems such as flow in the subsurface, atmospheric pollution, biological populations, wave propagation, and crustal deformation. Student teams define and present a modeling problem.

## **ENERGY 130. Well Log Analysis I. 3 Units.**

For earth scientists and engineers. Interdisciplinary, providing a practical understanding of the interpretation of well logs. Lectures, problem sets using real field examples: methods for evaluating the presence of hydrocarbons in rock formations penetrated by exploratory and development drilling. The fundamentals of all types of logs, including electric and non-electric logs.

## **ENERGY 141. Seismic Reservoir Characterization. 3-4 Units.**

(Same as GP241) Practical methods for quantitative characterization and uncertainty assessment of subsurface reservoir models integrating well-log and seismic data. Multidisciplinary combination of rock-physics, seismic attributes, sedimentological information and spatial statistical modeling techniques. Student teams build reservoir models using limited well data and seismic attributes typically available in practice, comparing alternative approaches. Software provided (SGEMS, Petrel, Matlab). Recommended: ERE240/260, or GP222/223, or GP260/262 or GES253/257; ERE246, GP112. Same as: ENERGY 241, GEOPHYS 241A.

## **ENERGY 146. Reservoir Characterization and Flow Modeling with Outcrop Data. 3 Units.**

Project addressing a reservoir management problem by studying an outcrop analog, constructing geostatistical reservoir models, and performing flow simulation. How to use outcrop observations in quantitative geological modeling and flow simulation. Relationships between disciplines. Weekend field trip. Same as: ENERGY 246, GES 246.

## **ENERGY 153. Carbon Capture and Sequestration. 3-4 Units.**

CO<sub>2</sub> separation from syngas and flue gas for gasification and combustion processes. Transportation of CO<sub>2</sub> in pipelines and sequestration in deep underground geological formations. Pipeline specifications, monitoring, safety engineering, and costs for long distance transport of CO<sub>2</sub>. Comparison of options for geological sequestration in oil and gas reservoirs, deep unmineable coal beds, and saline aquifers. Life cycle analysis. Same as: ENERGY 253.

## **ENERGY 154. Energy in Transition: Technology, Policy and Politics. 2 Units.**

The \$6 trillion dollar global energy sector is in the midst of change; increasing global demand, retiring energy assets, and abundant technology choices are creating an atmosphere of commercial dynamism. What is clear is that decision-making in the energy sector is not simply based on technology attributes. Through the lenses of TECHNOLOGY, POLICY AND POLITICS, this class will consider how new and improved energy technologies actually make their way into the marketplace in the real world.

**ENERGY 155. Undergraduate Report on Energy Industry Training. 1-3 Units.**

On-the-job practical training under the guidance of on-site supervisors. Required report detailing work activities, problems, assignments and key results. Prerequisite: written consent of instructor.

**ENERGY 160. Modeling Uncertainty in the Earth Sciences. 3 Units.**

Whether Earth Science modeling is performed on a local, regional or global scale, for scientific or engineering purposes, uncertainty is inherently present due to lack of data and lack of understanding of the underlying phenomena. This course highlights the various issues, techniques and practical modeling tools available for modeling uncertainty of complex 3D/4D Earth systems. The course focuses on a practical breath rather than theoretical depth. Topics covered are: the process of building models, sources of uncertainty, probabilistic techniques, spatial data analysis and geostatistics, grid and scale, spatio-temporal uncertainty, visualizing uncertainty in large dimensions, Monte Carlo simulation, reducing uncertainty with data, value of information. Applications to both local (reservoir, aquifer) and global (climate) are covered through literature study. Extensive software use with SGEMS and Petrel. Project homework. Prerequisites: algebra (CME 104 or equivalent), introductory statistics course (CME 106 or equivalent). Same as: ENERGY 260.

**ENERGY 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics. 3-4 Units.**

Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools. Same as: EARTHSYS 161, EESS 161.

**ENERGY 167. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties. 3 Units.**

Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion, and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor. Same as: ENERGY 267.

**ENERGY 171. Energy Infrastructure, Technology and Economics. 3 Units.**

Oil and gas represents more than 50% of global primary energy. In delivering energy at scale, the industry has developed global infrastructure with supporting technology that gives it enormous advantages in energy markets; this course explores how the oil and gas industry operates. From the perspective of these established systems and technologies, we will look at the complexity of energy systems, and will consider how installed infrastructure enables technology development and deployment, impacts energy supply, and how existing infrastructure and capital invested in fossil energy impacts renewable energy development. Prerequisites: Energy 101 and 102 or permission of instructor. Same as: ENERGY 271.

**ENERGY 175. Well Test Analysis. 3 Units.**

Lectures, problems. Application of solutions of unsteady flow in porous media to transient pressure analysis of oil, gas, water, and geothermal wells. Pressure buildup analysis and drawdown. Design of well tests. Computer-aided interpretation.

**ENERGY 180. Oil and Gas Production Engineering. 3 Units.**

Design and analysis of production systems for oil and gas reservoirs. Topics: well completion, single-phase and multi-phase flow in wells and gathering systems, artificial lift and field processing, well stimulation, inflow performance. Prerequisite: 120. Same as: ENERGY 280.

**ENERGY 191. Optimization of Energy Systems. 3 Units.**

Introductory mathematical programming and optimization using examples from energy industries. Emphasis on problem formulation and solving, secondary coverage of algorithms. Problem topics include optimization of energy investment, production, and transportation; uncertain and intermittent energy resources; energy storage; efficient energy production and conversion. Methods include linear and nonlinear optimization, as well as multi-objective and goal programming. Tools include Microsoft Excel and AMPL mathematical programming language. Prerequisites: MATH 41, MATH 51, or consent of instructor. Programming experience helpful (e.g., CS 106A, CS 106B). Same as: ENERGY 291.

**ENERGY 192. Undergraduate Teaching Experience. 1-3 Units.**

Leading field trips, preparing lecture notes, quizzes under supervision of the instructor. May be repeated for credit.

**ENERGY 193. Undergraduate Research Problems. 1-3 Units.**

Original and guided research problems with comprehensive report. May be repeated for credit.

**ENERGY 194. Special Topics in Energy and Mineral Fluids. 1-3 Units.**

May be repeated for credit.

**ENERGY 199. Senior Project and Seminar in Energy Resources. 3-4 Units.**

Individual or group capstone project in Energy Resources Engineering. Emphasis is on report preparation. May be repeated for credit.

**ENERGY 201. Laboratory Measurement of Reservoir Rock Properties. 3 Units.**

In this course, students will learn methods for measuring reservoir rock properties. Techniques covered include core preservation and sample preparation; Rock petrography; Interfacial tension of fluids; Measurement of contact angles of fluids on reservoir media; Capillary pressure measurement and interpretation; Absolute and effective porosities; Absolute permeability; Multiphase flow including relative permeability and residual saturation. The class will be 1 3-hour lecture/lab per week, with readings and weekly assignments. A field trip to a professional core characterization lab may be included.

**ENERGY 212. Advanced Programming for Scientists and Engineers. 3 Units.**

Advanced topics in software programming, debugging, and performance optimization are covered. The capabilities and usage of common libraries and frameworks such as BLAS, LAPACK, FFT, PETSc, and MKL/ACML are reviewed. Computer representation of integer and floating point numbers, and interoperability between C/C++ and Fortran is described. More advanced software engineering topics including: representing data in files, application checkpoint/restart, signals, unit and regression testing, and build automation. The use of debugging tools including static analysis, gdb, and Valgrind are introduced. An introduction to computer architecture covering processors, memory hierarchy, storage, and networking provides a foundation for understanding software performance. Profiles generated using gprof and OProfile, are used to help guide the performance optimization process. Computational problems from various science and engineering disciplines will be used in individual and group assignments. Prerequisites: CME 200/ME 300A; and CME 211 or CS 106X or equivalent level of programming proficiency in C/C++. Relevant courses: CS140, CS143, CS240 and EE282. Same as: CME 212.

**ENERGY 221. Fundamentals of Multiphase Flow. 3 Units.**

Multiphase flow in porous media. Wettability, capillary pressure, imbibition and drainage, Leverett J-function, transition zone, vertical equilibrium. Relative permeabilities, Darcy's law for multiphase flow, fractional flow equation, effects of gravity, Buckley-Leverett theory, recovery predictions, volumetric linear scaling, JBN and Jones-Rozelle determination of relative permeability. Frontal advance equation, Buckley-Leverett equation as frontal advance solution, tracers in multiphase flow, adsorption, three-phase relative permeabilities.

Same as: ENERGY 121.

**ENERGY 222. Advanced Reservoir Engineering. 3 Units.**

Lectures, problems. General flow equations, tensor permeabilities, steady state radial flow, skin, and succession of steady states. Injectivity during fill-up of a depleted reservoir, injectivity for liquid-filled reservoirs. Flow potential and gravity forces, coning. Displacements in layered reservoirs. Transient radial flow equation, primary drainage of a cylindrical reservoir, line source solution, pseudo-steady state. May be repeated for credit. Prerequisite: 221.

**ENERGY 223. Reservoir Simulation. 3-4 Units.**

Fundamentals of petroleum reservoir simulation. Equations for multicomponent, multiphase flow between gridblocks comprising a petroleum reservoir. Relationships between black-oil and compositional models. Techniques for developing black-oil, compositional, thermal, and dual-porosity models. Practical considerations in the use of simulators for predicting reservoir performance. Class project. Prerequisite: 221 and 246, or consent of instructor. Recommended: CME 206.

**ENERGY 224. Advanced Reservoir Simulation. 3 Units.**

Topics include modeling of complex wells, coupling of surface facilities, compositional modeling, dual porosity models, treatment of full tensor permeability and grid nonorthogonality, local grid refinement, higher order methods, streamline simulation, upscaling, algebraic multigrid solvers, unstructured grid solvers, history matching, other selected topics. Prerequisite: 223 or consent of instructor. May be repeated for credit.

**ENERGY 225. Theory of Gas Injection Processes. 3 Units.**

Lectures, problems. Theory of multicomponent, multiphase flow in porous media. Miscible displacement: diffusion and dispersion, convection-dispersion equations and its solutions. Method of characteristic calculations of chromatographic transport of multicomponent mixtures. Development of miscibility and interaction of phase behavior with heterogeneity. May be repeated for credit. Prerequisite: CME 200.

**ENERGY 226. Thermal Recovery Methods. 3 Units.**

Theory and practice of thermal recovery methods: steam drive, cyclic steam injections, and in situ combustion. Models of combined mass and energy transport. Estimates of heated reservoir volume and oil recovery performance. Wellbore heat losses, recovery production, and field examples.

**ENERGY 227. Enhanced Oil Recovery. 3 Units.**

The physics, theories, and methods of evaluating chemical, miscible, and thermal enhanced oil recovery projects. Existing methods and screening techniques, and analytical and simulation based means of evaluating project effectiveness. Dispersion-convection-adsorption equations, coupled heat, and mass balances and phase behavior provide requisite building blocks for evaluation.

**ENERGY 230. Advanced Topics in Well Logging. 3 Units.**

State of the art tools and analyses: the technology, rock physical basis, and applications of each measurement. Hands-on computer-based analyses illustrate instructional material. Guest speakers on formation evaluation topics. Prerequisites: 130 or equivalent; basic well logging; and standard practice and application of electric well logs.

**ENERGY 240. Geostatistics. 2-3 Units.**

Geostatistical theory and practical methodologies for quantifying and simulating spatial and spatio-temporal patterns for the Earth Sciences. Real case development of models of spatial continuity, including variograms, Boolean models and training images. Estimation versus simulation of spatial patterns. Loss functions. Estimation by kriging, co-kriging with secondary data. Dealing with data on various scales. Unconditional and conditional Boolean simulation, sequential simulation for continuous and categorical variables. Multi-variate geostatistical simulation. Probabilistic and pattern-based approaches to multiple-point simulation. Trend, secondary variable, auxiliary variable and probability-type constraints. Quality control techniques on generated models. Workflows for practical geostatistical applications in mining, petroleum, hydrogeology, remote sensing and environmental sciences. prerequisites: Energy 160/260 or basic course in data analysis/statistics  
Same as: GES 240.

**ENERGY 241. Seismic Reservoir Characterization. 3-4 Units.**

(Same as GP241) Practical methods for quantitative characterization and uncertainty assessment of subsurface reservoir models integrating well-log and seismic data. Multidisciplinary combination of rock-physics, seismic attributes, sedimentological information and spatial statistical modeling techniques. Student teams build reservoir models using limited well data and seismic attributes typically available in practice, comparing alternative approaches. Software provided (SGEMS, Petrel, Matlab). Recommended: ERE240/260, or GP222/223, or GP260/262 or GES253/257; ERE246, GP112  
Same as: ENERGY 141, GEOPHYS 241A.

**ENERGY 242. Topics in Advanced Geostatistics. 3-4 Units.**

Conditional expectation theory and projections in Hilbert spaces; parametric versus non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, and annealing approaches to stochastic imaging; multiple point statistics inference and reproduction; neural net geostatistics; Bayesian methods for data integration; techniques for upscaling hydrodynamic properties. May be repeated for credit. Prerequisites: 240, advanced calculus, C++/Fortran.  
Same as: EESS 263.

**ENERGY 246. Reservoir Characterization and Flow Modeling with Outcrop Data. 3 Units.**

Project addressing a reservoir management problem by studying an outcrop analog, constructing geostatistical reservoir models, and performing flow simulation. How to use outcrop observations in quantitative geological modeling and flow simulation. Relationships between disciplines. Weekend field trip.  
Same as: ENERGY 146, GES 246.

**ENERGY 247. Stochastic Simulation. 3 Units.**

Characterization and inference of statistical properties of spatial random function models; how they average over volumes, expected fluctuations, and implementation issues. Models include point processes (Cox, Poisson), random sets (Boolean, truncated Gaussian), and mixture of Gaussian random functions. Prerequisite: 240.

**ENERGY 251. Thermodynamics of Equilibria. 3 Units.**

Lectures, problems. The volumetric behavior of fluids at high pressure. Equation of state representation of volumetric behavior. Thermodynamic functions and conditions of equilibrium, Gibbs and Helmholtz energy, chemical potential, fugacity. Phase diagrams for binary and multicomponent systems. Calculation of phase compositions from volumetric behavior for multicomponent mixtures. Experimental techniques for phase-equilibrium measurements. May be repeated for credit.

**ENERGY 252. Chemical Kinetics Modeling. 3 Units.**

Fundamentals of chemical reaction kinetics in homogeneous and heterogeneous reaction systems from a molecular perspective. Development and application of the theory of chemical kinetics, including collision, transition state, and surface reactivity approaches. Relationships between thermodynamics and kinetics to overall mechanism predictions. Introduction to Gaussian 03. Lab involves chemical modeling including ab initio electronic structure calculations (Hartree-Fock, configuration interaction, coupled cluster, and many-body perturbation theory) and thermodynamic predictions.

**ENERGY 253. Carbon Capture and Sequestration. 3-4 Units.**

CO<sub>2</sub> separation from syngas and flue gas for gasification and combustion processes. Transportation of CO<sub>2</sub> in pipelines and sequestration in deep underground geological formations. Pipeline specifications, monitoring, safety engineering, and costs for long distance transport of CO<sub>2</sub>. Comparison of options for geological sequestration in oil and gas reservoirs, deep unmineable coal beds, and saline aquifers. Life cycle analysis. Same as: ENERGY 153.

**ENERGY 255. Master's Report on Energy Industry Training. 1-3 Units.**

On-the-job training for master's degree students under the guidance of on-site supervisors. Students submit a report detailing work activities, problems, assignments, and key results. May be repeated for credit. Prerequisite: consent of adviser.

**ENERGY 256. Electronic Structure Theory and Applications to Chemical Kinetics. 3 Units.**

Fundamentals of electronic structure theory as it applies to chemical reaction kinetics in homogeneous and heterogeneous reaction systems. Development and application of the theory of chemical kinetics, including traditional and harmonic transition state theories. Relationships between thermodynamics and kinetics to overall mechanism predictions. Lab involves chemical modeling including ab initio electronic structure calculations (Hartree-Fock, configuration interaction, coupled cluster, and many-body perturbation theory) and thermodynamic predictions. DFT calculations for catalysis applications are also covered. Prerequisite: quantum mechanics. Same as: CHEMENG 444.

**ENERGY 259. Presentation Skills. 1 Unitss.**

For teaching assistants in Energy Resources Engineering. Five two-hour sessions in the first half of the quarter. Awareness of different learning styles, grading philosophies, fair and efficient grading, text design; presentation and teaching skills, PowerPoint slide design; presentation practice in small groups. Taught in collaboration with the Center for Teaching and Learning.

**ENERGY 260. Modeling Uncertainty in the Earth Sciences. 3 Units.**

Whether Earth Science modeling is performed on a local, regional or global scale, for scientific or engineering purposes, uncertainty is inherently present due to lack of data and lack of understanding of the underlying phenomena. This course highlights the various issues, techniques and practical modeling tools available for modeling uncertainty of complex 3D/4D Earth systems. The course focuses on a practical breath rather than theoretical depth. Topics covered are: the process of building models, sources of uncertainty, probabilistic techniques, spatial data analysis and geostatistics, grid and scale, spatio-temporal uncertainty, visualizing uncertainty in large dimensions, Monte Carlo simulation, reducing uncertainty with data, value of information. Applications to both local (reservoir, aquifer) and global (climate) are covered through literature study. Extensive software use with SGEMS and Petrel. Project homework. Prerequisites: algebra (CME 104 or equivalent), introductory statistics course (CME 106 or equivalent). Same as: ENERGY 160.

**ENERGY 267. Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties. 3 Units.**

Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion, and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor. Same as: ENERGY 167.

**ENERGY 269. Geothermal Reservoir Engineering. 3 Units.**

Conceptual models of heat and mass flows within geothermal reservoirs. The fundamentals of fluid/heat flow in porous media; convective/conductive regimes, dispersion of solutes, reactions in porous media, stability of fluid interfaces, liquid and vapor flows. Interpretation of geochemical, geological, and well data to determine reservoir properties/characteristics. Geothermal plants and the integrated geothermal system.

**ENERGY 271. Energy Infrastructure, Technology and Economics. 3 Units.**

Oil and gas represents more than 50% of global primary energy. In delivering energy at scale, the industry has developed global infrastructure with supporting technology that gives it enormous advantages in energy markets; this course explores how the oil and gas industry operates. From the perspective of these established systems and technologies, we will look at the complexity of energy systems, and will consider how installed infrastructure enables technology development and deployment, impacts energy supply, and how existing infrastructure and capital invested in fossil energy impacts renewable energy development. Prerequisites: Energy 101 and 102 or permission of instructor. Same as: ENERGY 171.

**ENERGY 273. Special Topics in Petroleum Engineering. 1-3 Units.****ENERGY 280. Oil and Gas Production Engineering. 3 Units.**

Design and analysis of production systems for oil and gas reservoirs. Topics: well completion, single-phase and multi-phase flow in wells and gathering systems, artificial lift and field processing, well stimulation, inflow performance. Prerequisite: 120. Same as: ENERGY 180.

**ENERGY 281. Applied Mathematics in Reservoir Engineering. 3 Units.**

The philosophy of the solution of engineering problems. Methods of solution of partial differential equations: Laplace transforms, Fourier transforms, wavelet transforms, Green's functions, and boundary element methods. Prerequisites: CME 204 or MATH 131, and consent of instructor.

**ENERGY 284. Optimization and Inverse Modeling. 3 Units.**

Treatment of deterministic and stochastic optimization, gradient-based optimization, polytope method, generalized least squares, non-linear least squares and confidence intervals by numerical methods and bootstrap. Adjoint method for gradient calculation. Genetic algorithms and simulated annealing. Development of proxy functions using regression techniques and neural networks. Application of optimization methods to solving non-linear inverse problems. Bayesian method, rejection sampling, metropolis sampling, uncertainty quantification. Parameterization of high-dimensional problems through various expansion techniques. Examples of various Earth sciences inverse problems including flow and wave equations. Requirements: CME 106 and 200 (or equivalent courses).

**ENERGY 285A. SUPRI-A Research Seminar: Enhanced Oil Recovery. 1 Unitss.**

Focused study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SUPRI-A group. May be repeated for credit. Prerequisite: consent of instructor.

**ENERGY 285B. SUPRI-B Research Seminar: Reservoir Simulation. 1 Unitss.**

Focused study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in SUPRI-B (reservoir simulation) program. May be repeated for credit. Prerequisite: consent of instructor.

**ENERGY 285C. SUPRI-C Research Seminar: Gas Injection Processes. 1 Unitss.**

Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SUPRI-D well test analysis group. May be repeated for credit. Prerequisite: consent of instructor.

**ENERGY 285D. SUPRI-D Research Seminar: Well Test Analysis. 1 Unitss.**

Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SUPRI-D well test analysis group. May be repeated for credit. Prerequisite: consent of instructor. (Horne).

**ENERGY 285F. SCRF Research Seminar: Geostatistics and Reservoir Forecasting. 1 Unitss.**

Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the SCRF (Stanford Center for Reservoir Forecasting) program. Prerequisite: consent of instructor.

**ENERGY 285G. Geothermal Reservoir Engineering Research Seminar. 1 Unitss.**

Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in the geothermal energy group. Presentation required for credit. Prerequisite: consent of instructor.

**ENERGY 285H. SUPRI-HW Research Seminar: Horizontal Well Technology. 1 Unitss.**

Study in research areas within the department. Graduate students may participate in advanced work in areas of particular interest prior to making a final decision on a thesis subject. Current research in SUPRI-HW (productivity and injectivity of horizontal wells) program. Prerequisite: consent of instructor.

**ENERGY 290. Numerical Modeling of Fluid Flow in Heterogeneous Porous Media. 3 Units.**

How to mathematically model and solve elliptic partial differential equations with variable and discontinuous coefficients describing flow in highly heterogeneous porous media. Topics include finite difference and finite volume approaches on structured grids, efficient solvers for the resulting system of equations, Krylov space methods, preconditioning, multi-grid solvers, grid adaptivity and adaptivity criteria, multiscale approaches, and effects of anisotropy on solver efficiency and accuracy. MATLAB programming and application of commercial or public domain simulation packages. Prerequisite: CME 200, 201, and 202, or equivalents with consent of instructor.

**ENERGY 291. Optimization of Energy Systems. 3 Units.**

Introductory mathematical programming and optimization using examples from energy industries. Emphasis on problem formulation and solving, secondary coverage of algorithms. Problem topics include optimization of energy investment, production, and transportation; uncertain and intermittent energy resources; energy storage; efficient energy production and conversion. Methods include linear and nonlinear optimization, as well as multi-objective and goal programming. Tools include Microsoft Excel and AMPL mathematical programming language. Prerequisites: MATH 41, MATH 51, or consent of instructor. Programming experience helpful (e.g., CS 106A, CS 106B).

Same as: ENERGY 191.

**ENERGY 293A. Fundamentals of Energy Processes. 3-4 Units.**

For seniors and graduate students. Thermodynamics, heat engines, thermoelectrics, biomass. Recommended: MATH 41, 43; PHYSICS 41, 43, 45

Same as: EE 293A.

**ENERGY 293B. Fundamentals of Energy Processes. 3 Units.**

For seniors and graduate students. Fuel cells. Production of hydrogen: electrolytic, chemical, thermolytic, photolytic. Hydrogen storage: hydrides. Photoelectric converters; photo-thermovoltaic converters. Wind turbines. Recommended: EE 293A; MATH 41; PHYSICS 41, 43, 45

Same as: EE 293B.

**ENERGY 295. Quantitative environmental assessment of energy systems. 1 Unitss.**

Graduate seminar on quantitative environmental assessment of energy technologies. Assessment methods for analyzing multi-device and multi-technology energy systems (e.g., full energy production  $\zeta$ pathways $\zeta$ ). Methodological coverage includes process-model life cycle assessment (LCA), energy embodied $\zeta$  in materials, energy return on energy invested, and cumulative exergy consumption. Exploration of theoretical modeling of multi-technology systems using matrix formulations. Tools used include MATLAB and openLCA life cycle assessment software. Prerequisites: linear algebra and some programming experience helpful (e.g., CS 106A-B).

**ENERGY 301. The Energy Seminar. 1 Unitss.**

Interdisciplinary exploration of current energy challenges and opportunities, with talks by faculty, visitors, and students. May be repeated for credit. Same as: CEE 301.

**ENERGY 355. Doctoral Report on Energy Industry Training. 1-3 Units.**

On-the-job training for doctoral students under the guidance of on-site supervisors. Students submit a report on work activities, problems, assignments, and results. May be repeated for credit. Prerequisite: consent of adviser.

**ENERGY 359. Teaching Experience in Energy Resources Engineering. 1 Unitss.**

For TAs in Energy Resources Engineering. Course and lecture design and preparation; lecturing practice in small groups. Classroom teaching practice in an Energy Resources Engineering course for which the participant is the TA (may be in a later quarter). Taught in collaboration with the Center for Teaching and Learning.

**ENERGY 360. Advanced Research Work in Energy Resources Engineering. 1-10 Units.**

Graduate-level work in experimental, computational, or theoretical research. Special research not included in graduate degree program. May be repeated for credit.

**ENERGY 361. Master's Degree Research in Energy Resources Engineering. 1-6 Units.**

Experimental, computational, or theoretical research. Advanced technical report writing. Limited to 6 units total. (Staff).

**ENERGY 362. Engineer's Degree Research in Energy Resources Engineering. 1-10 Units.**

Graduate-level work in experimental, computational, or theoretical research for Engineer students. Advanced technical report writing. Limited to 15 units total, or 9 units total if 6 units of 361 were previously credited.

**ENERGY 363. Doctoral Degree Research in Energy Resources Engineering. 1-10 Units.**

Graduate-level work in experimental, computational, or theoretical research for Ph.D. students. Advanced technical report writing.

**ENERGY 365. Special Research Topics in Energy Resources Engineering. 1-15 Units.**

Graduate-level research work not related to report, thesis, or dissertation. May be repeated for credit.

**ENERGY 369. Practical Energy Studies. 1-3 Units.**

Students work on realistic industrial reservoir engineering problems. Focus is on optimization of production scenarios using secondary or tertiary recovery techniques. When possible, projects are conducted in direct collaboration with industry. May be repeated for credit.

**ENERGY 801. TGR Project. 0 Unit.****ENERGY 802. TGR Dissertation. 0 Unit.**

## Engineering Courses

**ENGR 10. Introduction to Engineering Analysis. 4 Units.**

Integrated approach to the fundamental scientific principles that are the cornerstones of engineering analysis: conservation of mass, atomic species, charge, momentum, angular momentum, energy, production of entropy expressed in the form of balance equations on carefully defined systems, and incorporating simple physical models. Emphasis is on setting up analysis problems arising in engineering. Topics: simple analytical solutions, numerical solutions of linear algebraic equations, and laboratory experiences. Provides the foundation and tools for subsequent engineering courses.

**ENGR 14. Intro to Solid Mechanics. 4 Units.**

Introduction to engineering analysis using the principles of engineering solid mechanics. Builds on the math and physical reasoning concepts in Physics 41 to develop skills in evaluation of engineered systems across a variety of fields. Foundational ideas for more advanced solid mechanics courses such as ME80 or CEE101A. Interactive lecture sessions focused on mathematical application of key concepts, with weekly complementary lab session on testing and designing systems that embody these concepts. Limited enrollment, subject to instructor approval.

**ENGR 15. Dynamics. 4 Units.**

The application of Newton's Laws to solve 2-D and 3-D static and dynamic problems, particle and rigid body dynamics, freebody diagrams, and equations of motion, with application to mechanical, biomechanical, and aerospace systems. Computer numerical solution and dynamic response. Prerequisites: Calculus (differentiation and integration) such as MATH 41; and ENGR 14 (statics and strength) or a mechanics course in physics such as PHYSICS 41.

**ENGR 20. Introduction to Chemical Engineering. 3 Units.**

Overview of chemical engineering through discussion and engineering analysis of physical and chemical processes. Topics: overall staged separations, material and energy balances, concepts of rate processes, energy and mass transport, and kinetics of chemical reactions. Applications of these concepts to areas of current technological importance: biotechnology, energy, production of chemicals, materials processing, and purification. Prerequisite: CHEM 31. Same as: CHEMENG 20.

**ENGR 25B. Biotechnology. 3 Units.**

Biology and chemistry fundamentals, genetic engineering, cell culture, protein production, pharmaceuticals, genomics, viruses, gene therapy, evolution, immunology, antibodies, vaccines, transgenic animals, cloning, stem cells, intellectual property, governmental regulations, and ethics. Prerequisites: CHEM 31 and MATH 41 or equivalent courage. Same as: CHEMENG 25B.

**ENGR 25E. Energy: Chemical Transformations for Production, Storage, and Use. 3 Units.**

An introduction and overview to the challenges and opportunities of energy supply and consumption. Emphasis on energy technologies where chemistry and engineering play key roles. Review of energy fundamentals along with historical energy perspectives and current energy production technologies. In depth analyses of solar thermal systems, biofuels, photovoltaics and electrochemical devices (batteries and fuel cells). Prerequisites: high school chemistry or equivalent. Same as: CHEMENG 25E.

**ENGR 30. Engineering Thermodynamics. 3 Units.**

The basic principles of thermodynamics are introduced in this course. Concepts of energy and entropy from elementary considerations of the microscopic nature of matter are discussed. The principles are applied in thermodynamic analyses directed towards understanding the performances of engineering systems. Methods and problems cover socially responsible economic generation and utilization of energy in central power generation plants, solar systems, refrigeration devices, and automobile, jet and gas-turbine engines.

**ENGR 31. Chemical Principles with Application to Nanoscale Science and Technology. 4 Units.**

Preparation for engineering disciplines emphasizing modern technological applications of solid state chemistry. Topics include: crystallography; chemical kinetics and equilibria; thermodynamics of phase changes and reaction; quantum mechanics of chemical bonding, molecular orbital theory, and electronic band structure of crystals; and the materials science of basic electronic and photonic devices. Prerequisite: high school or college chemistry background in stoichiometry, periodicity, Lewis and VSEPR structures, dissolution/precipitation and acid/base reactions, gas laws, and phase behavior.

**ENGR 40. Introductory Electronics. 5 Units.**

Overview of electronic circuits and applications. Electrical quantities and their measurement, including operation of the oscilloscope. Basic models of electronic components including resistors, capacitors, inductors, and the operational amplifier. Frequency response of linear circuits, including basic filters, using phasor analysis. Digital logic fundamentals, logic gates, and basic combinatorial logic blocks. Lab assignments. Enrollment limited to 200. Lab. Corequisite: PHYSICS 43.

**ENGR 40N. Engineering Wireless Networks. 5 Units.**

A hands on introduction to the design and implementation of modern wireless networks. Via a quarter long project on programmable radios, students will learn the fundamentals of wireless channels, encoding and decoding information, modeling of errors and error recovery algorithms, and the engineering of packet-switched networks. These concepts will be used to illustrate general themes in EE and CS: the role of abstraction and modularity in engineering design, building reliable systems using imperfect components, understanding the limits imposed by energy and noise, choosing effective representations for information, and engineering tradeoffs in complex systems.



**ENGR 40P. Physics of Electrical Engineering. 5 Units.**

How everything from electrostatics to quantum mechanics is used in common high-technology products. Electrostatics are critical in micro-mechanical systems used in many sensors and displays, and Electromagnetic waves are essential in all high-speed communication systems. How to propagate energy on transmission lines, optical fibers, and in free space. Which aspects of modern physics are needed to generate light for the operation of a DVD player or TV. Introduction to semiconductors, solid-state light bulbs, and laser pointers. Hands-on labs to connect physics to everyday experience. Prerequisites: Physics 43  
Same as: EE 41.

**ENGR 50. Introduction to Materials Science, Nanotechnology Emphasis. 4 Units.**

The structure, bonding, and atomic arrangements in materials leading to their properties and applications. Topics include electronic and mechanical behavior, emphasizing nanotechnology, solid state devices, and advanced structural and composite materials.

**ENGR 50E. Introduction to Materials Science - Energy Emphasis. 4 Units.**

Materials structure, bonding and atomic arrangements leading to their properties and applications. Topics include electronic, thermal and mechanical behavior; emphasizing energy related materials and challenges.

**ENGR 50M. Introduction to Materials Science, Biomaterials Emphasis. 4 Units.**

Topics include: the relationship between atomic structure and macroscopic properties of man-made and natural materials; mechanical and thermodynamic behavior of surgical implants including alloys, ceramics, and polymers; and materials selection for biotechnology applications such as contact lenses, artificial joints, and cardiovascular stents. No prerequisite.

**ENGR 60. Engineering Economy. 3 Units.**

Fundamentals of economic analysis. Interest rates, present value, and internal rate of return. Applications to personal and corporate financial decisions. Mortgage evaluation, insurance decision, hedging/risk reduction, project selection, capital budgeting, and investment valuation. Decisions under uncertainty and utility theory. Prerequisite: MATH 41 or equivalent. Recommended: sophomore or higher class standing; knowledge of elementary probability.

**ENGR 62. Introduction to Optimization. 4 Units.**

Formulation and analysis of linear optimization problems. Solution using Excel solver. Polyhedral geometry and duality theory. Applications to contingent claims analysis, production scheduling, pattern recognition, two-player zero-sum games, and network flows. Prerequisite: MATH 51.  
Same as: MSE 111.

**ENGR 70A. Programming Methodology. 3-5 Units.**

Introduction to the engineering of computer applications emphasizing modern software engineering principles: object-oriented design, decomposition, encapsulation, abstraction, and testing. Uses the Java programming language. Emphasis is on good programming style and the built-in facilities of the Java language. No prior programming experience required.  
Same as: CS 106A.

**ENGR 70B. Programming Abstractions. 3-5 Units.**

Abstraction and its relation to programming. Software engineering principles of data abstraction and modularity. Object-oriented programming, fundamental data structures (such as stacks, queues, sets) and data-directed design. Recursion and recursive data structures (linked lists, trees, graphs). Introduction to time and space complexity analysis. Uses the programming language C++ covering its basic facilities. Prerequisite: 106A or equivalent.  
Same as: CS 106B.

**ENGR 70X. Programming Abstractions (Accelerated). 3-5 Units.**

Intensive version of 106B for students with a strong programming background interested in a rigorous treatment of the topics at an accelerated pace. Additional advanced material and more challenging projects. Prerequisite: excellence in 106A or equivalent, or consent of instructor. Same as: CS 106X.

**ENGR 80. Introduction to Bioengineering. 4 Units.**

Overview of bioengineering focused on engineering analysis and design of biological systems. Topics include chemical properties of biological components, rates and equilibrium properties of biological reactions, cellular structure and communication, genetic programming of biological systems, and engineering balances and systems analysis. Application of these concepts to engineering biological systems for diverse areas, including health and medicine, biomanufacturing, and sustainability, is emphasized. Includes an introduction to MATLAB as a problem-solving tool and a team-based project emphasizing the responsible development of technologies. 4 units, Spr (Barron)  
Same as: BIOE 80.

**ENGR 90. Environmental Science and Technology. 3 Units.**

Introduction to environmental quality and the technical background necessary for understanding environmental issues, controlling environmental degradation, and preserving air and water quality. Material balance concepts for tracking substances in the environmental and engineering systems.  
Same as: CEE 70.

**ENGR 100. Teaching Public Speaking. 3 Units.**

The theory and practice of teaching public speaking and presentation development. Lectures/discussions on developing an instructional plan, using audiovisual equipment for instruction, devising tutoring techniques, and teaching delivery, organization, audience analysis, visual aids, and unique speaking situations. Weekly practice speaking. Students serve as apprentice speech tutors. Those completing course may become paid speech instructors in the Technical Communications Program. Prerequisite: consent of instructor.

**ENGR 102M. Technical/Professional Writing for Mechanical Engineers. 1 Unitss.**

Required of Mechanical Engineering majors. The process of writing technical/professional documents. Lecture, writing assignments, individual conferences. Corequisite for WIM: ME 203.

**ENGR 103. Public Speaking. 3 Units.**

Priority to Engineering students. Introduction to speaking activities, from impromptu talks to carefully rehearsed formal professional presentations. How to organize and write speeches, analyze audiences, create and use visual aids, combat nervousness, and deliver informative and persuasive speeches effectively. Weekly class practice, rehearsals in one-on-one tutorials, videotaped feedback. Limited enrollment.

**ENGR 105. Feedback Control Design. 3 Units.**

Design of linear feedback control systems for command-following error, stability, and dynamic response specifications. Root-locus and frequency response design techniques. Examples from a variety of fields. Some use of computer aided design with MATLAB. Prerequisite: EE 102, ME 161, or equivalent.

**ENGR 110. Perspectives in Assistive Technology. 1-3 Units.**

Seminar and student project course. Medical, social, ethical, and technical challenges surrounding the design, development, and use of assistive technologies that improve the lives of people with disabilities and seniors. Guest lecturers include engineers, clinicians, and individuals with disabilities. Tours of local facilities. 1 unit for seminar attendance only (CR/NC) or individual project (letter grade). 3 units for students who pursue a team-based assistive technology project. Projects can be continued in ME113 or CS194 or as independent study in Spring Quarter. See <http://engr110.stanford.edu/>. Service Learning Course (certified by Haas Center for Public Service). Same as: ENGR 210.

**ENGR 113A. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu). (This class is also being offered as ENGR 213A for grad students) Enrolled students will meet for work sessions Tuesdays & Thursdays 4-6 pm in Y2E2 266.

**ENGR 113B. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu). (This class is also being offered as ENGR 213B for grad students).

**ENGR 113C. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu). (This class is also being offered as ENGR 213C for grad students).

**ENGR 113D. SOLAR DECATHLON. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu). (This class is also being offered as ENGR 213A for grad students).

**ENGR 118. Cross-Cultural Design for Service. 3 Units.**

Students spend the summer in China working collaboratively to use design thinking for a project in the countryside. Students learn and apply the principles of design innovation including user research, ideation, prototyping, storytelling and more in a cross cultural setting to design a product or service that will benefit Chinese villagers. Students should be prepared to work independently in a developing region of China, to deal with persistent ambiguity, and to work with a cross-cultural, diverse team of students on their projects. Applications for Summer 2012 were due in March.

**ENGR 120. Fundamentals of Petroleum Engineering. 3 Units.**

Lectures, problems, field trip. Engineering topics in petroleum recovery; origin, discovery, and development of oil and gas. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations. Gas laws. Single phase and multiphase flow through porous media. Same as: ENERGY 120.

**ENGR 130. Science, Technology, and Contemporary Society. 4-5 Units.**

Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as sociotechnical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. Same as: STS 101, STS 201.

**ENGR 140A. Leadership of Technology Ventures. 3-4 Units.**

First of three-part sequence for students selected to the Mayfield Fellows Program. Management and leadership within high technology startups, focusing on entrepreneurial skills related to product and market strategy, venture financing and cash flow management, team recruiting and organizational development, and the challenges of managing growth and handling adversity in emerging ventures. Other engineering faculty, founders, and venture capitalists participate as appropriate. Recommended: accounting or finance course (MS&E 140, ECON 90, or ENGR 60).

**ENGR 140B. Leadership of Technology Ventures. 1-2 Units.**

Open to Mayfield Fellows only; taken during the summer internship at a technology startup. Students exchange experiences and continue the formal learning process. Activities journal. Credit given following quarter.

**ENGR 140C. Leadership of Technology Ventures. 2-3 Units.**

Open to Mayfield Fellows only. Capstone to the 140 sequence. Students, faculty, employers, and venture capitalists share recent internship experiences and analytical frameworks. Students develop living case studies and integrative project reports.

**ENGR 145. Technology Entrepreneurship. 4 Units.**

How do you create a successful start-up? What is entrepreneurial leadership in a large firm? What are the differences between an idea and true opportunity? How does an entrepreneur form a team and gather the resources necessary to create a great enterprise? This class mixes mentor-guided team projects, in-depth case studies, research on the entrepreneurial process, and the opportunity to network and ask questions of Silicon Valley's top entrepreneurs and venture capitalists. For undergraduates of all majors who seek to understand the formation and growth of high-impact start-ups in areas such as information, green/clean, medical and consumer technologies. No prerequisites. Limited enrollment.

**ENGR 150. Social Innovation and Entrepreneurship. 1-6 Units.**

(Graduate students register for 250.) The art of innovation and entrepreneurship for social benefit. Project team develops, tests, and iteratively improves technology-based social innovation and business plan to deploy it. Feedback and coaching from domain experts, product designers, and successful social entrepreneurs. Limited enrollment; application required. See <http://sie.stanford.edu> for course information. Same as: ENGR 250.

**ENGR 154. Vector Calculus for Engineers. 5 Units.**

Computation and visualization using MATLAB. Differential vector calculus: analytic geometry in space, functions of several variables, partial derivatives, gradient, unconstrained maxima and minima, Lagrange multipliers. Integral vector calculus: multiple integrals in Cartesian, cylindrical, and spherical coordinates, line integrals, scalar potential, surface integrals, Green's, divergence, and Stokes' theorems. Examples and applications drawn from various engineering fields. Prerequisites: MATH 41 and 42, or 10 units AP credit. Same as: CME 100.

**ENGR 155A. Ordinary Differential Equations for Engineers. 5 Units.**

Analytical and numerical methods for solving ordinary differential equations arising in engineering applications: Solution of initial and boundary value problems, series solutions, Laplace transforms, and non-linear equations; numerical methods for solving ordinary differential equations, accuracy of numerical methods, linear stability theory, finite differences. Introduction to MATLAB programming as a basic tool kit for computations. Problems from various engineering fields. Prerequisite: CME 100/ENGR 154 or MATH 51. Same as: CME 102.

**ENGR 155B. Linear Algebra and Partial Differential Equations for Engineers. 5 Units.**

Linear algebra: matrix operations, systems of algebraic equations, Gaussian elimination, undetermined and overdetermined systems, coupled systems of ordinary differential equations, eigensystem analysis, normal modes. Fourier series with applications, partial differential equations arising in science and engineering, analytical solutions of partial differential equations. Numerical methods for solution of partial differential equations: iterative techniques, stability and convergence, time advancement, implicit methods, von Neumann stability analysis. Examples and applications from various engineering fields. Prerequisite: CME 102/ENGR 155A. Same as: CME 104.

**ENGR 155C. Introduction to Probability and Statistics for Engineers. 3-4 Units.**

Probability: random variables, independence, and conditional probability; discrete and continuous distributions, moments, distributions of several random variables. Topics in mathematical statistics: random sampling, point estimation, confidence intervals, hypothesis testing, non-parametric tests, regression and correlation analyses; applications in engineering, industrial manufacturing, medicine, biology, and other fields. Prerequisite: CME 100/ENGR154 or MATH 51. Same as: CME 106.

**ENGR 159Q. Japanese Companies and Japanese Society. 3 Units.**

Preference to sophomores. The structure of a Japanese company from the point of view of Japanese society. Visiting researchers from Japanese companies give presentations on their research enterprise. The Japanese research ethic. The home campus equivalent of a Kyoto SCTI course. Same as: MATSCI 159Q.

**ENGR 192. Engineering Public Service Project. 1-2 Units.**

Volunteer work on a public service project with a technical engineering component. Project requires a faculty sponsor and a community partner such as a nonprofit organization, school, or individual. Required report. See <http://soe.stanford.edu/publicservice>. May be repeated for credit. Prerequisite: consent of instructor.

**ENGR 199. Special Studies in Engineering. 1-15 Units.**

Special studies, lab work, or reading under the direction of a faculty member. Often research experience opportunities exist in ongoing research projects. Students make arrangements with individual faculty and enroll in the section number corresponding to the particular faculty member. May be repeated for credit. Prerequisite: consent of instructor.

**ENGR 199W. Writing of Original Research for Engineers. 1-3 Units.**

Technical writing in science and engineering. Students produce a substantial document describing their research, methods, and results. Prerequisite: completion of freshman writing requirements; prior or concurrent in 2 units of research in the major department; and consent of instructor. WIM for BioMedical Computation.

**ENGR 202S. Writing: Special Projects. 1 Units.**

Writing tutorial for students working on non-course projects such as theses, journal articles, and conference papers. Weekly individual conferences.

**ENGR 202W. Technical Writing. 3 Units.**

How to write clear, concise, and well-ordered technical prose. Principles of editing for structure and style. Applications to a variety of genres in engineering and science.

**ENGR 205. Introduction to Control Design Techniques. 3 Units.**

Review of root-locus and frequency response techniques for control system analysis and synthesis. State-space techniques for modeling, full-state feedback regulator design, pole placement, and observer design. Combined observer and regulator design. Lab experiments on computers connected to mechanical systems. Prerequisites: 105, MATH 103, 113. Recommended: Matlab.

**ENGR 206. Control System Design. 3-4 Units.**

Design and construction of a control system and working plant. Topics include: linearity, actuator saturation, sensor placement, controller and model order; linearization by differential actuation and sensing; analog op-amp circuit implementation. Emphasis is on qualitative aspects of analysis and synthesis, generation of candidate design, and engineering tradeoffs in system selection. Large team-based project. Limited enrollment. Prerequisite: 105.

**ENGR 207A. Linear Control Systems I. 3 Units.**

Introduction to control of discrete-time linear systems. State-space models. Controllability and observability. The linear quadratic regulator. Prerequisite: 105 or 205.

**ENGR 207B. Linear Control Systems II. 3 Units.**

Probabilistic methods for control and estimation. Statistical inference for discrete and continuous random variables. Linear estimation with Gaussian noise. The Kalman filter. Prerequisite: EE 263.

**ENGR 209A. Analysis and Control of Nonlinear Systems. 3 Units.**

Introduction to nonlinear phenomena: multiple equilibria, limit cycles, bifurcations, complex dynamical behavior. Planar dynamical systems, analysis using phase plane techniques. Describing functions. Lyapunov stability theory. SISO feedback linearization, sliding mode control. Design examples. Prerequisite: 205.

**ENGR 210. Perspectives in Assistive Technology. 1-3 Units.**

Seminar and student project course. Medical, social, ethical, and technical challenges surrounding the design, development, and use of assistive technologies that improve the lives of people with disabilities and seniors. Guest lecturers include engineers, clinicians, and individuals with disabilities. Tours of local facilities. 1 unit for seminar attendance only (CR/NC) or individual project (letter grade). 3 units for students who pursue a team-based assistive technology project. Projects can be continued in ME113 or CS194 or as independent study in Spring Quarter. See <http://enr110.stanford.edu/>. Service Learning Course (certified by Haas Center for Public Service). Same as: ENGR 110.

**ENGR 213. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a personal work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu).

**ENGR 213A. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a personal work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu).

**ENGR 213B. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a personal work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu).

**ENGR 213C. Solar Decathlon. 1-4 Units.**

Open to all engineering majors. Project studio for all work related to the Solar Decathlon 2013 competition. Each student will develop a personal work plan for the quarter with his or her advisor and perform multidisciplinary collaboration on designing systems for the home or pre-construction planning. Work may continue through the summer as a paid internship, as well as through the next academic year. For more information about the team and the competition, please visit [solardecathlon.stanford.edu](http://solardecathlon.stanford.edu).

**ENGR 240. Introduction to Micro and Nano Electromechanical Systems. 3 Units.**

Miniaturization technologies now have important roles in materials, mechanical, and biomedical engineering practice, in addition to being the foundation for information technology. This course will target an audience of first-year engineering graduate students and motivated senior-level undergraduates, with the goal of providing an introduction to M/NEMS fabrication techniques, selected device applications, and the design tradeoffs in developing systems. The course has no specific prerequisites, other than graduate or senior standing in engineering; otherwise, students will require permission of the instructors.

**ENGR 245. Technology Entrepreneurship and Lean Startups. 3-4 Units.**

Apply emerging entrepreneurship principles including the popular "lean startups" and "customer development" frameworks to prototype, test, and iterate your product while discovering if you have a profitable business model. Work and study in teams or, in rare cases, alone. Proposal required during first week of the quarter. Proposals can be software, physical good, or service of any kind. Projects are treated as real start-ups, so work will be intense. Prerequisite: interest and passion in exploring whether a technology idea can become a real company.

**ENGR 250. Social Innovation and Entrepreneurship. 1-6 Units.**

(Graduate students register for 250.) The art of innovation and entrepreneurship for social benefit. Project team develops, tests, and iteratively improves technology-based social innovation and business plan to deploy it. Feedback and coaching from domain experts, product designers, and successful social entrepreneurs. Limited enrollment; application required. See <http://sie.stanford.edu> for course information. Same as: ENGR 150.

**ENGR 280. From Play to Innovation. 2-4 Units.**

Project-based and team-centered. Enhancing the innovation process with playfulness. The human state of play and its principal attributes and importance to creative thinking. Play behavior, and its development and biological basis. Students apply those principles through design thinking to promote innovation in the corporate world with real-world partners on design projects with widespread application.

**ENGR 281. d.media 4.0 - Designing Media that Matters. 2 Units.**

Design practicum; project-based. Explore the why & how of designing media. What motivates our consumption of media, what real needs linger beneath the surface? How do you design a new media experience? Join us and find out. The world is Changing, What Are You Going to Do About It? In the shift from a consumer culture to a creative society has old media institutions collapsing while participatory media frameworks are emerging. Media designers of all types have an opportunity and responsibility to make this change positive. 3 Projects explore: Communication Design, Digital Interaction, User Motivations. Admission by application. Design Institute class; see <http://dschool.stanford.edu>.

**ENGR 290. Graduate Environment of Support. 1 Unitss.**

For course assistants (CAs) and tutors in the School of Engineering tutorial and learning program. Interactive training for effective academic assistance. Pedagogy, developing course material, tutoring, and advising. Sources include video, readings, projects, and role playing.

**ENGR 298. Seminar in Fluid Mechanics. 1 Unitss.**

Interdepartmental. Problems in all branches of fluid mechanics, with talks by visitors, faculty, and students. Graduate students may register for 1 unit, without letter grade; a letter grade is given for talks. May be repeated for credit.

**ENGR 299. Special Studies in Engineering. 1-15 Units.**

Special studies, lab work, or reading under the direction of a faculty member. Often research experience opportunities exist in ongoing research projects. Students make arrangements with individual faculty and enroll in the corresponding section. Prerequisite: consent of instructor.

**ENGR 311A. Women's Perspectives. 1 Unitss.**

Master's and Ph.D. seminar series driven by student interests. Possible topics: time management, career choices, health and family, diversity, professional development, and personal values. Guest speakers from academia and industry, student presentations with an emphasis on group discussion. Graduate students share experiences and examine scientific research in these areas. May be repeated for credit.

**ENGR 311B. Designing the Professional. 1 Unitss.**

Seminar for doctoral students in science and engineering. Limited enrollment. Apply principles of design thinking to the designing your professional life following Stanford. Topics include: The principles and tools of design thinking, a framework for orienting your plans and philosophy regarding career and professional life, and for locating career within life overall; exercises for investigating alternatives and career "prototypes;" and a drafting a plan.

**ENGR 312. Science and Engineering Course Design. 2-3 Units.**

For students interested in an academic career and who anticipate designing science courses at the undergraduate or graduate level. Goal is to apply research on science learning to the design of effective course materials. Topics include syllabus design, course content and format decisions, assessment planning and grading, and strategies for teaching improvement. Same as: CTL 312.

**ENGR 313. Topics in Engineering Education. 1 Units.**

Master's and Ph.D. seminar series focused on teaching engineering courses based on research. Weekly, student-led group discussions follow engineering education and education literature. Topics include: best practices in teaching, theories on how people learn, education research methods, assessing learning, and evaluating teaching, all in an engineering context. May be repeated for credit.

**ENGR 341. Micro/Nano Systems Design and Fabrication. 3-5 Units.**

Laboratory course in micro and nano fabrication technology that combines lectures on theory and fundamentals with hands-on training in the Stanford Nanofabrication Facility. Prerequisite: ENGR 240 or equivalent.

## English Courses

**ENGLISH 1. History and Theory of Novel Group. 1 Units.**

For undergraduates in English, the DLCL, and East Asian literatures interested in the novel and the events sponsored by the Center for the Study of the Novel (CSN) and to prepare them to attend CSN events with some understanding of the material presented. Each CSN event, the New Book Events, the Ian Watt Lecture on the History and/or Theory of the Novel, and the Center's annual conference, will either be preceded or followed by a colloquium, led by a member of the graduate student staff. In these colloquia, students will engage with the material under discussion, usually written by the speaker(s) on whose work the events are based. Participation at 75% of events and colloquia is mandatory for course credit. Precirculated readings will be made available for all colloquia preceding an event, and often for those held after the event, to enable students to develop a familiarity with issues pertaining to the theoretical and historical study of the novel.

Same as: DLCL 1.

**ENGLISH 10AX. Fiction Writing. 2 Units.**

"Of the many definitions of a story, the simplest may be this: it is a piece of writing that makes the reader want to find out what happens next. Good writers, it is often said, have the ability to make you keep on reading them whether you want to or not—the milk boils over, the subway stop is missed." —Bill Buford, former fiction editor of *The New Yorker* This course will introduce students to an assortment of short stories by past and contemporary masters, from Ernest Hemingway to ZZ Packer. We will explore the basic elements of fiction writing, including story structure, point of view, dialogue, and exposition, always keeping in mind the overarching goal of trying to get the reader to turn the page in anticipation. Some summer reading and participation in an online blog will prepare us for discussions we'll have together when the class begins. The course will indeed be "intensive," as we will write a complete draft of a short story in the first week and then distribute these stories for feedback sessions in the second week. Along the way, we'll write additional short exercises to stimulate our imaginations and to practice elements of craft. Field trips will include visits to some of the vibrant literary hotspots in San Francisco as well as a conversation with Stephen Elliott, editor of *The Rumpus* and a writer and member of the *Writer's Grotto* collective.

**ENGLISH 14Q. "Tis All In Pieces, All Coherence Gone": John Donne, the Neurosciences, and the Early Modern World. 4 Units.**

John Donne, poet and dean of St. Paul's Cathedral, London, is one of the most innovative and dramatic poets in literary history. His writing bears the marks of the profound changes that were occurring on the threshold of the modern world, in such areas as anatomy, astronomy, mathematical perspective, religion, exploration, theatre, art, and concepts of the self. The dramatic realism of his poetry exerted a shaping influence on such modern poets as Browning, Eliot, and Rich; on contemporary composers such as Bob Dylan, Van Morrison, and Benjamin Britten; and on the plays of Samuel Beckett and Pulitzer Prizewinning playwright, Margaret Edson. The seminar will situate Donne's work within the vibrant historical and cultural milieu of the early modern world in conjunction with recent "and highly thought-provoking" developments in the neurosciences and the cognitive features of early modern literature, including Shakespeare and Marlowe, and the modern plays of Samuel Beckett.

**ENGLISH 15SC. Mixed Race in the New Millennium: Crossings of Kin, Culture, & Faith in the 21st Century. 2 Units.**

Recently, a *New York Times* article identified the vanguard of the future as young, global, and hybrid. The article gave this demographic a name: Generation E.A. (Ethnically Ambiguous). Our course examines the political and aesthetic implications of Generation E.A. We will look at the hot new vogue for "mixed race," examining contemporary images of mixed race as represented in literature, art, performance, film, Internet, and popular culture. Galvanized by the 2000 census with its offer of a "mark one or more" (MOOM) racial option to check, mixed race advocates have acquired legal leverage and national recognition in the last decade. Dozens of organizations, websites, affinity and advocacy groups, modeling and casting agencies, television pilots, magazines, and journals—all focused on the mixed race and cross-cultural experience—have emerged in the last few years. Clearly all these cultural and legal events are changing the way we talk and think not only about race but also crossings and mixings across gender, nation, religion, and socioeconomic experience. Assignments explore the current controversies over mixed race identification and also the expressive and political possibilities for representing complex identities: requirements include three two to three-page analytical writing assignments and an individualized project. (Students can choose two options for this project: artistic project or written narrative.)

**ENGLISH 43. Introduction to African American Literature. 3-5 Units.**

(English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. We will engage some of the defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attuned to the invariably hybrid nature of this tradition, we will also devote attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history.

Same as: AFRICAAM 43, AMSTUD 143, ENGLISH 143.

**ENGLISH 43A. American Indian Mythology, Legend, and Lore. 3-5 Units.**

(English majors and others taking 5 units, register for 143A.) Readings from American Indian literatures, old and new. Stories, songs, and rituals from the 19th century, including the Navajo Night Chant. Tricksters and trickster stories; war, healing, and hunting songs; Aztec songs from the 16th century. Readings from modern poets and novelists including N. Scott Momaday, Louise Erdrich, and Leslie Marmon Silko, and the classic autobiography, *Black Elk Speaks*.

Same as: ENGLISH 143A, NATIVEAM 143A.

**ENGLISH 46N. The Hemingway Era. 3 Units.**

While Hemingway and Fitzgerald were flirting with the expatriate avant-garde in Europe, Hurston and Faulkner were performing anthropological field-work in the local cultures of the American South. This course will address the tremendous diversity of concerns and styles of four writers who marked America's coming-of-age as a literary nation with their multifarious experiments in representing the regional and the global, the racial and the cosmopolitan, the macho and the feminist, the decadent and the impoverished.

**ENGLISH 47N. Sports and Culture. 3 Units.**

Stanford has the most successful student-athlete program in the country (maybe ever) and athletics are an enormously important aspect of Stanford's student culture. This course looks in depth at sports in American culture. Through film, essays, fiction, poetry and other media, we will explore an array of topics including representations of the athlete, violence, beauty, the mass media, ethics, college sports, race and gender.

**ENGLISH 50N. The Literature of Inequality: Have and Have-Nots from the Gilded Age to the Occupy Era. 3 Units.**

Not since the turn of the last century have Americans experienced such a profound gap between those who have and those who do not, between wealthy and working poor, between defacto upper and lower classes, between those of the status quo and those who slip to the social periphery. We will be examining literary and artistic explorations of social and economic inequity, fiction and art that looks at reversals of fortune as well as the possibilities for social change. Readings include Jacob Riis's *How the Other Half Lives*, W.E.B. Du Bois's *The Souls of Black Folk*, Edith Wharton's *House of Mirth*, James Agee & Walker Evans's *Let Us Not Forget Famous Men*, T.C. Boyle's *The Tortilla Curtain*, Julie Otsuka's *When the Emperor Was Divine* and Occupy Movement art. Same as: AMSTUD 50N.

**ENGLISH 68N. Mark Twain and American Culture. 4 Units.**

Preference to freshmen. Mark Twain has been called our Rabelais, our Cervantes, our Homer, our Tolstoy, our Shakespeare. Ernest Hemingway maintained that all modern American literature comes from one book by Mark Twain called *The Adventures of Huckleberry Finn*. President Franklin D. Roosevelt got the phrase New Deal from *A Connecticut Yankee in King Arthur's Court*. Class discussions will focus on how Twain's work illuminates and complicates his society's responses to such issues as race, technology, heredity versus environment, religion, education, and what it means to be American. Same as: AMSTUD 68N.

**ENGLISH 71N. American Daughters: Hawthorne to Robinson. 3 Units.**

The American novel is often characterized as a tradition focused on the relationships of men to other men. This is partly because American novels have supplied some of the greatest examples of adventure or road novels in which female characters played minor roles, if any, in the novels' plots. We will examine novels in which daughters figure significantly in order to examine how the representation of daughters has motivated experiments with form and character in the American novel.

**ENGLISH 81. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track; majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English. Same as: CLASSGEN 81, COMPLIT 181, FRENCH 181, GERMAN 181, ITALIAN 181, PHIL 81, SLAVIC 181.

**ENGLISH 88N. Graphic Novels Asian American Style. 3 Units.**

Though genre fiction has occasionally been castigated as a lowbrow form only pandering to the uneducated masses, this course reveals how Asian American writers transform the genre to speak to issues of racial difference and social inequality. Same as: ASNAMST 88N.

**ENGLISH 90. Fiction Writing. 5 Units.**

The elements of fiction writing: narration, description, and dialogue. Students write complete stories and participate in story workshops. May be repeated for credit. Prerequisite: PWR 1 (waived in summer quarter).

**ENGLISH 91. Creative Nonfiction. 5 Units.**

(Formerly 94A.) Historical and contemporary as a broad genre including travel and nature writing, memoir, biography, journalism, and the personal essay. Students use creative means to express factual content.

**ENGLISH 92. Reading and Writing Poetry. 5 Units.**

Prerequisite: PWR 1. Issues of poetic craft. How elements of form, music, structure, and content work together to create meaning and experience in a poem. May be repeated for credit.

**ENGLISH 94. Writing Across Genres. 5 Units.**

For minors in creative writing. The forms and conventions of the contemporary short story and poem. How form, technique, and content combine to make stories and poems organic. Prerequisite: 90, 91, or 92.

**ENGLISH 100A. Literary History I. 5 Units.**

First in a three quarter sequence. Team-taught, and ranging in subject matter across almost a millennium from the age of parchment to the age of Facebook, this required sequence of classes is the department's account of the major historical arc traced so far by literature in English. It maps changes and innovations as well as continuities, ideas, and aesthetic forms, providing a grid of knowledge and contexts for other, more specialized classes.

**ENGLISH 100B. Literary History II. 5 Units.**

Second in a three quarter sequence. Team-taught, and ranging in subject matter across almost a millennium from the age of parchment to the age of Facebook, this required sequence of classes is the department's account of the major historical arc traced so far by literature in English. It maps changes and innovations as well as continuities, ideas as well as aesthetic forms, providing a grid of knowledge and contexts for other, more specialized classes.

**ENGLISH 100C. Literary History III. 5 Units.**

Third in a three quarter sequence. Team-taught, and ranging in subject matter across almost a millennium from the age of parchment to the age of Facebook, this required sequence of classes is the department's account of the major historical arc traced so far by literature in English. It maps changes and innovations as well as continuities, ideas as well as aesthetic forms, providing a grid of knowledge and contexts for other, more specialized classes.

**ENGLISH 105. The Renaissance: Art, Science, Magic and Love. 5 Units.**

A survey of English Renaissance literature from Sidney and Spenser to Milton and Marvell, and including Marlowe's *Doctor Faustus* and Shakespeare's *The Tempest*. The course gives training in the reading of early modern poetry and prose, and considers what kind of cultural, social and political institution literature was in Renaissance England: who wrote it and why and for whom, what the pressures were on it, what expectations it fulfilled (or on occasion defeated), whose interests it served.

**ENGLISH 115. The Literature of Crisis: From Chaucer to Graham Greene. 5 Units.**

An historical analysis of the various ways in which authors ranging from Chaucer and Boccaccio to Sinclair Lewis and T.S.Eliot have portrayed the human response to different forms of crisis - social, personal, cultural, marital, economic, and moral - in such works as *Troilus and Criseyde*, *Hamlet*, *Lycidas*, *Candide*, *The Mayor of Casterbridge*, and *Dodsworth*.

**ENGLISH 115A. Shakespeare and Modern Critical Developments. 5 Units.**

Approaches include gender studies and feminism, race studies, Shakespeare's geographies in relation to the field of cultural geography, and the importance of religion in the period.

**ENGLISH 116A. The Poetry of John Milton. 5 Units.**

A study of Milton's poetry from "On the Death of a Fair Infant" and "The Nativity Ode" to "Paradise Lost" and "Samson Agonistes". Recommended: ENGLISH 160. Poetry and Poetics.

**ENGLISH 117A. Irony: From Socrates to David Foster Wallace. 5 Units.**

Studies the varieties of literary irony from Plato's dialogues to contemporary fiction. Focus is on questions about what irony is and why writers use it. How does irony go astray? What kinds of topics seem to require irony? How does irony work? Writers include Plato, Chaucer, Swift, Thomas Mann, David Foster Wallace. Class also makes widespread use of contemporary comedy. Requirements will be one short paper, one long paper and an in-class presentation. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature.

**ENGLISH 118. Literature and the Brain. 5 Units.**

Recent developments in and neuroscience and experimental psychology have transformed the way we think about the operations of the brain. What can we learn from this about the nature and function of literary texts? Can innovative ways of speaking affect ways of thinking? Do creative metaphors draw on embodied cognition? Can fictions strengthen our "theory of mind" capabilities? What role does mental imagery play in the appreciation of descriptions? Does (weak) modularity help explain the mechanism and purpose of self-reflexivity? Can the distinctions among types of memory shed light on what narrative works have to offer? Same as: ENGLISH 218, FRENCH 118, FRENCH 318, PSYCH 118F.

**ENGLISH 119F. British Women Novelists from Aphra Behn to Charlotte Bronte. 5 Units.**

A chronological reading of works by various pioneering women novelists of the late seventeenth, eighteenth, and early nineteenth century. Theoretical and historical questions to be addressed: why were British women writers particularly drawn to the novel genre? What kinds of historical changes and thematic preoccupations do their works reveal?. How sensible--or not--is it to speak of a 'female tradition' in the development of the English Novel?.

**ENGLISH 121A. Tattoos, Scars, Marks and American Cultures of Inscription. 5 Units.**

From Anne Hutchinson to Nathaniel Hawthorne, American writers were drawn to marked, tattooed, and scarred bodies. This course examines how various corporeal inscriptions, real or imagined, have become vehicles of reward and punishment, objects of science, sites of race and gender identities, and vessels of the divine and the unsayable. Considering a wide range of texts, images and movies, we will trace how marks on the very surface of the subject have been read and made meaningful. What is the relationship between body and text? What are the confines of surface and self? How does the body participate in constructions of race, class, and gender?.

**ENGLISH 122A. Austen and Woolf. 5 Units.**

Reading of three novels by Jane Austen; arguably the most influential and gifted of British female novelists; and three novels by Virginia Woolf, whose debt to Austen was immense. Topics include the relationship between women writers and the evolution of the English novel; the extraordinary predominance of the marriage plot in Austen's fiction (and the various transformations Woolf works on it); each novelist's relationship to the cultural and social milieu in which she wrote.

**ENGLISH 123. American Literature and Culture to 1855. 5 Units.**

A survey of early American writings, including sermons, poetry, captivity and slave narratives, essays, autobiography, and fiction, from the colonial era to the eve of the Civil War.

Same as: AMSTUD 150.

**ENGLISH 132. Literary Media: From Frankenstein to Facebook. 5 Units.**

The nineteenth century was a critical period for technological development. Literature changed dramatically as the telegraph replaced the letter and photographs replaced painted illustrations. Through texts such as Keats's Letters, Shelley's Frankenstein, Carroll's Alice in Wonderland, and Stoker's Dracula, we will explore the effects of media on the creation, dissemination and reception of literature. This course will also facilitate comparative work by juxtaposing nineteenth-century technologies with our own contemporary literary media such as twitter, tumblr, youtube, and facebook.

**ENGLISH 132D. Suspense and Fear in Literature: Digitally Decoding a Literary Effect. 5 Units.**

Use of new digital methodologies to explore why certain texts create the feeling of suspense. Does the effect of tension or fear result from just subject matter, or is there a deeper linguistic pattern that creates this experience for readers? Reading includes some of the key works of suspense from the last three centuries: books by Walpole, Poe, Doyle, Collins and Christie along with critical essays that explore their effect on readers. We will also work together to create a new digital model of the lexical and syntactic features of these works to uncover the reoccurring hidden patterns of language that help explain why we are affected by literary suspense. No previous technical experience is necessary.

**ENGLISH 134. The Marriage Plot. 5 Units.**

The marriage plot in British fiction. Novels include *Pamela*, *Pride and Prejudice*, *Middlemarch*, *Jude the Obscure* and *Mrs. Dalloway*.

**ENGLISH 140H. The Idea of the Theater. 5 Units.**

Examines the idea of a theater from the religious street theater of Medieval York, though Shakespeare's Globe, and onto the mental theater of the Romantic reader and the alienation effects of Brecht's radical playhouse in the 20th cent.

**ENGLISH 142D. Talking Back: Intertextuality in Contemporary Fiction. 5 Units.**

Why do so many contemporary writers create fictions that contend with the past by rewriting, revising, or otherwise 'talking back' to their literary forebears? Is everything intertextual or are post-WW II experiments in intertextuality characteristic of historical, cultural, and geopolitical changes particular to the twentieth century? How does intertextuality inform narrative voice, constructions of authorship, character portrayal, political and aesthetic interpretation, and contemporary claims to; or critiques of; fame and canonization? Students will be encouraged to make comparative connections with the contemporary media scene, while comparing EM Forster and Zadie Smith; Virginia Woolf and Michael Cunningham; George Orwell and Margaret Atwood; Charlotte Bronte and Jean Rhys; Oscar Wilde and Tom Stoppard.

**ENGLISH 143. Introduction to African American Literature. 3-5 Units.**

(English majors and others taking 5 units, register for 143.) African American literature from its earliest manifestations in the spirituals, trickster tales, and slave narratives to recent developments such as black feminist theory, postmodern fiction, and hip hop lyricism. We will engage some of the defining debates and phenomena within African American cultural history, including the status of realist aesthetics in black writing; the contested role of literature in black political struggle; the question of diaspora; the problem of intra-racial racism; and the emergence of black internationalism. Attuned to the invariably hybrid nature of this tradition, we will also devote attention to the discourse of the Enlightenment, modernist aesthetics, and the role of Marxism in black political and literary history.

Same as: AFRICAAM 43, AMSTUD 143, ENGLISH 43.

**ENGLISH 143A. American Indian Mythology, Legend, and Lore. 3-5 Units.**

(English majors and others taking 5 units, register for 143A.) Readings from American Indian literatures, old and new. Stories, songs, and rituals from the 19th century, including the Navajo Night Chant. Tricksters and trickster stories; war, healing, and hunting songs; Aztec songs from the 16th century. Readings from modern poets and novelists including N. Scott Momaday, Louise Erdrich, and Leslie Marmon Silko, and the classic autobiography, *Black Elk Speaks*.

Same as: ENGLISH 43A, NATIVEAM 143A.

**ENGLISH 144B. Contemporary British Fiction. 5 Units.**

How do contemporary British novelists represent the dramatic changes in culture, class, landscape, economy, gender, race, and national identity that followed the allied victory in the Second World War (1939-1945)? Focusing on writers born in the aftermath of the war, and the successive generation, this course asks what political, cultural, and literary concerns shape historical consciousness in novels by Zadie Smith, Ian McEwan, Kazuo Ishiguro, Jeanette Winterson, Hanif Kureishi, Julian Barnes, and Ali Smith.

**ENGLISH 145G. American Fiction since 1945. 5 Units.**

A survey of the American novel and short story since WWII focusing on themes of mass media and mass marketing, technology and information, poverty and prosperity, race and ethnicity. Included are works by Flannery O'Connor, Thomas Pynchon, Philip Roth, Raymond Carver, Maxine Hong Kingston, Sandra Cisneros and others.

**ENGLISH 146. Development of the Short Story: Continuity and Innovation. 5 Units.**

Exploration of the short story form's ongoing evolution as diverse writers address love, death, desire. Maupassant, D.H. Lawrence, Woolf, Flannery O'Connor, Hurston, and others. Required for Creative Writing emphasis. All majors welcome.

**ENGLISH 148. Family Drama: American Plays about Families. 5 Units.**

Plays written by 20th century writers that concentrate on the family as the primary source of dramatic conflict and comedy. Writers include Williams, O'Neill, Wilder, Albee, Vogel, Parks, Lindsay-Abaire, and Hwang. Same as: TAPS 248.

**ENGLISH 151C. Wastelands. 5 Units.**

Beginning with a sustained examination of T.S. Eliot's "The Waste Land," this class will explore the trope of ecological and/or spiritual devastation as it enters into other modernist (Hemingway, Cather, Faulkner, O'Neill) and postmodernist (Ballard, Atwood, McCarthy) projects, tracing this theme to its culmination in the contemporary zombie apocalypse.

**ENGLISH 151F. Angelheaded Hipsters: Beat Writers of San Francisco and New York. 5 Units.**

Reading of central writers of the Beat movement (Ginsberg, Kerouac, di Prima, Snyder, Whalen) as well as some related writers (Creeley, Gunn, Levertov). Issues explored include NY and SF, Buddhism and leftist politics, poetry and jazz. Some exposure to reading poems to jazz accompaniment. Examination of some of the writers and performers growing out of the Beats: Bob Dylan, rock music, especially from San Francisco, and jazz.

**ENGLISH 152A. "Mutually Assured Destruction": American Culture and the Cold War. 5 Units.**

The temperature of the early Cold War years via readings of Soviet and U.S. propaganda; documentary film and film noir; fiction by Bellow, Ellison, O'Connor, and Mailer; social theory by Arendt, the New York Intellectuals, and the Frankfurt School; and political texts such as Kennan's *Sources of Soviet Conduct*, the Truman Doctrine speech, and the National Security Council Report 68. Major themes include the discourse of totalitarianism, McCarthyism, strategies of containment, the nuclear threat, the figure of the outsider, and the counterculture, and the cultural shift from sociological to psychological idioms.

Same as: AMSTUD 152A.

**ENGLISH 153A. James Joyce. 5 Units.**

A close reading of Joyce's works, including *Dubliners*, *A Portrait of the Artist as a Young Man*, *Ulysses*, and *Finnegans Wake*. We will also read *Stephen Hero*, the abandoned draft of *A Portrait*, *Giacomo Joyce*, several of Joyce's speeches, letters and poems, and the play *Exiles*. We'll devote some attention to his biographies, and also watch clippings from the two film versions of *Ulysses*: Joseph Strick's *Ulysses* (1967) and Sean Walsh's *Bloom* (2004). We will read some of the classics of Joyce criticism (Wilson, Levin, Lukacs), as well as later, more contemporary approaches (Jameson, Moretti, Duffy, Gibson, Wicke, Latham, Rubenstein, Walkowitz).

**ENGLISH 153J. Virginia Woolf: Form, Function, Feminism. 5 Units.**

Who's afraid of Virginia Woolf? Once upon a time, it was Woolf's feminism that made her a scary cultural commodity. Now, she is the respected grande dame of twentieth-century feminism, author of *A Room of One's Own* (1929), a founding feminist treatise of the last century. But what connects Woolf's role as novelist with that of polemicist? Against what cultural canvas was she working? This course will put Woolf's feminism in historical context, drawing on a range of writers and rhetorical modes to supplement our study of her novels and essays, and will chart the evolution of her fictional experiments for what they tell us about the intersection of politics and aesthetics in the modernist period.

**ENGLISH 154. Mapping the Romantic Imagination. 5 Units.**

Building a Romantic xenograph: an interactive digital map of the places and geographic spaces that informed the writing of British Romantic poets, essayists, and novelists between 1780 and 1830. Explore the meaning of foreignness in the Romantic period. Why was geographic imagination so resonant for the Romantics? What did they gain through poetic descriptions of foreign people and places? Are there particular subjects or ways of writing that happen in or about particular kinds of places? Answer these questions by supplementing readings and discussions of Romantic literature with digital analyses while creating a new map of the physical and imaginative geographic interests of the Romantic period. Authors include Mary Wollstonecraft, Thomas De Quincey, Lord Byron, Anna Barbauld, Ann Radcliff, and William Beckford. No prior technical experience required.#.



**ENGLISH 156. Whitman and Dickinson. 5 Units.**

Why are Emily Dickinson (1830-1886) and Walt Whitman (1819-1892) regarded as the two most important figures among all of America's early poets? (The fact that they are would have astonished them both.) This course introduces students to the core themes and key work of these two conspicuously different artists; artists whose ambitions and achievements went widely unrecognized in their own day, who never read each other's work, and yet whose divergent, doubled influence on post-1900 American poetry is impossible to underestimate.

**ENGLISH 158A. Literary Celebrity: Douglass, Hemingway, Plath. 5 Units.**

This course considers the phenomenon of literary celebrity by examining three American authors whose lives and public images transcended their work: Frederick Douglass, the orator and three-time autobiographer whose image was placed on the wall of many nineteenth-century African-American homes; Ernest Hemingway, the Modernist writer whose hyper-masculine reputation has remained powerful in American culture even as his literary star has declined; and Sylvia Plath, the confessional poet and novelist who, with her controversial suicide at age 30, became a figurehead in the emerging women's movement. By reading texts from each author, newspaper and magazine coverage, and critical assessments, we will explore how authors' texts help create their legends, and how their reputations influence the way we read their work.

**ENGLISH 160. Poetry and Poetics. 5 Units.**

Introduction to the reading of poetry, with emphasis on how the sense of poems is shaped through diction, imagery, and technical elements of verse.

**ENGLISH 161. Narrative and Narrative Theory. 5 Units.**

An introduction to stories and storytelling--that is, to narrative. What is narrative? When is narrative fictional and when non-fictional? How is it done, word by word, sentence by sentence? Must it be in prose? Can it be in pictures? How has storytelling changed over time? Focus on various forms, genres, structures, and characteristics of narrative.

**ENGLISH 162. Critical Methods. 5 Units.**

Introduction to the different intellectual models which help us explain and interpret literary texts, genres, and movements.

**ENGLISH 163B. The Other Shakespeare. 5 Units.**

Reading and discussion of six less familiar Shakespeare plays: *Henry IV Part 1*, *Measure for Measure*, *King Lear*, *Antony and Cleopatra*, *The Winter's Tale*, and *The Tempest*. Material covered will include dramatic and poetic analysis, cultural and social history, stage history, and performance.

**ENGLISH 164. Senior Seminar. 5 Units.**

Small-class format focused on the close reading of literary texts and analysis of literary criticism. This class answers the questions: How do literary critics do what they do? What styles and gambits make criticism vibrant and powerful? Goal is to examine how one goes about writing a lucid, intelligent, and convincing piece of literary criticism based on original research.

**ENGLISH 172. Modern Indian Literature. 5 Units.**

Engagement with the various vernacular and Anglophone literary traditions of modern India. What is gained, and what is lost for the large and complex phenomenon of modern Indian literature, when its most visible representative, Anglophone fiction, threatens to overshadow the rest and sits easy with the new image of rise and growth that engulfs the nation and its diaspora today? Texts by Dutt, Chatterjee, Tagore, Devi, Premchand, Verma, Sobti, Manto, Murthy, Ambai, Narayan, Rao, Ezekiel, Lal, Ghosh, Rushdie, and others.

**ENGLISH 172D. Introduction to Comparative Studies in Race and Ethnicity. 5 Units.**

How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. Same as: ANTHRO 33, CSRE 196C, PSYCH 155, SOC 146.

**ENGLISH 172E. The Literature of the Americas. 5 Units.**

A wide-ranging overview of the literatures of the Americas in comparative perspective, emphasizing continuities and crises that are common to North American, Central American, and South American literatures as well as the distinctive national and cultural elements of a diverse array of primary works. Topics include the definitions of such concepts as empire and colonialism, the encounters between worldviews of European and indigenous peoples, the emergence of creole and racially mixed populations, slavery, the New World voice, myths of America as paradise or utopia, the coming of modernism, twentieth-century avant-gardes, and distinctive modern episodes--the Harlem Renaissance, the Beats, magic realism, Noigandres--in unaccustomed conversation with each other. Same as: AMSTUD 142, COMPLIT 142, CSRE 142.

**ENGLISH 173H. Passions, Emotions, Moods. 5 Units.**

From Descartes on the passions to Heidegger on moods, from rage and grief in *King Lear* to love and anxiety in the Hollywood woman's film of the 1940s, this course will examine modern theories and enactments of feeling in literature (and film). This will mean reading broadly across the centuries and also across literary forms and genres organized around specific kinds of feeling: tragedy, melodrama, noir, lyric poetry, science fiction, popular feminist fiction, psychoanalysis. Authors may include: Shakespeare, Donne, Melville, James, Ellison, Plath, Beckett, Stein, Spahr.

**ENGLISH 175C. American Nature. 5 Units.**

This course will examine a broad range of American engagements with nature: as a determinant of national character and destiny, as a source of spiritual and moral revitalization, as a molding mechanism of citizenship, as the basis of a national art and culture, as a resource for exploitation or preservation, and as a maker and breaker of dreams. Course readings will include explicitly environmentalist literature as well as works that imagine the American landscape as a site of cultural and political formations.

**ENGLISH 181. Development of Literary Essay. 5 Units.**

Reading and discussion of masters of the essay who have dealt with literature and some of the other arts such as film, music, painting, with attention to varieties of style and approach. Readings will include writers like Montaigne, Addison, Dr. Johnson, Eliot, Blackmur, Winters, Hardwick, Guerard, Watt, Rich, Davenport, Gass, Sobin, Barthes, and Cameron. Emphasis will be on how to read varieties of essays (often on works you have not yet read), and how to write them.

**ENGLISH 182S. Looking North: Canadian Literature. 5 Units.**

A survey of major contemporary novelists north of the forty-ninth parallel and the literary, historical, linguistic, and political traditions that inform their narrative visions. What makes Canadian literature distinctive? What makes it transnational? Writers include Alice Munro, Margaret Atwood, Michael Ondaatje, Jane Urquhart, Michel Tremblay, Joy Kagawa, Carol Shields, and Yann Martel. Topics include postcolonialism, postmodernism, federalism, bilingualism, regionalism, Canadian/American relations, transatlantic relations, gender, race, class, and the North as geo-cultural signifier.

**ENGLISH 184H. Text Technologies: A History. 5 Units.**

What technologies have historically been used to record and transmit human experience and cultural memory across time and space? Topics include the study of writing, image, sound, and byte, examining all forms of text employed to communicate and represent thought and ideas. Writers including Eric Gill, Walter Benjamin, Walter Ong and Alberto Manguel will cast light on our work on cave painting, inscription, graffiti, tattoo, and manuscript, print, photographic and digital technologies.

**ENGLISH 190. Intermediate Fiction Writing. 5 Units.**

May be taken twice for credit. Lottery. Priority to last quarter/year in school, majors in English with Creative Writing emphasis, and Creative Writing minors. Prerequisite: 90 or 91.

**ENGLISH 190F. Fiction into Film. 5 Units.**

Workshop. For screenwriting students. Story craft, structure, and dialogue. Assignments include short scene creation, character development, and a long story. How fictional works are adapted to screenplays, and how each form uses elements of conflict, time, summary, and scene. Priority to seniors and Film Studies majors. Prerequisite: 90.

**ENGLISH 190T. Special Topics in Intermediate Fiction Writing. 5 Units.**

Focus on a particular topic or process. Work includes aspects of reading short stories and novels, writing at least 30-50 pages of fiction, and responding to peers' work in workshop. May be repeated for credit. Prerequisite: 91 or 90.

**ENGLISH 190V. Reading for Writers. 5 Units.**

Taught by the Stein Visiting Fiction Writer. Prerequisite: 90.

**ENGLISH 191. Intermediate Creative Nonfiction. 5 Units.**

Continuation of 91. Workshop. The application of advanced storytelling techniques to fact-based personal narratives, emphasizing organic writing, discovering audience, and publication. Guest lecturers, collaborative writing, and publication of the final project in print, audio, or web formats. Prerequisite: 91 or 90.

**ENGLISH 191T. Special Topics in Intermediate Creative Nonfiction. 5 Units.**

Workshop. Continuation of 91. Focus is on forms of the essay. Works from across time and nationality for their craft and technique; experimentation with writing exercises. Students read and respond to each other's longer nonfiction projects. May be repeated for credit. Prerequisite: 91 or 90.

**ENGLISH 192. Intermediate Poetry Writing. 5 Units.**

May be taken twice. Lottery. Priority to last quarter/year in school, majors in English with Creative Writing emphasis, and Creative Writing minors. Prerequisite: 92.

**ENGLISH 192T. Topics in Intermediate Poetry Writing. 5 Units.**

Generation and discussion of student poems. How to recognize a poem's internal structure; how to seek models for work. Students submit portfolio for group critique. May be repeated for credit. Prerequisite: ENGLISH 92.

**ENGLISH 192V. The Occasions of Poetry. 5 Units.**

Taught by the Mohr Visiting Poet. Prerequisite: 92.

**ENGLISH 194. Individual Research. 5 Units.**

See section above on Undergraduate Programs, Opportunities for Advanced Work, Individual Research.

**ENGLISH 195D. Writing 2.0: The Art of the Digital Essay. 5 Units.**

Contemporary changes in the technologies of writing now allow writers to compose using color, images, sound, video, hyperlinks, and other forms of multimedia. Students in this course will explore examples of a number of what we might call "animated" essays (by composers like Diana Slattry and Shelley Jackson) and then work to create a major digital essay of their own. No special expertise needed: just curiosity and a willingness to experiment.

**ENGLISH 195W. Writing Center Peer Tutor Seminar. 3 Units.**

For students selected to serve as peer writing tutors in the Stanford Writing Center and/or at other campus sites. Readings on and reflection about writing processes, the dynamics of writing and tutoring situations, tutoring techniques, learning styles, diversity, and ethics. Observation of tutoring sessions, written responses to readings, and other written work. Same as: PWR 195.

**ENGLISH 196A. Honors Seminar: Critical Approaches to Literature. 3 Units.**

Overview of literary-critical methodologies, with a practical emphasis shaped by participants' current honors projects. Restricted to students in the English Honors Program. Offered in conjunction with ENGLISH 196B. Honors Writing Workshop.

**ENGLISH 196B. Honors Essay Workshop. 2 Units.**

Required of English honors students.

**ENGLISH 197. Seniors Honors Essay. 1-10 Units.**

In two quarters.

**ENGLISH 198. Individual Work. 1-5 Units.**

Undergraduates who wish to study a subject or area not covered by regular courses may, with consent, enroll for individual work under the supervision of a member of the department. 198 may not be used to fulfill departmental area or elective requirements without consent. Group seminars are not appropriate for 198.

**ENGLISH 198L. Individual Work: Levinthal Tutorial. 5 Units.**

Undergraduate writers work individually with visiting Stegner Fellows in poetry, fiction, and if available, nonfiction. Students design their own curriculum; Stegner Fellows act as writing mentors and advisers. Prerequisites: 90, 91, or 92; submitted manuscript.

**ENGLISH 199. Senior Independent Essay. 1-10 Units.**

Open, with department approval, to seniors majoring in non-Honors English who wish to work throughout the year on a 10,000 word critical or scholarly essay. Applicants submit a sample of their expository prose, proposed topic, and bibliography to the Director of Undergraduate Studies before preregistration in May of the junior year. Each student accepted is responsible for finding a department faculty adviser. May be repeated for credit.

**ENGLISH 201. The Bible and Literature. 5 Units.**

Differences in translations of the Bible into English. Recognizing and interpreting biblical allusion in texts from the medieval to modern periods. Readings from the Bible and from British, Canadian, American, and African American, and African literature in English.

**ENGLISH 202. History of the Book. 5 Units.**

Taught in the Department of Special Collections, the course examines the book as both a developing concept and as a material object, from scroll to codex, from manuscript to print, from cold type to electronic medium. Basic bibliographical and paleographical techniques will be taught, and readings in history and theory will be discussed. Attention will focus particularly on the use of books, and hence on the history of reading practices, including marginalia and other marks of ownership. Students will be expected to develop their own projects from among the riches of Stanford's rare book collection. The final project may be a collaborative one, with contributions by the class as a whole. This has typically been the preparation of an edition of a manuscript or piece of ephemera in Stanford's collection.

**ENGLISH 209. Paleography of Medieval and Early Modern Manuscripts. 3-5 Units.**

Introductory course in the history of writing and of the book, from the late antique period until the advent of printing. Opportunity to learn to read and interpret medieval manuscripts through hands-on examination of original materials in Special Collections of Stanford Libraries as well as through digital images. Offers critical training in the reading of manuscripts for students from departments as diverse as Classics, History, Philosophy, Religious Studies, English, and the Division of Languages Cultures and Literatures.

Same as: CLASSGEN 311, DLCL 209, HISTORY 309G, RELIGST 204.

**ENGLISH 218. Literature and the Brain. 5 Units.**

Recent developments in and neuroscience and experimental psychology have transformed the way we think about the operations of the brain. What can we learn from this about the nature and function of literary texts? Can innovative ways of speaking affect ways of thinking? Do creative metaphors draw on embodied cognition? Can fictions strengthen our "theory of mind" capabilities? What role does mental imagery play in the appreciation of descriptions? Does (weak) modularity help explain the mechanism and purpose of self-reflexivity? Can the distinctions among types of memory shed light on what narrative works have to offer? Same as: ENGLISH 118, FRENCH 118, FRENCH 318, PSYCH 118F.

**ENGLISH 261B. East Goes West: Transnational Asia/Pacific Spatial Geographies. 5 Units.**

East goes west as a metaphor to invoke the conceptions of fantasy and desire that play out in transnational scope. What attracts diasporic Asian/American subjects to the locations that they travel to, whether it be an identified homeland with which a character attaches a strong affinity, or to a new country where the promise of economic possibilities await? Same as: AMSTUD 261B, ASNAMST 261B.

**ENGLISH 261C. Globalization and Contemporary Fiction. 5 Units.**

The globalization of the novel in English in the second half of the 20th century; the relationship of the Anglophone novel from the global south with metropolitan aesthetic practices such as those of modernism and postmodernism, and with Western and indigenous narrative theories; the politics of colonialism, anti-colonial resistance, and globalization as refracted in the novel as a genre. Texts by Rhys, Naipaul, Tutuola, Achebe, Rushdie, Okrie, Carey, Coetzee, Gordimer, and Ihimaera.

**ENGLISH 261F. Gender and Sexuality in Asian American Literature. 5 Units.**

How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings will include literary criticism, feminist and queer theory. Same as: AMSTUD 261F, ASNAMST 188, FEMST 261F, FEMST 361F.

**ENGLISH 262F. Transnational American Studies. 5 Units.**

Exploration of the transnational turn in American Studies, focusing on how transnational perspectives enrich and complicate our understanding of American literature, history and the arts. Readings include recent work in transnational American Studies. Topics include experiments with ways of using digital technology to allow archival materials in different locations to be in conversation with each other. Same as: AMSTUD 262F, ENGLISH 362F.

**ENGLISH 290. Advanced Fiction Writing. 5 Units.**

Workshop critique of original short stories or novel. Prerequisites: manuscript, consent of instructor, and 190-level fiction workshop.

**ENGLISH 291. Advanced Creative Nonfiction. 5 Units.**

Continuation of 191. Workshop. The application of advanced storytelling techniques to fact-based personal narratives, emphasizing organic writing, discovering audience, and publication. Guest lecturers, collaborative writing, and publication of the final project in print, audio, or web formats. Prerequisite: ENGLISH 191.

**ENGLISH 292. Advanced Poetry Writing. 5 Units.**

Focus is on generation and discussion of student poems, and seeking published models for the work.

**ENGLISH 293. Literary Translation. 3-5 Units.**

An overview of translation theories and practices over time. The aesthetic, ethical, and political questions raised by the act and art of translation and how these pertain to the translator's tasks. Discussion of particular translation challenges and the decision processes taken to address these issues. Coursework includes assigned theoretical readings, comparative translations, and the undertaking of an individual translation project. Same as: DLCL 293.

**ENGLISH 303. Experiment and the Novel. 5 Units.**

A double exploration of experiment in the novel from 1750 into the 19th century. Taking off from Zola's "The Experimental Novel," consideration of the novel's aspect as scientific instrument. Taking the idea of experimental fiction in the usual sense of departures from standard practice, consideration of works that seem to break away from techniques of "realism" devised prior to 1750. Possible texts by: Lennox, Sterne, Walpole, Goldsmith, Godwin, Lewis, Shelley, Hogg, Emily Bronte, and Diderot. Same as: COMPLIT 353A.

**ENGLISH 314. Epic and Empire. 5 Units.**

Focus is on Virgil's *Aeneid* and its influence, tracing the European epic tradition (Ariosto, Tasso, Camoes, Spenser, and Milton) to New World discovery and mercantile expansion in the early modern period. Same as: COMPLIT 320A.

**ENGLISH 334A. Concepts of Modernity 1: Philosophical Foundations. 5 Units.**

In the late eighteenth century Immanuel Kant proclaimed his age to be "the genuine age of criticism." He went on to develop the critique of reason, which set the stage for many of the themes and problems that have preoccupied Western thinkers for the last two centuries. This fall quarter course is intended as an introduction to these themes and problems. We begin this course with an examination of Kant's philosophy before approaching a number of texts that extend and further interrogate the critique of reason. In addition to Kant, we will read texts by Hegel, Marx, Nietzsche, Weber, Freud, Lukács, and Heidegger. This course is the first of a two-course sequence. Priority to graduate students in MTL and English. The course will be capped at 12 students. Same as: MTL 334A.

**ENGLISH 334B. Concepts of Modernity 2: The Study of Culture in the Age of Globalization. 5 Units.**

A survey of 20th-century theory with focus on the concept of culture and methods of studying it from diverse disciplines including, anthropology, historical sociology, literary and cultural studies. Discussions will emphasize modernization, transmodernization and globalization processes in their relations to culture broadly understood, cultures in their regional, national and diasporic manifestations, and cultures as internally differentiated (high and low culture, subcultures, media cultures). Same as: COMPLIT 334B, MTL 334B.

**ENGLISH 357A. Precision's Point: Hopkins, Moore, Bishop. 5 Units.**

Among the three poets (Hopkins, Moore, Bishop) to be considered, only Marianne Moore claimed the title of "precisionist," thus linking her to a specifically American branch of cubism. Yet each of these poets offers us extraordinary models by which to investigate the means and ends of poetic precision. With a sustained focus on the prose as well as the poetry of Elizabeth Bishop and two of her most important literary influences, we will investigate, and historically contextualize, the modes of descriptive and structural precision that each poet offers and resists.

**ENGLISH 360A. The Literature of Posthumanity. 5 Units.**

An exploration of the theory and literary history of the posthuman, with readings ranging from Mary Shelley's *The Last Man* to recent works in technology and animal studies.

**ENGLISH 362F. Transnational American Studies. 5 Units.**

Exploration of the transnational turn in American Studies, focusing on how transnational perspectives enrich and complicate our understanding of American literature, history and the arts. Readings include recent work in transnational American Studies. Topics include experiments with ways of using digital technology to allow archival materials in different locations to be in conversation with each other.

Same as: AMSTUD 262F, ENGLISH 262F.

**ENGLISH 362S. Trauma Theory, Psychoanalysis and Asian American Literature. 5 Units.**

How Asian American literature emerges through its relationship to oppression, trauma, and disillusionment. Approaches include critical and theoretical archives including psychoanalysis, trauma theory, and cultural studies. Writers may include Alexander Chee, Fae Myenne Ng, Peter Bacho, Suki Kim, Mohsin Hamid, and le thi diem thuy.

**ENGLISH 365D. American Rebellion: Anne Hutchinson to Thomas Paine. 5 Units.**

This course will analyze literary, journalistic, sermon, juridical, and propagandistic documents from the Great Migration to the Revolutionary War to help us understand how the transition from colonial to national status was accomplished. Our focus will be on the evolution of selfhood and subjectivity and their collective expressions. Categories of selfhood to which we'll attend will include the concepts of sainthood and election; republican and democratic subjectivity; the subject of human rights and the subject of conscience; and the subjective processes of conversion and secularization. The course will provide a thorough survey of the American 17th and 18th centuries.

**ENGLISH 369E. Postcolonial Theory in Motion: from the Bandung Era to the Present. 5 Units.**

After exploding onto the intellectual scene in the late twentieth century, postcolonial studies appears to have lost momentum in recent years, even fading according to its detractors into quiet irrelevance. Drawing on foundational and cutting-edge work in postcolonial theory, this seminar asks whether its key insights remain salient for cultural and political analysis in the era of globalization. Readings might include the work of Albert Memmi, Frantz Fanon, Edward Said, Dipesh Chakrabarty, Leela Gandhi, Achille Mbembe, and others.

**ENGLISH 371A. Early Modern Prose Fiction. 5 Units.**

A survey of proto-novels and other experimental fictions of the sixteenth and seventeenth centuries in the context of Renaissance and present-day theories of prose fiction. With some attention to issues of epistemology, politics, and religion, the course charts an episode in European literature that has gone largely unarticulated by critics and historians. Texts include Gascoigne's *The Adventures of Master F.J.*, Philip Sidney's two *Arcadias*, Greene's *Pandosto*, Cavendish's *The Blazing World*, and Bunyan's *Pilgrim's Progress*, as well as some influential continental models such as *Pantagruel* and *Don Quixote*.

**ENGLISH 373A. Shakespeare from Script to Stage. 5 Units.**

Consideration of the nature and history of the Shakespearean text from its beginnings, from script and performance to quartos, to the folios, to the multitude of editions, and constantly back to script and performance. What, historically, has constituted a good text of Shakespeare, and what is bad about bad quartos? What have been, historically, the ethics and politics of editing, and what has been the relation of editorial practice to stage practice on the one hand, and to what we want Shakespeare to be on the other? Plays with multiple original texts will be studied, (e.g. *Romeo and Juliet*, *Hamlet*, *King Lear*) through the lenses of theatrical history, bibliography and editorial theory.

**ENGLISH 377A. The Art of the Memoir: Autobiographical Writing from 1820 to the Present. 5 Units.**

Readings in British and American autobiographical writing from the Romantic Age to the Present. Why do people write memoirs? What kinds of rhetorical goals underlie any given memoir? Readings may include autobiographical works by Hazlitt, Henry James, H.D., J.R. Ackerley, Lucy Greeve, Joan Didion, Edmund White, Patti Smith, Daniel Mendelsohn and others.

**ENGLISH 384C. Thomas Hardy and D.H. Lawrence. 5 Units.**

Topics include Hardy's and Lawrence's views of modernization, urbanization, sexual politics, desire, and the novelistic project. Works studied include *Far from the Madding Crowd*, *Tess of the D'Urbervilles*, *Jude the Obscure*, *The Rainbow*, *Women in Love*, and *Lady Chatterley's Lover*. Augmented by critical readings.

**ENGLISH 390. Graduate Fiction Workshop. 3 Units.**

For Stegner fellows in the writing program. May be repeated for credit. Prerequisite: consent of instructor.

**ENGLISH 392. Graduate Poetry Workshop. 3 Units.**

For Stegner fellows in the writing program. May be repeated for credit. Prerequisite: consent of instructor.

**ENGLISH 394. Independent Study. 1-10 Units.**

Preparation for first-year Ph.D. qualifying examination.

**ENGLISH 395. Ad Hoc Graduate Seminar. 1-5 Units.**

Three or more graduate students who wish in the following quarter to study a subject or an area not covered by regular courses and seminars may plan an informal seminar and approach a member of the department to supervise it.

**ENGLISH 396. Introduction to Graduate Study for Ph.D. Students. 5 Units.**

Required for first-year graduate students in English. The major historical, professional, and methodological approaches to the study of literature in English.

**ENGLISH 396L. Pedagogy Seminar I. 2 Units.**

Required for first-year Ph.D students in English, Modern Thought and Literature, and Comparative Literature. Preparation for surviving as teaching assistants in undergraduate literature courses. Focus is on leading discussions and grading papers. Same as: COMPLIT 396L.

**ENGLISH 396P. Publication Workshop: The Article. 3-5 Units.**

A practical and theoretical study of the genre of the journal article, with critical reflection on its status as a gateway to academic professionalization and as a highly specialized form of public address. We will be reading articles published over the last decade across a diverse range of journals, focusing on issues surrounding methodology, style, tone, and audience. Participants will also work on developing an already polished piece of writing into the form of an article potentially publishable by a peer-reviewed publication. Admission by application in Fall quarter.

**ENGLISH 397A. Pedagogy Seminar II. 1 Unit.**

Apprenticeship for second-year graduate students in English, Modern Thought and Literature, and Comparative Literature who teach in the Program in Writing and Rhetoric. Each student is assigned as an apprentice to an experienced teacher and sits in on classes, conferences, and tutorials, with eventual responsibility for conducting a class, grading papers, and holding conferences. Meetings explore rhetoric, theories and philosophies of composition, and the teaching of writing. Each student designs a syllabus in preparation for teaching PWR 1.

**ENGLISH 398. Research Course. 1-18 Units.**

A special subject of investigation under supervision of a member of the department. Thesis work is not registered under this number.

**ENGLISH 398L. Literary Lab. 5 Units.**

Gathering and analyzing data, constructing hypotheses and designing experiments to test them, writing programs [if needed], preparing visuals and texts for articles or conferences. Requires a year-long participation in the activities of the Lab.

**ENGLISH 398R. Revision and Development of a Paper. 4-5 Units.**

Students revise and develop a paper under the supervision of a faculty member with a view to possible publication.

**ENGLISH 398W. Orals, Publication and Dissertation Workshop. 2 Units.**

For third- and fourth-year graduate students in English. Strategies for studying for and passing the oral examination, publishing articles, and for writing and researching dissertations and dissertation proposals. May be repeated for credit.

**ENGLISH 399. Thesis. 1-10 Units.**

For M.A. students only. Regular meetings with thesis advisers required.

**ENGLISH 802. TGR Dissertation. 0 Unit.**

## English for Foreign Students Courses

**EFSLANG 197. Directed Study. 1-3 Units.****EFSLANG 397. Directed Study. 1-3 Units.****EFSLANG 683P. Workshop in Pronunciation for International Students. 1-2 Units.**

(1-2 units). Provides support in the development of clear, comprehensible English pronunciation. Includes attention to individual sounds as well as stress, rhythm, and intonation. Students taking the course for 2 units will have additional individual assignments and a 30-minute tutorial each week. Limited to visiting undergraduates and students in the High School Summer College program.

**EFSLANG 683R. Workshop in Reading and Vocabulary for International Students. 1-2 Units.**

(1-2 units). Provides support in the development of English reading skills for academic purposes, including work on comprehension, speed, and critical interpretation, along with strategies for improving vocabulary. Students taking the course for 2 units will have additional individual assignments and a 30-minute tutorial each week. Limited to visiting undergraduates and students in the High School Summer College program.

**EFSLANG 683S. Workshop in Oral Communication for International Students. 1-2 Units.**

(1-2 units) Provides support in the development of listening and speaking skills in English, including academic listening, small group discussion, oral presentation, and intercultural communication. Students taking the course for 2 units will have additional individual assignments and a 30-minute tutorial each week. Limited to visiting undergraduates and students in the High School Summer College program.

**EFSLANG 683W. Workshop in Written Communication for International Students. 1-2 Units.**

(1-2 units). Provides support in the development of English writing skills for non-natives. Writing assignments are negotiated with the instructor and may include practice in composition, SAT or TOEFL writing, and writing university application essays and statements of purpose. Students taking the course for 2 units will have additional individual assignments and a 30-minute tutorial each week. Limited to visiting undergraduates and students in the High School Summer College program.

**EFSLANG 687X. American Language and Culture, First Session. 3 Units.**

Closed enrollment. Intensive English language and U.S. culture program. Enrollment limited to 14.

**EFSLANG 687Y. American Language and Culture, Second Session. 3 Units.**

Closed enrollment. Intensive English language and U.S. culture program. Enrollment limited to 14. Course may be repeated once.

**EFSLANG 688. Intensive English and Academic Orientation for Foreign Graduate Students. 6 Units.**

Goal is to prepare incoming international graduate students for full-time study. Academic orientation and instruction in academic writing, listening, discussion, oral presentation, and spoken usage. Enrollment limited to 14. Course may be repeated once.

**EFSLANG 688A. Intensive Spoken English. 3 Units.**

For current graduate students. Includes work on listening, oral presentation, discussion, and conversational interaction. May fulfill any two of the following EFS requirements, subject to approval by the EFS Director: EFSLANG 690A, 690B, 691, 693B.

**EFSLANG 688B. Intensive Academic Writing. 3 Units.**

For current graduate students. Focus on academic writing, with some work in reading and vocabulary development. Engineering, science, humanities, and social science students prepare a research paper; business students write one or more case studies. Fulfills requirement for EFSLANG 697 or 698A, subject to approval by the EFSLANG Director.

**EFSLANG 688V. Intensive English and Academic Orientation for Stanford Visiting Scholars. 5 Units.**

Goal is to improve English proficiency and introduce the university environment. Writing, pronunciation, listening, discussion, oral presentation, and spoken usage. Enrollment limited to 14.

**EFSLANG 689E. Learning English on Your Own. 1 Unitss.**

Independent English language learning. Learning strategies and objectives, setting and maintaining practice schedules, and evaluating progress. Focus is on exploiting web-based resources. Individual meetings.

**EFSLANG 689H. American Humor. 1 Unitss.**

Analysis of jokes, humorous stories, and situations through modern media. Practice in advanced listening comprehension and English idioms.

**EFSLANG 689L. Living in the USA. 1 Unitss.**

Life and relationships outside the University classroom. Goal is to familiarize international students with the cultural expectations and forms of language use in a variety of situations in the University community and in other social situations. Enrollment limited to 14.

**EFSLANG 689P. Pronunciation. 2 Units.**

The sounds of English, and stress, intonation, and rhythm patterns important to natural-sounding speech. Enrollment limited to 14.

**EFSLANG 689T. Interacting in California's Vineyard Culture. 1 Unitss.**

Focuses on communicative skills in the context of California's renowned wine culture. Emphasis on the language of wine using appropriate terminology, and interacting knowledgeably with restaurant and retail wine staff. Topics include learning the fundamentals of vineyard techniques, varietal characteristics, tasting techniques, drinking and ordering etiquette. Course is co-taught by a wine expert and an ESL instructor. Class consists of a short interactive lecture, a communicative activity such as role playing, and a tasting of four specially selected wines. Participants must be at least 21 years old. Fee.

**EFSLANG 689V. Vocabulary and Idiom. 1 Unit.**

Building vocabulary for academic success. Idiomatic language, and what idioms and metaphors reflect about American culture. Enrollment limited to 14.

**EFSLANG 689W. Working in the USA. 1 Unit.**

The language and culture of the workplace. Goal is to familiarize international students with the cultural expectations of situations in the business setting and in social situations related to business.

**EFSLANG 690A. Interacting in English. 1-3 Units.**

Strategies for communicating effectively in social and academic settings. Informal and formal language used in campus settings, including starting and maintaining conversations, asking questions, making complaints, and contributing ideas and opinions. Simulations and discussions, with feedback on pronunciation, grammar, and usage. Enrollment limited to 14.

**EFSLANG 690B. Academic Discussion. 1-3 Units.**

Skills for effective participation in classroom settings, seminars, and research group meetings. Pronunciation, grammar, and appropriateness for specific tasks. Feedback on language and communication style. Enrollment limited to 14. May be repeated once for credit. Prerequisite: EFSLANG 690A or consent of instructor.

**EFSLANG 690C. Advanced Interacting in English. 1-3 Units.**

Communication skills for extended discourse such as storytelling and presenting supported arguments. Development of interactive listening facility and overall intelligibility and accuracy. Goal is advanced fluency in classroom, professional and social settings. Identification of and attention to individual patterned errors. May be repeated once for credit. Prerequisite: EFSLANG 690B or consent of instructor. Enrollment limited to 14.

**EFSLANG 691. Oral Presentation. 1-3 Units.**

For advanced graduate students. Practice in academic presentation skills; strategy, design, organization, and use of visual aids. Focus is on improving fluency and delivery style, with videotaping for feedback on language accuracy and usage. Enrollment limited to 14. May be repeated once for credit.

**EFSLANG 692. Speaking and Teaching in English. 1-3 Units.**

For non-native speakers who must teach in English. Focus is on developing clarity, intelligibility, and effectiveness through weekly presentations simulating actual teaching assistant responsibilities. Enrollment limited to 14. May be repeated once for credit.

**EFSLANG 693A. Listening Comprehension. 1-3 Units.**

Strategies for effective listening in an academic setting, focusing on identifying key ideas in lectures. Practice in understanding words and phrases commonly encountered in classroom settings. Computer-based exercises for comprehension of rapid, natural speech. Enrollment limited to 14.

**EFSLANG 693B. Advanced Listening Comprehension, and Vocabulary Development. 1-3 Units.**

Listening strategies and vocabulary for understanding English in academic and non-academic contexts. Discussion and interpretation of communicative intent. Computer-based and video exercises across a range of genres; individual project. May be repeated once for credit. Prerequisite: EFSLANG 693A or consent of instructor.

**EFSLANG 694. English for Business, Industry and Professional Life. 1-3 Units.**

For advanced graduate students. Task-based practice of language appropriate for professional settings in industry and related teamwork. Simulation of the roles of manager, applicant, subordinate, and coworker. Prerequisite: EFSLANG 693A, or consent of instructor. Enrollment limited to 14.

**EFSLANG 695A. Pronunciation and Intonation. 1-3 Units.**

Recognition and practice of American English sounds, stress, and intonation patterns for greater comprehension and intelligibility. Analysis of problem areas. Biweekly tape assignments and tutorials. May be repeated once for credit. Enrollment limited to 14.

**EFSLANG 695B. Advanced Pronunciation and Intonation. 1-3 Units.**

Continuation of EFSLANG 695A, focusing on American English sounds, stress, rhythm, and intonation patterns. Emphasis is on self-monitoring, integrated with short presentations. Biweekly tape assignments and tutorials. Enrollment limited to 14. May be repeated for credit three times. Prerequisite: EFSLANG 695A.

**EFSLANG 696. Understanding American Humor. 1-3 Units.**

Recognizing rhetorical devices, jokes, and character types common to spoken humor in film and television programs. Crosscultural discussion. Prerequisite: EFSLANG 690B, EFSLANG 693B or consent of the instructor. Enrollment limited to 14.

**EFSLANG 697. Writing Fundamentals. 1-3 Units.**

Focus is on improving grammatical accuracy and vocabulary, building fluency, and learning the structure and conventions of English correspondence, reports, and short academic papers. Enrollment limited to 14.

**EFSLANG 698A. Writing Academic English. 1-3 Units.**

Strategies and conventions for graduate writing. Emphasis is on fluency, organization, documentation, and appropriateness for writing tasks required in course work. Enrollment limited to 14. May be repeated once for credit.

**EFSLANG 698B. Advanced Graduate Writing. 1-3 Units.**

Focus on clarity, accuracy, and appropriate style. For graduate students experienced in English writing and currently required to write for courses and research. Class meetings and individual conferences. Prerequisite: EFSLANG 698A. Enrollment limited to 14. May be repeated once for credit.

**EFSLANG 698C. Writing and Presenting Research. 1-3 Units.**

For advanced graduate students completing major research projects. Revising and editing strategies for preparing papers, conference abstracts, and poster presentations. Adapting content and style to different audiences. Students present their research with participant feedback. Enrollment limited to 14. May be repeated once for credit. Prerequisite: EFSLANG 698B and EFSLANG 691 or consent of instructor.

## Environment and Resources Courses

**ENVRES 200. Sustaining Action: Research, Analysis and Writing for the Public. 3 Units.**

Preference to graduate students and senior undergraduates in environmental, natural and social sciences, engineering, journalism. Students help produce and publish SAGE, an eco advice column, by choosing, researching, and answering questions about sustainable living submitted by Stanford alumni and the general public. Prerequisite: admission by application, available from instructor, thayden@stanford.edu, and due 9/21/11 (Aut) or 3/28/12 (Spr). (Meets Earth Systems WIM requirement).

Same as: EARTHSYS 200.

**ENVRES 205. Exploring Environmental Learning and Environmental Behavior. 1-2 Units.**

Exploration of foundational and more recent literature addressing environmental learning and environmental behavior, both as separate and intersecting concepts. Critical reading and active discussions contributing to broader and deeper understanding of how environmental learning occurs in a variety of settings and with a range of audiences, and how this environmental learning might - or might not - contribute to environmental behavior. Enrollment limited to PhD students.

**ENVRES 210. Communication and Leadership Skills. 2 Units.**

Focus is on delivering information to policy makers and the lay public. How to speak to the media, Congress, and the general public; how to write op-eds and articles; how to package ideas including titles, abstracts, and CVs; how to survive peer review, the promotion process, and give a job talk; and how to be a responsible science advocate.

Same as: BIO 388.

**ENVRES 215. Digital Storytelling for Researchers. 1-3 Units.**

A starting point in multimedia storytelling for graduate students who are actively involved in research. Students gain project-based experience in still photography, audio podcasting, online slideshows and web video production and editing, enabling them to record and report their own research stories from the lab and field. Enrollment limited, consent of the instructor required.

**ENVRES 225. E-IPER Current Topics Seminar. 1 Unitss.**

For E-IPER Ph.D and Joint M.S. students only. Weekly presentations of E-IPER students' research and other program-related projects. Occasional guest speakers. Active participation including individual or team presentation and attendance required for credit. May be repeated once for credit.

**ENVRES 270. Graduate Practicum in Environment and Resources. 1-9 Units.**

Opportunity for E-IPER students to pursue areas of specialization in an institutional setting such as a laboratory, clinic, research institute, governmental agency, non-governmental organization, or multilateral organization. Meets US CIS requirements for off-campus employment with endorsement from designated school official.

**ENVRES 277C. Specialized Writing and Reporting: Environmental Journalism. 4-5 Units.**

(Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in science-based environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: COMM 104, ENVRES 200 or consent of instructor. Admissions by application only, available from thayden@stanford.edu and due 3/28/12.

Same as: COMM 177C, COMM 277C.

**ENVRES 290. Capstone Project Seminar in Environment and Resources. 1-3 Units.**

Required for E-IPER Joint M.S. students. Propose, conduct and publicly present final individual or team projects demonstrating the integration of professional (M.B.A., J.D., or M.D.) and M.S. in Environment and Resources degrees. Presentation and submission of final product required.

**ENVRES 310. Environmental Forum Seminar. 1-2 Units.**

Required core course for first year E-IPER PhD students and Joint JD/MS students. Also required for Joint MBA/MS students who did not take OIT 538/540 or 539/540. Conceptual frameworks, analytical approaches, validity of conclusions from an interdisciplinary perspective. Participants attend various environmentally-focused seminars on campus selected by faculty and students, followed by student-facilitated discussions.

**ENVRES 315. Environmental Research Design Seminar. 1-2 Units.**

Required core course for first year E-IPER Ph.D. students; optional for Joint M.S. students; other graduate students with instructor's permission. Series of faculty presentations and student-led discussions on interdisciplinary research design as exemplars of the research design theories discussed in ENVRES 320. Designing Environmental Research. Topics parallel the ENVRES 320 syllabus. Corequisite: ENVRES 320.

**ENVRES 320. Designing Environmental Research. 3-4 Units.**

Required core course restricted to first year E-IPER Ph.D. students. Research design options for causal inference in environmentally related research. Major philosophies of knowledge and how they relate to research objectives and design choices. Identification of critical elements within a broad range of research designs. Evaluation of the types of research questions for which different designs are suited, emphasizing fit between objectives, design, methods, and argument. Development of individual research design proposals, including description and justification understandable to a non-specialist.

**ENVRES 330. Research Approaches for Environmental Problem Solving. 3 Units.**

Required core course for first year E-IPER Ph.D. students. How to develop and implement interdisciplinary research in environment and resources. Assignments include development of research questions, a preliminary literature review, and a summer funding proposal. Course is structured on peer critique and student presentations of work in progress. Corequisite: ENVRES 398 with a faculty member chosen to explore a possible dissertation topic.

**ENVRES 380. Collaborating with the Future: Launching Large Scale Sustainable Transformations. 3-4 Units.**

This project-based d.school class combines Design Thinking Processes, Behavioral Sciences, and elements of Diffusion Theory. Tools and theories introduced in class will be used to structure large-scale transformations that simultaneously create value on environmental, societal, and economic fronts. We encourage students to use this class as a launching pad for real initiatives. Primarily meant for Graduate Students. (Especially qualified/motivated Seniors will be considered). Admission to the class is through an application process which ends on March 3. Please find instructions and applications at <https://dschool.stanford.edu/groups/largetransformations/>. Same as: ME 380, PSYCH 380.

**ENVRES 398. Directed Individual Study in Environment and Resources. 1-9 Units.**

Under supervision of an E-IPER affiliated faculty member on a subject of mutual interest. Joint M.S. students must submit an Independent Study Agreement for approval.

**ENVRES 399. Directed Research in Environment and Resources. 1-15 Units.**

For advanced graduate students. Under supervision of an E-IPER affiliated faculty member. Joint M.S. students must submit an Independent Study Agreement for approval.

**ENVRES 410. Ph.D. Qualifying Tutorial. 1 Unitss.**

For Ph.D. students only. Under supervision of an E-IPER affiliated faculty member.

**ENVRES 801. TGR Project. 0 Unit.**

**ENVRES 802. TGR Dissertation. 0 Unit.**

# Environmental Earth System Sciences Courses

## **EESS 8. The Oceans: An Introduction to the Marine Environment. 3 Units.**

For non-majors and majors in earth science or environmental science. Students will learn about the major ocean ecosystems and how they function both naturally and under the influence of human activities. Emphasis will be placed on the dominant organisms of each ecosystem and how they interact with each other and their physical and chemical environment. The types of ecosystems discussed will include coral reefs, deep-sea hydrothermal vents, coastal upwelling systems, blue-water oceans, estuaries, near-shore dead zones, etc. The course will incorporate a mix of lectures, multi-media presentations, and group activities. Same as: EARTHSYS 8.

## **EESS 11SI. Human and Environmental Rights from Farm to Fork. 1 Units.**

This course aims to understand the environmental and human rights implications of our modern globalized food system—from farm, to factory, to international commerce, and finally, to fork. Focus will be on the labor and environmental conditions of industrial agriculture, working conditions and environmental consequences of processing factories, the implications of international food commerce, the modern obesity crisis, and emerging solutions that aim to correct these problems. Same as: EARTHSYS 14SI.

## **EESS 12SC. Environmental and Geological Field Studies in the Rocky Mountains. 2 Units.**

The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and increased demand for its abundant natural resources. These broad topics are integrated into a coherent field-study as we examine earth/ environmental science-related questions in three different settings: 1) the three-billion-year-old rocks and the modern glaciers of the Wind River Mountains of Wyoming; 2) the sediments in the adjacent Wind River basin that host abundant gas and oil reserves and also contain the long-term climate history of this region; and 3) the volcanic center of Yellowstone National Park and the mountainous region of Teton National Park, and the economic and environmental problems associated with gold mining and extraction of oil and gas in areas adjoining these national parks. Students will complete six assignments based upon field exercises, working in small groups to analyze data and prepare reports and maps. Lectures will be held in the field prior to and after fieldwork. Note: This course involves one week of backpacking in the Wind Rivers and hiking while staying in cabins near Jackson Hole, Wyoming. Students must arrive in Salt Lake City on Monday, September 3. (Hotel lodging will be provided for the night of September 3, and thereafter students will travel as a Sophomore College group.) We will return to campus on Friday, September 21.

Same as: EARTHSYS 12SC, GES 12SC.

## **EESS 37N. Climate Change: Science & Society. 3 Units.**

Preference to freshmen. How and why do greenhouse gases cause climate to change? How will a changing climate affect humans and natural ecosystems? What can we do to prevent climate change and better adapt to the climate change that does occur? This course will focus on developing quantitative understanding of these issues rooted in both the physical and social sciences. Exercises will be based on simple quantitative observations and calculations; algebra only, no calculus. Same as: EARTHSYS 37N.

## **EESS 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration. 3 Units.**

Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include *The Worst Journey in the World* by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar) Same as: EARTHSYS 38N, GES 38N.

## **EESS 39N. The Carbon Cycle: Reducing Your Impact. 3 Units.**

Preference to freshmen. Changes in the long- and short-term carbon cycle and global climate through the burning of fossil fuels since the Industrial Revolution. How people can shrink their carbon footprints. Long-term sources and sinks of carbon and how they are controlled by tectonics and short-term sources and sinks and the interaction between the biosphere and ocean. How people can shrink their carbon footprints. Held at the Stanford Community Farm. Same as: EARTHSYS 39N.

## **EESS 41N. The Global Warming Paradox. 3 Units.**

Preference to freshman. Focus is on the complex climate challenges posed by the substantial benefits of energy consumption, including the critical tension between the enormous global demand for increased human well-being and the negative climate consequences of large-scale emissions of carbon dioxide. Topics include: Earth's energy balance; detection and attribution of climate change; the climate response to enhanced greenhouse forcing; impacts of climate change on natural and human systems; and proposed methods for curbing further climate change. Sources include peer-reviewed scientific papers, current research results, and portrayal of scientific findings by the mass media and social networks. Same as: EARTHSYS 41N.

## **EESS 42. The Global Warming Paradox II. 1 Units.**

Further discussion of the complex climate challenges posed by the substantial benefits of energy consumption, including the critical tension between the enormous global demand for increased human well-being and the negative climate consequences of large-scale emissions of carbon dioxide. Discussions will explore topics of student interest, including peer-reviewed scientific papers, current research results, and portrayal of scientific findings by the mass media and social networks. Focus will also be placed on student engagement in on-campus and off-campus activities. Grading is Ltr-CR/NC. Prerequisite: EESS/EARTHSYS 42 or consent of instructor. Same as: EARTHSYS 42.

## **EESS 43. THE GLOBAL WARMING PARADOX III. 1 Units.**

Further discussion of the complex climate challenges posed by the substantial benefits of energy consumption, including the critical tension between the enormous global demand for increased human well-being and the negative climate consequences of large-scale emissions of carbon dioxide. Discussions will explore topics of student interest, including peer-reviewed scientific papers, current research results, and portrayal of scientific findings by the mass media and social networks. Focus will also be placed on student engagement in on-campus and off-campus activities. Grading is Ltr-CR/NC. Prerequisite: None.



**EESS 46N. Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough. 3 Units.**

Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries, and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's *Changes in a California Estuary: A Profile of Elkhorn Slough*. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.

Same as: EARTHSYS 46N.

**EESS 49N. Multi-Disciplinary Perspectives on a Large Urban Estuary: San Francisco Bay. 3 Units.**

This course will be focused around San Francisco Bay, the largest estuary on the Pacific coasts of both North and South America as a model ecosystem for understanding the critical importance and complexity of estuaries. Despite its uniquely urban and industrial character, the Bay is of immense ecological value and encompasses over 90% of California's remaining coastal wetlands. Students will be exposed to the basics of estuarine biogeochemistry, microbiology, ecology, hydrodynamics, pollution, and ecosystem management/restoration issues through lectures, interactive discussions, and field trips. Knowledge of introductory biology and chemistry is recommended.

Same as: EARTHSYS 49N.

**EESS 56Q. Changes in the Coastal Ocean: The View From Monterey and San Francisco Bays. 3 Units.**

Preference to sophomores. Recent changes in the California current, using Monterey Bay as an example. Current literature introduces principles of oceanography. Visits from researchers from MBARI, Hopkins, and UCSC. Optional field trip to MBARI and Monterey Bay.

Same as: EARTHSYS 56Q.

**EESS 57Q. Climate Change from the Past to the Future. 3 Units.**

Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history. Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.

Same as: EARTHSYS 57Q.

**EESS 61Q. Food and security. 3 Units.**

The course will provide a broad overview of key policy issues concerning agricultural development and food security, and will assess how global governance is addressing the problem of food security. At the same time the course will provide an overview of the field of international security, and examine how governments and international institutions are beginning to include food in discussions of security.

Same as: EARTHSYS 61Q, INTNLREL 61Q.

**EESS 101. Environmental and Geological Field Studies in the Rocky Mountains. 3 Units.**

Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns.

Same as: EARTHSYS 100, GES 101.

**EESS 105. Food and Community: New Visions for a Sustainable Future. 3-5 Units.**

Service and research focused on providing healthy and environmentally friendly food for the under served in our community. Hands-on collaboration with the Stanford Glean student group, the Stanford Community Garden, and San Francisco nonprofits. Coverage of the broad spectrum from garden development to food dispersal to the needy. Design and implementation of projects that address an aspect of food and social justice, such as urban farming in low-income communities and sustainable food networks for the elderly. Service Learning Course (certified by Haas Center). Limited enrollment. May be repeated for credit.

Same as: EARTHSYS 105.

**EESS 106. World Food Economy. 5 Units.**

The interrelationships among food, populations, resources, and economic development. The role of agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis is on public sector decision making as it relates to food policy.

Same as: EARTHSYS 106, ECON 106.

**EESS 111. Biology and Global Change. 4 Units.**

The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use. Prerequisite: Biology or Human Biology core or graduate standing.

Same as: BIO 117, EARTHSYS 111.

**EESS 112. Human Society and Environmental Change. 4 Units.**

Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A

Same as: EARTHSYS 112, HISTORY 103D.

**EESS 117. Earth Sciences of the Hawaiian Islands. 4 Units.**

Progression from volcanic processes through rock weathering and soil-ecosystem development to landscape evolution. The course starts with an investigation of volcanic processes, including the volcano structure, origin of magmas, physical-chemical factors of eruptions. Factors controlling rock weathering and soil development, including depth and nutrient levels impacting plant ecosystems, are explored next. Geomorphic processes of landscape evolution including erosion rates, tectonic/volcanic activity, and hillslope stability conclude the course. Methods for monitoring and predicting eruptions, defining spatial changes in landform, landform stability, soil production rates, and measuring biogeochemical processes are covered throughout the course. This course is restricted to students accepted into the Earth Systems of Hawaii Program.

Same as: EARTHSCI 117, EARTHSYS 117.

**EESS 126. Institutions and the Natural Environment. 4 Units.**

Institutional theory is one of the most dynamic fields in social science today. The course will explore foundational and more recent literature in institutional theory from different disciplinary perspectives as it applies to environmental issues. Critical reading and active discussions will contribute to a deeper understanding of how environmental change is informed by institutions and organizations. Enrollment is limited to graduate students or permission from the instructor.

Same as: EARTHSYS 126, EARTHSYS 226, EESS 226.

**EESS 131. Communicating Environmental Research Using Narratives and Stories. 1 Units.**

Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

Same as: EARTHSYS 131, EARTHSYS 231, EESS 231.

**EESS 134. Stable Isotopes in Biogeochemistry. 3 Units.**

Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals.

Same as: EARTHSYS 134, EARTHSYS 234, EESS 234.

**EESS 141. Remote Sensing of the Oceans. 3-4 Units.**

How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features.

Same as: EARTHSYS 141, EARTHSYS 241, EESS 241.

**EESS 146A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

Same as: EARTHSYS 146A, EARTHSYS 246A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A.

**EESS 146B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. This course will give an overview of the structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic Circumpolar Current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A or EESS 246A, or CEE 164 or CEE 262D, or consent of instructor.

Same as: EARTHSYS 146B, EARTHSYS 246B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B.

**EESS 148. Introduction to Physical Oceanography. 4 Units.**

The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53). (Note: this course will be offered Win Qtr 2012-13. For Academic Year 2013-14, this course will potentially be moved to Aut Qtr)

Same as: CEE 164, CEE 262D, EARTHSYS 164.

**EESS 151. Biological Oceanography. 3-4 Units.**

Required for Earth Systems students in the oceans track. Interdisciplinary look at how oceanic environments control the form and function of marine life. Topics include distributions of planktonic production and abundance, nutrient cycling, the role of ocean biology in the climate system, expected effects of climate changes on ocean biology. Local weekend field trips. Designed to be taken concurrently with Marine Chemistry (EESS/EARTHSYS 152/252). Prerequisites: BIO 43 and EESS 8 or equivalent. Same as: EARTHSYS 151, EARTHSYS 251, EESS 251.

**EESS 152. Marine Chemistry. 3-4 Units.**

Introduction to the interdisciplinary knowledge and skills required to critically evaluate problems in marine chemistry and related disciplines. Physical, chemical, and biological processes that determine the chemical composition of seawater. Air-sea gas exchange, carbonate chemistry, and chemical equilibria, nutrient and trace element cycling, particle reactivity, sediment chemistry, and diagenesis. Examination of chemical tracers of mixing and circulation and feedbacks of ocean processes on atmospheric chemistry and climate. Designed to be taken concurrently with Biological Oceanography (EESS/EARTHSYS 151/251)

Same as: EARTHSYS 152, EARTHSYS 252, EESS 252.

**EESS 155. Science of Soils. 3-4 Units.**

Physical, chemical, and biological processes within soil systems. Emphasis is on factors governing nutrient availability, plant growth and production, land-resource management, and pollution within soils. How to classify soils and assess nutrient cycling and contaminant fate. Recommended: introductory chemistry and biology.

Same as: EARTHSYS 155.

**EESS 156. Soil and Water Chemistry. 1-4 Units.**

(Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.

Same as: EARTHSYS 156, EARTHSYS 256, EESS 256.

**EESS 158. Geomicrobiology. 3 Units.**

How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

Same as: EARTHSYS 158, EARTHSYS 258, EESS 258.

**EESS 160. Statistical Methods for Earth and Environmental Sciences: General Introduction. 3 Units.**

Extracting information from data using statistical summaries and graphical visualization, statistical measures of association and correlation, distribution models, sampling, error estimation and confidence intervals, linear models and regression analysis, introduction to time-series and spatial data with geostatistics, applications including environmental monitoring, natural hazards, and experimental design.

Same as: EARTHSYS 160.

**EESS 161. Statistical Methods for the Earth and Environmental Sciences: Geostatistics. 3-4 Units.**

Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools.  
Same as: EARTHSYS 161, ENERGY 161.

**EESS 162. Remote Sensing of Land. 4 Units.**

The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.  
Same as: EARTHSYS 142, EARTHSYS 242, EESS 262.

**EESS 164. Fundamentals of Geographic Information Science (GIS). 4 Units.**

Survey of geographic information including maps, satellite imagery, and census data, approaches to spatial data, and tools for integrating and examining spatially-explicit data. Emphasis is on fundamental concepts of geographic information science and associated technologies. Topics include geographic data structure, cartography, remotely sensed data, statistical analysis of geographic data, spatial analysis, map design, and geographic information system software. Computer lab assignments.  
Same as: EARTHSYS 144.

**EESS 173. Aquaculture and the Environment: Science, History, and Policy. 3 Units.**

Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures. By application only - instructor consent required. Contact gerhart@stanford.edu or dhklinger@stanford.edu prior to first day of class.  
Same as: EARTHSYS 173, EARTHSYS 273, EESS 273.

**EESS 179S. Issues in Environmental Science, Technology and Sustainability. 1-2 Units.**

Weekly seminar series that explores a wide range of topics associated with the environmental science and engineering and sustainability. Students taking the class for one unit must generate critiques and participate in discussion sections for a subset of the seminars. Students taking the class for 2 units will in addition to the one unit requirements will give a presentation on a relevant topic of their own choosing.  
Same as: CEE 179S, CEE 279S, EARTHSYS 179S.

**EESS 180B. Principles and Practices of Sustainable Agriculture. 3-4 Units.**

Field-based training in ecologically sound agricultural practices at the Stanford Community Farm. Weekly lessons, field work, and group projects. Field trips to educational farms in the area. Topics include: soils, composting, irrigation techniques, IPM, basic plant anatomy and physiology, weeds, greenhouse management, and marketing.  
Same as: EARTHSYS 180B.

**EESS 181. Concepts of Urban Agriculture. 3 Units.**

For advanced undergraduates and graduate students from all fields. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips are required. Students must attend one field trip from group A and another from group B. See below. Enrollment is limited. Application on the first day of class, attendance mandatory. Enrollment permissions will be determined after first class meeting. Contact tcostell@stanford.edu with questions. Group A: Community Urban Gardens - Saturday, April 14 (morning); Saturday, April 21 (morning) Group B: Commercial Urban Agriculture Operations - Friday, April 20 (all day); Friday, April 27 (all day)  
Same as: EARTHSYS 181, EARTHSYS 281, EESS 281.

**EESS 182. Current Issues in Sustainable Agriculture. 2 Units.**

Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.  
Same as: EARTHSYS 182, EARTHSYS 282, EESS 282.

**EESS 183. Food Matters: Agriculture in Film. 1 Unitss.**

Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.  
Same as: EARTHSYS 183, EARTHSYS 283, EESS 283.

**EESS 184. Climate and Agriculture. 3-4 Units.**

The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.  
Same as: EARTHSYS 184, EARTHSYS 284, EESS 284.

**EESS 208. Topics in Geobiology. 1 Unitss.**

Reading and discussion of classic and recent papers in the field of Geobiology. Co-evolution of Earth and life; critical intervals of environmental and biological change; geomicrobiology; paleobiology; global biogeochemical cycles; scaling of geobiological processes in space and time.  
Same as: GES 208.

**EESS 211. Fundamentals of Modeling. 3-5 Units.**

Simulation models are a powerful tool for environmental research, if used properly. The major concepts and techniques for building and evaluating models. Topics include model calibration, model selection, uncertainty and sensitivity analysis, and Monte Carlo and bootstrap methods. Emphasis is on gaining hands-on experience using the R programming language. Prerequisite: asic knowledge of statistics.  
Same as: EARTHSYS 211.

**EESS 212. Measurements in Earth Systems. 4 Units.**

Restricted to EESS first-year, graduate students. Techniques to track biological, chemical, and physical processes operating across the San Francisquito Creek watershed, encompassing upland, aquatic, estuarine, and marine environments. Topics include gas and water flux measurement, assessment of microbiological communities, determination of biological productivity, isotopic analysis, soil and water chemistry determination, and identification of rock strata and weathering processes.

**EESS 214. Introduction to geostatistics and modeling of spatial uncertainty. 3-4 Units.**

Introduction of fundamental geostatistical tools for modeling spatial variability and uncertainty, and mapping of environmental attributes. Additional topics include sampling design and incorporation of different types of information (continuous, categorical) in prediction. Assignments consist of small problems to familiarize students with theoretical concepts, and applications dealing with the analysis and interpretation of various data sets (soil, water pollution, atmospheric constituents, remote sensing) primarily using Matlab. No prior programming experience is required. Open to graduates. Open to undergraduates with consent from the instructor. 3-credit option includes midterm/final or student-developed project. 4-credit option requires both. Prerequisite: College-level introductory statistics.

**EESS 215. Earth System Dynamics. 4 Units.**

This is a graduate level course that examines the dynamics of the Earth System from an integrated perspective. Lectures introduce the physical, biogeochemical, ecological, and human dimensions of the Earth System, with emphasis on feedbacks, thresholds and tipping points. Human interactions with climate and land systems are emphasized in order to enable in-depth exploration of Earth System dynamics. Lab projects focus on a region of the globe for which rich coordinated data sources exist and complex Earth System dynamics dominate the environment.

**EESS 216. Terrestrial Biogeochemistry. 3 Units.**

Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students.

Same as: BIO 216.

**EESS 217. Climate of the Cenozoic. 3 Units.**

For upper-division undergraduate and graduate students. The paleoclimate of the Cenozoic and how climate changes in the past link to the carbon cycle. Topics include long- and short-term records of climate on continents and oceans, evidence for and causes of hyperthermal events, how the Earth's climate has responded in increased carbon dioxide in the atmosphere. Guest speakers, student presentations.

**EESS 220. Physical Hydrogeology. 4 Units.**

(Formerly GES 230.) Theory of underground water occurrence and flow, analysis of field data and aquifer tests, geologic groundwater environments, solution of field problems, and groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Lab. Prerequisite: elementary calculus.

Same as: CEE 260A.

**EESS 221. Contaminant Hydrogeology. 4 Units.**

(Formerly GES 231.) For earth scientists and engineers. Environmental and water resource problems involving contaminated groundwater. The processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Prerequisite: GES 230 or CEE 260A or equivalent.

Same as: CEE 260C.

**EESS 226. Institutions and the Natural Environment. 4 Units.**

Institutional theory is one of the most dynamic fields in social science today. The course will explore foundational and more recent literature in institutional theory from different disciplinary perspectives as it applies to environmental issues. Critical reading and active discussions will contribute to a deeper understanding of how environmental change is informed by institutions and organizations. Enrollment is limited to graduate students or permission from the instructor.

Same as: EARTHSYS 126, EARTHSYS 226, EESS 126.

**EESS 231. Communicating Environmental Research Using Narratives and Stories. 1 Unitss.**

Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

Same as: EARTHSYS 131, EARTHSYS 231, EESS 131.

**EESS 234. Stable Isotopes in Biogeochemistry. 3 Units.**

Light stable isotopes and their application to geological, ecological, and environmental problems. Isotopic systematics of hydrogen, carbon, nitrogen, oxygen, and sulfur; chemical and biogenic fractionation of light isotopes in the atmosphere, hydrosphere, and rocks and minerals.

Same as: EARTHSYS 134, EARTHSYS 234, EESS 134.

**EESS 240. Advanced Oceanography. 3 Units.**

For upper-division undergraduates and graduate students in the earth, biologic, and environmental sciences. Topical issues in marine science/oceanography. Topics vary each year following or anticipating research trends in oceanographic research. Focus is on links between the circulation and physics of the ocean with climate in the N. Pacific region, and marine ecologic responses. Participation by marine scientists from research groups and organizations including the Monterey Bay Aquarium Research Institute.

**EESS 241. Remote Sensing of the Oceans. 3-4 Units.**

How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features.

Same as: EARTHSYS 141, EARTHSYS 241, EESS 141.

**EESS 242. Antarctic Marine Geology. 3 Units.**

For upper-division undergraduates and graduate students. Intermediate and advanced topics in marine geology and geophysics, focusing on examples from the Antarctic continental margin and adjacent Southern Ocean.

Topics: glaciers, icebergs, and sea ice as geologic agents (glacial and glacial marine sedimentology, Southern Ocean current systems and deep ocean sedimentation), Antarctic biostratigraphy and chronostratigraphy (continental margin evolution). Students interpret seismic lines and sediment core/well log data. Examples from a recent scientific drilling expedition to Prydz Bay, Antarctica. Up to two students may have an opportunity to study at sea in Antarctica during Winter Quarter.

Same as: EARTHSYS 272.

**EESS 244. Marine Ecosystem Modeling. 3 Units.**

Practical background necessary to construct and implement a 2-dimensional (space and time) numerical model of a simple marine ecosystem. Computer programming, model design and parameterization, and model evaluation. Students develop and refine their own multi-component marine ecosystem model.

**EESS 245. Advanced Biological Oceanography. 3-4 Units.**

For upper-division undergraduates and graduate students. Themes vary annually but include topics such as marine bio-optics, marine ecological modeling, and phytoplankton primary production. Hands-on laboratory and computer activities, and field trips into local waters. May be repeated for credit.

**EESS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

Same as: EARTHSYS 146A, EARTHSYS 246A, EESS 146A, GEOPHYS 146A, GEOPHYS 246A.

**EESS 246B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. This course will give an overview of the structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic Circumpolar Current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A or EESS 246A, or CEE 164 or CEE 262D, or consent of instructor.

Same as: EARTHSYS 146B, EARTHSYS 246B, EESS 146B, GEOPHYS 146B, GEOPHYS 246B.

**EESS 249. Marine Stable Isotopes. 3 Units.**

This course will provide an introduction to stable isotopes biogeochemistry with emphasis on applications in marine science. We will cover fundamental concepts of nuclear structure and origin of elements and isotopes, and stable isotopic fractionation. We will discuss mass spectrometry techniques, mass independent fractionation, clumped isotopes, mass balance and box models. Applications of these concepts to studies of ocean circulation, marine carbon and nitrogen cycles, primary productivity, and particle scavenging will also be discussed.

**EESS 250. Elkhorn Slough Microbiology. 3 Units.**

(Formerly GES 270.) The microbial ecology and biogeochemistry of Elkhorn Slough, an agriculturally-impacted coastal estuary draining into Monterey Bay. The diversity of microbial lifestyles associated with estuarine physical/chemical gradients, and the influence of microbial activity on the geochemistry of the Slough, including the cycling of carbon, nitrogen, sulfur, and metals. Labs and field work. Location: Hopkins Marine Station.

**EESS 251. Biological Oceanography. 3-4 Units.**

Required for Earth Systems students in the oceans track. Interdisciplinary look at how oceanic environments control the form and function of marine life. Topics include distributions of planktonic production and abundance, nutrient cycling, the role of ocean biology in the climate system, expected effects of climate changes on ocean biology. Local weekend field trips. Designed to be taken concurrently with Marine Chemistry (EESS/EARTHSYS 152/252). Prerequisites: BIO 43 and EESS 8 or equivalent. Same as: EARTHSYS 151, EARTHSYS 251, EESS 151.

**EESS 252. Marine Chemistry. 3-4 Units.**

Introduction to the interdisciplinary knowledge and skills required to critically evaluate problems in marine chemistry and related disciplines. Physical, chemical, and biological processes that determine the chemical composition of seawater. Air-sea gas exchange, carbonate chemistry, and chemical equilibria, nutrient and trace element cycling, particle reactivity, sediment chemistry, and diagenesis. Examination of chemical tracers of mixing and circulation and feedbacks of ocean processes on atmospheric chemistry and climate. Designed to be taken concurrently with Biological Oceanography (EESS/EARTHSYS 151/251)

Same as: EARTHSYS 152, EARTHSYS 252, EESS 152.

**EESS 253S. Hopkins Microbiology Course. 3-12 Units.**

(Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their population, and other biological entities in a dynamically changing microbial ecosystem. Prerequisites: CEE 274A,B, or equivalents.

Same as: BIO 274S, BIOHOPK 274, CEE 274S.

**EESS 256. Soil and Water Chemistry. 1-4 Units.**

(Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.

Same as: EARTHSYS 156, EARTHSYS 256, EESS 156.

**EESS 258. Geomicrobiology. 3 Units.**

How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

Same as: EARTHSYS 158, EARTHSYS 258, EESS 158.

**EESS 259. Environmental Microbial Genomics. 1-3 Units.**

The application of molecular and environmental genomic approaches to the study of biogeochemically-important microorganisms in the environment without the need for cultivation. Emphasis is on genomic analysis of microorganisms by direct extraction and cloning of DNA from natural microbial assemblages. Topics include microbial energy generation and nutrient cycling, genome structure, gene function, physiology, phylogenetic and functional diversity, evolution, and population dynamics of uncultured communities.

**EESS 260. Advanced statistical methods for earth system analysis. 3 Units.**

Introduction for graduate students to important issues in data analysis relevant to earth system studies. Emphasis on concepts and implementation (in R), rather than formal proofs. Likely topics include the bootstrap, non-parametric methods, regression in the presence of spatial and temporal correlation, measurement errors, extreme value distributions, and high-dimensional regressions. Topics subject to change each year. Prerequisites: Stats 110 or equivalent, EESS 211.

**EESS 262. Remote Sensing of Land. 4 Units.**

The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

Same as: EARTHSYS 142, EARTHSYS 242, EESS 162.

**EESS 263. Topics in Advanced Geostatistics. 3-4 Units.**

Conditional expectation theory and projections in Hilbert spaces; parametric versus non-parametric geostatistics; Boolean, Gaussian, fractal, indicator, and annealing approaches to stochastic imaging; multiple point statistics inference and reproduction; neural net geostatistics; Bayesian methods for data integration; techniques for upscaling hydrodynamic properties. May be repeated for credit. Prerequisites: 240, advanced calculus, C++/Fortran.

Same as: ENERGY 242.

**EESS 273. Aquaculture and the Environment: Science, History, and Policy. 3 Units.**

Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures. By application only - instructor consent required. Contact gerhart@stanford.edu or dhklinger@stanford.edu prior to first day of class.

Same as: EARTHSYS 173, EARTHSYS 273, EESS 173.

**EESS 277G. Health and Development at the Food-Water Nexus. 1 Unitss.**

Linkages between water access, smallholder food production, poverty, and infectious disease, with particular emphasis on sub-Saharan Africa. Weekly reading, writing and discussion assignments focused on topics such as water supply, sanitation, and HIV: smallholder production, nutrition, and poverty; and infectious disease and child development. Permission of instructors required.

Same as: CEE 277G, MED 277.

**EESS 281. Concepts of Urban Agriculture. 3 Units.**

For advanced undergraduates and graduate students from all fields. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips are required. Students must attend one field trip from group A and another from group B. See below. Enrollment is limited. Application on the first day of class, attendance mandatory. Enrollment permissions will be determined after first class meeting. Contact tcostell@stanford.edu with questions. Group A: Community Urban Gardens - Saturday, April 14 (morning); Saturday, April 21 (morning) Group B: Commercial Urban Agriculture Operations - Friday, April 20 (all day); Friday, April 27 (all day)

Same as: EARTHSYS 181, EARTHSYS 281, EESS 181.

**EESS 282. Current Issues in Sustainable Agriculture. 2 Units.**

Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.

Same as: EARTHSYS 182, EARTHSYS 282, EESS 182.

**EESS 283. Food Matters: Agriculture in Film. 1 Unitss.**

Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.

Same as: EARTHSYS 183, EARTHSYS 283, EESS 183.

**EESS 284. Climate and Agriculture. 3-4 Units.**

The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.

Same as: EARTHSYS 184, EARTHSYS 284, EESS 184.

**EESS 292. Directed Individual Study in Environmental Earth System Science. 1-10 Units.**

Under supervision of an Environmental Earth System Science faculty member on a subject of mutual interest.

**EESS 301. Topics in Environmental Earth System Science. 1 Unitss.**

Current topics, issues, and research related to interactions that link the oceans, atmosphere, land surfaces and freshwater systems. May be repeated for credit.

**EESS 310. Climate and Energy Seminar. 3 Units.**

This course examines the links between climate change policy and other regulation of the energy sector in the U.S. context. In the electricity sector, these policies are likely to be closely interconnected, yet they are often considered in isolation. We will evaluate the impacts of energy, air pollution, and water pollution regulations on US greenhouse gas emissions from the energy sector. We will also examine how state regulatory activities aimed at reducing greenhouse gas emissions in the electricity sector are likely to have co-benefits for air and water pollution.

**EESS 318. Global Land Use Change to 2050. 2-3 Units.**

An exploration of the fundamental drivers behind long term shifts in the demand for, and supply of, land for agriculture, forestry and environmental uses over the next four decades. Topics include trends in food and bioenergy demand, crop productivity on existing and potential croplands, water and climate constraints, non-extractive uses such as carbon sequestration, and the role of global trade and public policies. Students will lead discussions of weekly readings and perform simple numerical experiments to explore the role of individual drivers of long run global land use.

**EESS 322A. Seminar in Hydrogeology. 1 Unitss.**

Current topics. May be repeated for credit. Autumn Quarter has open enrollment, For Winter Quarter, consent of instructor is required.

**EESS 322B. Seminar in Hydrogeology. 1 Unitss.**

Current topics. May be repeated for credit. Prerequisite: consent of instructor.

**EESS 323. Stanford at Sea. 16 Units.**

(Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

Same as: BIOHOPK 182H, BIOHOPK 323H, EARTHSYS 323.

**EESS 330. Advanced Topics in Hydrogeology. 1-2 Units.**

Topics: questioning classic explanations of physical processes; coupled physical, chemical, and biological processes affecting heat and solute transport. May be repeated for credit.

**EESS 342. Geostatistics. 1-2 Units.**

Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.

**EESS 342B. Geostatistics. 1-2 Units.**

Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.

**EESS 342C. Geostatistics. 1-2 Units.**

Classic results and current research. Topics based on interest and timeliness. May be repeated for credit.

**EESS 363F. Oceanic Fluid Dynamics. 3 Units.**

Dynamics of rotating stratified fluids with application to oceanic flows. Topics include: inertia-gravity waves; geostrophic and cyclogeostrophic balance; vorticity and potential vorticity dynamics; quasi-geostrophic motions; planetary and topographic Rossby waves; inertial, symmetric, barotropic and baroclinic instability; Ekman layers; and the frictional spin-down of geostrophic flows. Prerequisite: CEE 262A or a graduate class in fluid mechanics.

Same as: CEE 363F.

**EESS 364F. Advanced Topics in Geophysical Fluid Dynamics. 2-3 Units.**

A seminar-style class covering the classic papers on the theory of the large-scale ocean circulation. Topics include: wind-driven gyres, mesoscale eddies and geostrophic turbulence, eddy-driven recirculation gyres, homogenization of potential vorticity, the ventilated thermocline, subduction, and the abyssal circulation. Prerequisite: EESS 363F or CEE 363F. Recommended: EESS 246B.

Same as: CEE 364F.

**EESS 385. Practical Experience in the Geosciences. 1 Unitss.**

On-the-job training, that may include summer internship, in applied aspects of the geosciences, and technical, organizational, and communication dimensions. Meets USCIS requirements for F-1 curricular practical training. May be repeated for credit.

**EESS 398. Current Topics in Ecosystem Modeling. 1-2 Units.****EESS 400. Graduate Research. 1-15 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**EESS 801. TGR Project. 0 Unit.****EESS 802. TGR Dissertation. 0 Unit.**

## Ethics in Society Courses

**ETHICSOC 10SC. The Meaning of Life: Moral and Spiritual Inquiry through Literature. 2 Units.**

Short novels and plays will provide the basis for reflection on ethical values and the purpose of life. Some of the works to be studied are F. Scott Fitzgerald's *The Great Gatsby*, George Bernard Shaw's *Major Barbara*, Hermann Hesse's *Siddhartha*, Jane Smiley's *Good Will*, Robert Bolt's *A Man for All Seasons*, John Steinbeck's *Of Mice and Men*, and Nadine Gordimer's *None to Accompany Me*. We will read for plot, setting, character, and theme using a two-text method; looking at the narrative of the literary work and students' own lives, rather than either deconstructing the literature or relating it to the author's biography and psychology. The questions we will ask have many answers. Why are we here? How do we find meaningful work? What can death teach us about life? What is the meaning of success? What is the nature of true love? How can one find balance between work and personal life? How free are we to seek our own destiny? What obligations do we have to others? We will draw from literature set in the United States and elsewhere; secular and religious world views from a variety of traditions will be considered. The authors chosen are able to hold people up as jewels to the light, turning them around to show all of their facets, both blemished and pure, while at the same time pointing to any internal glow beneath the surface. Classes will be taught in a Socratic, discussion-based style. Study questions will accompany each reading and provide a foundation for class discussion. Grading will be based 50 percent on class participation, 25 percent on one-page reflection papers on reading assignments, and 25 percent on a four-page final paper due on September 15. Field trips will include an overnight camping experience.

**ETHICSOC 20. Introduction to Moral Philosophy. 5 Units.**

A survey of moral philosophy in the Western tradition. What makes right actions right and wrong actions wrong? What is it to have a virtuous rather than a vicious character? What is the basis of these distinctions? Why should we care about morality at all? Our aim is to understand how some of the most influential philosophers (including Aristotle, Kant, and Mill) have addressed these questions, and by so doing, to better formulate our own views. No prior familiarity with philosophy required. Fulfills the Ethical Reasoning requirement.

Same as: PHIL 2.

**ETHICSOC 131S. Modern Political Thought. 5 Units.**

This course offers an introduction to the history of Western political thought from the late fifteenth through the nineteenth centuries. We will consider the development of ideas like individual rights, government by consent, and the protection of private property. We will also explore the ways in which these ideas continue to animate contemporary political debates. Thinkers covered will include: Niccolò Machiavelli, Thomas Hobbes, John Locke, Jean-Jacques Rousseau, Edmund Burke, John Stuart Mill, and Karl Marx. Same as: POLISCI 131L.

**ETHICSOC 136R. Introduction to Global Justice. 5 Units.**

Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

Same as: INTNLREL 136R, PHIL 76, POLISCI 136R, POLISCI 336.

**ETHICSOC 170. Ethical Theory. 4 Units.**

A more demanding version of Phil. 2. Designed for juniors, seniors, and first-year graduate students who are new to moral philosophy. May be appropriate for some freshmen and sophomores (contact professor). Fulfills the Ethical Reasoning requirement.

Same as: PHIL 170, PHIL 270.

**ETHICSOC 171. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors. Same as: IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307.

**ETHICSOC 174A. Moral Limits of the Market. 4 Units.**

Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute? Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases.

Same as: PHIL 174A, PHIL 274A.

**ETHICSOC 178M. Introduction to Environmental Ethics. 5 Units.**

This course examines the following ethical questions about the environment: (1) how we ought morally to relate to animals; (2) attempts to expand the circle of moral concern beyond animals to other parts of nature; (3) economic approaches to environmental problems (e.g. cost-benefit analysis) and the justification of the precautionary principle; and (4) our moral obligations to future people. The class will conclude by considering whether the theoretical tools that we have examined help to address the problems of climate change, one of the most pressing environmental challenges of our time.

Same as: ETHICSOC 278M, PHIL 178M, PHIL 278M, POLISCI 134L.

**ETHICSOC 180M. Collective Action: Ethics and Policy. 4 Units.**

Individually rational actions can give rise to results that are collectively irrational. For example, the collective result of our consumption decisions is to warm the planet, destroy the world's fisheries, and increase reliance on factory farming; at the same time, the decisions of a single individual seem to have no tangible effect on such things. In light of this, what (if anything) are you as an individual required to do in these and other collective action situations, especially when others are not doing their part to prevent things from getting out of control? For example, are you required to reduce your carbon footprint and avoid products that are produced in ethically objectionable ways? Do you have a duty to vote? Is free-riding always ethically objectionable? Can you be required to 'cooperate' in a situation where you know that most others will 'defect'? Finally, from a real-world policy perspective, how can we bring about the best solutions to these and other collective action problems? Is the best policy response always a straightforward function of the variable features of each case? Interdisciplinary readings from authors in philosophy, politics, economics, and law such as Elinor Ostrom, Peter Singer, and Cass Sunstein.

Same as: PHIL 73, PUBLPOL 304A.

**ETHICSOC 182M. Business Ethics. 4 Units.**

What do people mean when they say, "it's just business"? Do they mean that there are no moral norms in business or do they mean that there are special moral norms in business that differ from those of personal relationships and other spheres of social activity? In this class we will examine ethical questions that arise in the domain of business. We will ask, for example: What does the market reward and what should it reward? What are the moral responsibilities of a business owner in a competitive environment? Is it acceptable to employ 'sweatshop labor'? How do the moral responsibilities of a business owner differ from that of a policy maker? What information does a seller (or buyer) have a moral duty to disclose? In real estate, is a strategic default morally wrong? How much government regulation of Wall Street is morally justified? We will use the writings of Plato, Aristotle, Cicero, J. S. Mill, Marx, Jevons and Menger, Hayek, Walzer, and Sandel, among others, to help us answer these questions. We will see, for example, what Aristotle thought about day trading.

Same as: PHIL 74.

**ETHICSOC 183M. Family, Friends, and Groups: The Ethics of Association. 4 Units.**

The practice of associating with others is a fundamental part of human existence. We cultivate friendships, we grow up in families, we work for nonprofit associations or businesses, we join social movements and sport clubs, and we participate in political associations with our fellow citizens. This seminar explores the ethical dimensions of association. What grounds a right to freedom of association? Do we have, beyond a right, also a duty to participate in associational life? Do we have special obligations towards our friends, family members, or fellow-citizens that we do not have toward strangers? To what extent should the internal life of private associations, such as families or churches, be regulated by the state? Should the state support, through tax-exemptions and subsidies, the nonprofit associations of civil society? Can a state exclude non-citizens, such as immigrants, in the same way in which a private club excludes non-members? These questions have wide-ranging implications for contemporary political and legal debates.

Same as: POLISCI 132C.

**ETHICSOC 184M. Population Ethics. 4 Units.**

This course examines the ethical issues that surround the decision to have a child. These issues are both private and public. For example, should we even have children knowing the environmental impacts of doing so? What kinds of population policies can the state legitimately enforce? Can it legitimately forbid parents from having more than one child? Can it adopt policies to promote a larger population? Other questions the course will consider include: Is the genetic engineering of children acceptable? Can it be permissible to use abortion as a means of sex selection? If one does have children, who ought pay the costs of supporting them?

Same as: PHIL 71.

**ETHICSOC 185M. Contemporary Moral Problems. 5 Units.**

As individuals and as members of societies, we make choices that can be assessed from the moral point of view. What choices should we make, and how should we make them? Is it ok to buy iThings when others lack basic nutrition? Does a preference for the taste of meat justify killing animals? When is deceptive seduction seriously wrong and when is it just sketchy? Topics include exploitation, poverty, sexual and reproductive autonomy, commercialization, homelessness, citizenship, education, stereotypes, affirmative action, and social responsibility.

Same as: PHIL 72, POLISCI 134P.

**ETHICSOC 190. Ethics in Society Honors Seminar. 3 Units.**

For students planning honors in Ethics in Society. Methods of research. Students present issues of public and personal morality; topics chosen with advice of instructor.

Same as: PHIL 178.

**ETHICSOC 199. Independent Studies in Ethics in Society. 1-15 Units.**

May be repeated for credit.

**ETHICSOC 200A. Ethics in Society Honors Thesis. 1-5 Units.**

Limited to Ethics in Society honors students, who must enroll once in A and once in B.

**ETHICSOC 200B. Ethics in Society Honors Thesis. 1-5 Units.**

Limited to Ethics in Society honors students, who must enroll once in A and once in B.



**ETHICSOC 232T. Theories of Civil Society, Philanthropy, and the Nonprofit Sector. 5 Units.**

What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. Readings in political philosophy, political sociology, and public policy. WIM for PoliSci students who enroll in PoliSci 236S.

Same as: POLISCI 236, POLISCI 236S.

**ETHICSOC 237M. Politics and Evil. 5 Units.**

In the aftermath of the Second World War, the political theorist Hannah Arendt wrote that the problem of evil will be the fundamental question of postwar intellectual life in Europe. This question remains fundamental today. The acts to which the word evil might apply—genocide, terrorism, torture, human trafficking, etc.—persist. The rhetoric of evil also remains central to American political discourse, both as a means of condemning such acts and of justifying preventive and punitive measures intended to combat them. In this advanced undergraduate seminar, we will examine the intersection of politics and evil by considering works by philosophers and political theorists, with occasional forays into film and media. The thinkers covered will include: Hannah Arendt, Immanuel Kant, Niccolò Machiavelli, Friedrich Nietzsche, and Michael Walzer.

Same as: POLISCI 237M.

**ETHICSOC 278M. Introduction to Environmental Ethics. 5 Units.**

This course examines the following ethical questions about the environment: (1) how we ought morally to relate to animals; (2) attempts to expand the circle of moral concern beyond animals to other parts of nature; (3) economic approaches to environmental problems (e.g. cost-benefit analysis) and the justification of the precautionary principle; and (4) our moral obligations to future people. The class will conclude by considering whether the theoretical tools that we have examined help to address the problems of climate change, one of the most pressing environmental challenges of our time.

Same as: ETHICSOC 178M, PHIL 178M, PHIL 278M, POLISCI 134L.

**ETHICSOC 280. Transitional Justice, International Criminal Tribunals, and the International Criminal Court. 3-5 Units.**

Historical backdrop of the Nuremberg and Tokyo Tribunals. The creation and operation of the Yugoslav and Rwanda Tribunals (ICTY and ICTR). The development of hybrid tribunals in East Timor, Sierra Leone, and Cambodia, including evaluation of their success in addressing perceived shortcomings of the ICTY and ICTR. Examination of the role of the International Criminal Court and the extent to which it will succeed in supplanting all other ad hoc international justice mechanisms and fulfill its goals. Analysis focuses on the politics of creating such courts, their interaction with the states in which the conflicts took place, the process of establishing prosecutorial priorities, the body of law they have produced, and their effectiveness in addressing the needs of victims in post-conflict societies.

Same as: INTNLREL 180A, IPS 280.

**FAMMED 210. The Healer's Art. 1 Unitss.**

Explores the human dimensions of medicine, creating a firm foundation for meeting the challenging demands of medical training and practice. A unique curriculum developed by Dr. Rachel Naomi Remen at UCSF and now offered at 70 U.S. medical schools and worldwide. (For details/evaluations see [http://ishiprograms.org/programs-medical\\_educators.html](http://ishiprograms.org/programs-medical_educators.html)). Medical students and faculty participate together in an innovative discovery model process that enables an in-depth sharing of experience, beliefs, aspirations and personal truths. Topics include deep listening, presence, acceptance, loss, grief, healing, relationship, encounters with awe and mystery, finding meaning, service, and self-care practices. No papers/exams. May be repeated for credit.

**FAMMED 213. Medical Tai Chi. 1 Unitss.**

Tai chi as a recognized form of complimentary and alternative medicine. Intended to promote student health and well-being and to decrease stress, depression, and anxiety through the practice of tai chi. Weekly practices under the instruction of world-renowned 20th generation tai chi expert, Master Shu Dong Li. Includes analysis of the literature/research regarding health benefits of tai chi.

**FAMMED 219. Mind-Body Medicine. 1 Unitss.**

AA small group (8-10) medical students experientially exploring of the interconnections among human capacities such as thought, emotion, belief, attitudes, and physical health. Review and practice of specific skills (including mindfulness exercises, meditation, imagery, visualization, body awareness, autogenics, and biofeedback) to enhance self-awareness, self-expression, and stress management. Readings relevant to mind-body medicine made available. Anticipated benefits to class participants include discovering and mobilizing their capacity to participate in valuable and proven methods of self knowledge and stress reduction, while dealing with the frustrations and alienation that many students experience in medical school and beyond.

**FAMMED 241. Assistantship in Family and Community Medicine. 6-12 Units.**

An in-depth experience with a family physician preceptor following the first year of the pre-clinical curriculum. The student applies during the first year to participate in the summer following completion. Application is through the Center for Family and Community Medicine ([avjohn@stanford.edu](mailto:avjohn@stanford.edu)). Placements with family physicians' practices throughout California.

**FAMMED 243. Introduction to Integrative Medicine. 1 Unitss.**

Presentations by local, national, and international experts in various modalities of integrative medicine commonly used by patients in the US, including mind-body medicine (biofeedback, clinical hypnosis, meditation, yoga); traditional whole systems of medicine (traditional Chinese medicine, Ayurveda); biological therapies (botanical medicine, supplements, herbal medicine); manipulative therapies (chiropractic, massage); and acupuncture. Lectures focus on evidence supporting the potential value of various treatment modalities and explanations of both the traditional and proposed scientific mechanisms of actions. Most classes include an experiential portion.

Same as: ANES 243.

## Family and Community Medicine Courses

**FAMMED 199. Undergraduate Directed Reading and Research in Family and Community Medicine. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**FAMMED 244. Ethnicity and Medicine. 1-3 Units.**

Weekly lecture series. Examines the linguistic, social class, and cultural factors that impact patient care. Presentations promote culturally sensitive health care services and review contemporary research issues involving minority and underserved populations. Topics include health care inequities and medical practices of African Americans, Asians, Latinos, Native Americans, immigrants, and refugees in both urban and rural settings. 1 unit requires weekly lecture attendance, completion of required readings, completion of response questions; 2 units requires weekly lecture attendance and discussion session, completion of required readings and weekly response questions; additional requirement for 3 units (HUMBIO only) is completion of a significant term paper. Only students taking the course for 3 units may request a letter grade.

Same as: HUMBIO 121E.

**FAMMED 245. Women and Health Care. 1 Unitss.**

Lecture series. Topics of interest to women as health care consumers and providers. The historical role of women in health care; current and future changes.

**FAMMED 252. Medicine & Horsemanship: An Outdoor, Equine Assisted Learning Course for Doctor-Patient Relationship. 1 Unitss.**

An outdoor experience working with horses to develop interpersonal skills for the clinician-patient and peer-peer relationship. A challenge throughout a clinical career is to conduct relationships with patients and colleagues in a manner that is professional, perceptive, confident, and authentic. Horses mirror and magnify our intentions and behaviors. Working with horses requires sensitivity to nonverbal cues, discrimination in the quality and amount of physical contact, and an awareness of one's emotional state, all important skills for relating to patients. Horses give non-judgmental feedback about our personal communication and leadership styles and our ability to operate from a place of empathy and kindness. The course also teaches how to recognize subjectivity in judgment and how to overcome fear and immobility in the face of uncertainty. No riding is required and no previous horse experience is assumed. Open to anyone with direct patient care responsibility, space permitting. Limit 12 students.

**FAMMED 280. Early Clinical Experience in Family and Community Medicine. 1-3 Units.**

Provides an observational experience for pre-clinical students as determined by the instructor and student. Prerequisite: consent of instructor.

**FAMMED 292. Clinical Skills Maintenance Experience. 3 Units.**

(Formerly FAMMED 311) For MSTP students and other Stanford Medical students obtaining combined M.D./Ph.D. degrees through non-MSTP programs only. Students are assigned to a primary care clinic within medicine, family medicine or pediatrics, or a specialty clinic that can offer similar experiences. Continuity of mentorship is the first priority and is desired for reinforcement of basic medical skills; continuity of patients is also desirable, but second priority. Students attend clinic one morning or afternoon per week for two contiguous quarters of the year in which they defend their Ph.D.theses (minimum 10 clinics per quarter). Each four hour clinic session the student: (1) obtains the history of a clinic patient; (2) conducts a physical exam; (3) formulates a differential diagnosis or problem list; (4) presents the patient to her/his clinic preceptor; and (5) prepares a write-up of the case. The clinic preceptor observes and provides guidance for the student's history taking and physical examination skills and critiques the differential diagnosis, verbal presentation, and write-up. The student is guided in the use of the computerized medical record and is asked to progressively integrate this information into the review of the patient history. The clinical preceptor reviews the results of the student's Micro-CPX, Mini-CPX, POM course evaluations, and E4C Mentor evaluations and uses this information to address any perceived weaknesses. The preceptor provides verbal and written performance evaluations to the student and a standardized evaluation becomes part of the student's record. The director of the E4C-MSTP program reviews, on a regular basis, the written performance evaluations of each student taking this course.. Deficits are to be identified and addressed before the student enters clinical training. Prerequisite: INDE 206.

**FAMMED 299. Directed Reading in Family and Community Medicine. 1-18 Units.**

Students organize an individualized study program in family and community medicine. Prerequisite: consent of instructor.

**FAMMED 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**FAMMED 399. Graduate Research. 1-18 Units.**

Students interested in conducting research in a specific area of family and community medicine undertake investigations sponsored by the faculty instructor. Prerequisite: consent of instructor.

## Feminist Studies Courses

### **FEMST 52N. Spoken Sexuality: Language and the Social Construction of Sexuality. 3 Units.**

This course, divided into three sections, examines the many ways language is used in the construction of sexuality and sexual identity. In the first section, we consider how language is used as a resource for performing and perceiving sexual identity. Drawing on detailed linguistic analyses of pronunciation, word choice, and grammar, we will address questions such as the following: Is there a gay accent? Why isn't there a lesbian accent? How do transgendered people modify their linguistic behavior when transitioning? How are unmarked (heterosexual) identities linguistically constructed? While sexuality is largely an issue of identity, it is also an issue of desire. In the second section of the course, we examine iconic relations between elements of language (e.g. breathy voice quality, high pitch) and aspects of desire (e.g. arousal, excitement). In the final section, we investigate ways in which language encodes ideologies about sexuality. Specifically, we will study how language is used to talk about sexuality in public discourses about gay marriage and bullying, as well as in personal narratives of coming out. We will also consider how language encodes dominant ideologies about sexuality, evident in labels for sexual minorities as well as terminology for sex acts. Class activities will center on discussions of readings, explorations of how sexuality is portrayed in popular media, and analyses of primary data. Students will be expected to write a final research paper on a topic of their choice.

Same as: LINGUIST 52N.

### **FEMST 85SI. Gender and Politics. 1-2 Units.**

In 1776, Abigail Adams asked her husband to "remember the ladies" as he drafted the Constitution. Echoing one of the fundamental grievances of the Revolution, she warned: "We will not hold ourselves bound by laws in which we have no voice or representation." However, as we enter the 2012 elections, women remain severely underrepresented in America's political institutions with a recent UN Women study ranking the United States as No 78 in the world in terms of women's political representation. With Elections 2012 coming up, this course will explore both theoretical approaches to women's political representation and leadership and current politics relating to gender.

### **FEMST 101. Introduction to Feminist Studies. 4-5 Units.**

Introduction to interdisciplinary feminist scholarship, which seeks to understand the creation, perpetuation, and critiques of gender inequalities. Topics include the historical emergence of feminist politics and contemporary analyses of work and family, health and sexuality, creativity, and politics. Close attention to the intersections of race, gender, ethnicity, and sexuality and to international, as well as U.S., perspectives. Students learn to think critically about gender in the past, present, and future.

Same as: AMSTUD 107, CSRE 108.

### **FEMST 102. Contemporary Topics in Feminist & Queer Theories. 4-5 Units.**

Introduction to the points of overlap and departure in the development of feminist and queer theories. Interdisciplinary perspectives on gender and sexuality in relation to current discussions of race, class, ethnicity, citizenship, and ability. Topics include the production of femininity and masculinity, human-animal divisions, transgender subjectivities, diasporic sexualities, disability and sexuality, same-sex marriage. Course materials include theoretical texts as well as film, visual art, and literature. Preference to Feminist Studies majors.

Same as: FEMST 202.

### **FEMST 103. Feminist Theories and Methods Across the Disciplines. 2-5 Units.**

The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research.

Same as: FEMST 203, PHIL 153, PHIL 253.

### **FEMST 104A. Junior Seminar and Practicum. 1 Unitss.**

Preference to and required of Feminist Studies majors; others require consent of instructor. Feminist experiential learning projects related to critical studies in gender and sexuality. Identifying goals, grant proposal writing, and negotiating ethical issues in feminist praxis. Developing the relationship between potential projects and their academic focus in the major.

### **FEMST 104B. Senior Seminar and Practicum. 2 Units.**

Required for Feminist Studies majors. Non-majors enrolled with consent of instructor. Students develop oral reports on their practicum and its relationship to their academic work, submit a report draft and revised written analysis of the practicum, and discuss applications of feminist scholarship. May be repeated once for credit.

### **FEMST 105. Honors Work. 1-15 Units.**

(Staff).

### **FEMST 106. Queer Studies Colloquium. 1 Unitss.**

What is Queer Studies? What kind of work is being done in Queer Studies at Stanford and beyond? Weekly interdisciplinary lectures focus on issues of gender, sexuality, and queer theory. Scholars across programs and departments cover topics such as international queer social movements, queer literary studies, and queer theory and the environment, among others. No prior knowledge of Queer Studies required.

Same as: FEMST 206.

### **FEMST 108. Internship in Feminist Studies. 1-5 Units.**

Supervised field, community, or lab experience in law offices, medical research and labs, social service agencies, legislative and other public offices, or local and national organizations that address issues related to gender and/or sexuality. One unit represents approximately three hours work per week. Required paper. May be repeated for credit. Service Learning Course (certified by Haas Center). FS Majors may not receive 108 credit for their required practicum, as they are to sign up for FEMST 104 A & B instead. Prerequisites: Course work in Feminist Studies, written proposal and application form submitted for approval by program office, written consent of faculty sponsor. Course may be taken 3 times total, for a max of 15 units.

### **FEMST 110. Introduction to Comparative Queer Literary Studies. 3-5 Units.**

Introduction to the comparative literary study of important gay, lesbian, queer, bisexual, and transgender writers and their changing social, political, and cultural contexts from the 1890s to today: Wilde, Gide, Lucie Delarue-Mardrus, Radclyffe Hall, E.M. Forster, Thomas Mann, Georges Bataille, James Baldwin, Jean Genet, Jeanette Winterson, Sarah Waters, Audre Lorde, discussed in the context of 20th-century feminist and queer literary and social theories of gender and sexuality (Judith Butler, Eve Sedgwick, Julia Serano, and others).

Same as: COMPLIT 110, COMPLIT 310.

### **FEMST 120. Introduction to Queer Studies. 4-5 Units.**

A historical overview of key theoretical developments in Queer studies. Multidisciplinary perspective from a social constructionist approach to gender and sexual identity, which not only affects understandings of "queer" people, but "straight" as well. Examines how queer theory has been influential across disciplines and in popular culture, refining not only an understanding of gender and sexuality but also providing new critical perspectives for social theory more broadly. Engagement with contemporary debates and controversies in the public domain.

**FEMST 129. Critical Issues in International Women's Health. 4 Units.**

Women's lives, from childhood through adolescence, reproductive years, and aging. Economic, social, and human rights factors, and the importance of women's capacities to have good health and manage their lives in the face of societal pressures and obstacles. Emphasis is on life or death issues of women's health that depend on their capacity to negotiate or feel empowered, including maternal mortality, violence, HIV/AIDS, reproductive health, and sex trafficking. Organizations addressing these issues. A requirement of this class is participation in public blogs. Prerequisites: Human Biology core or equivalent or consent of instructor. Same as: HUMBIO 129.

**FEMST 138. Violence Against Women: Theory, Issues, and Prevention. 3-4 Units.**

Course offers an interdisciplinary feminist perspective on the causes of gender violence, addresses the multi-leveled approaches to ending gender violence, and explores the relationship between violence against women and other forms of oppression: racism, economic exploitation, heterosexism and social class. Framework examines institutional barriers maintaining gender violence in our culture and considers multi-dimensional solutions. Students from every discipline, women and men, apply theoretical perspectives to professional goals and an optional service-learning project. Service Learning Course (certified by Haas Center) Same as: FEMST 238.

**FEMST 139. Rereading Judaism in Light of Feminism. 4 Units.**

During the past three decades, Jewish feminists have asked new questions of traditional rabbinic texts, Jewish law, history, and religious life and thought. Analysis of the legal and narrative texts, rituals, theology, and community to better understand contemporary Jewish life as influenced by feminism. Same as: JEWISHST 139.

**FEMST 140D. LGBT/Queer Life in the United States. 4-5 Units.**

An introductory course on LGBT social, cultural, and political history in the United States. This course explores how categories of sexuality have changed over time, with particular emphasis on the relationship among homosexuality, heterosexuality, and transgenderism. Students will analyze how the intersections of race, class, and sexuality influenced the constitution of these categories and the politics of social relations. Historical and literary sources will be used to examine changes in LGBT experiences and identities, primarily in the twentieth century. Same as: HISTORY 257C.

**FEMST 140E. Black (W)holes: Queering Afro-Futurism. 5 Units.**

This course will examine the mode of expression, artistic ideology, radical philosophy, political aim and social claim that constitutes what scholars and artists have termed "Afro-futurity." We will consider the ways that this project - manifest in black explorations of space, bio-technologies, sci-fantasy, and the complex connections between the past and future - might hearken to or give room for a queer liberationist politic. Looking to critical feminist, queer, and race theory as an interpretive base, we will investigate afro-futurist expressions in film, literature, music, visual art, and other performance, reflecting on questions and themes like: How does the afro-futurist vision imagine new modes of gender, sex/uality, embodiment, and power? How does it radicalize the notion of the individual? What existential anxieties and assurances conjure the afro-futurist vision? What (a)historical traumas, breaches, breaks and cuts trouble notions of humanity, terrestrial belonging, normative realities? How does the power of black speculation (as progressive truth) work to displace these norms and "truths"?

**FEMST 140P. Queer Art and Performance. 4-5 Units.**

Examines the late 19th, 20th and 21st century forms of performance-- including examples from drama, theater, cabaret, and performance art -- through the perspectives of contemporary critical gender and queer theories. Texts and movements range from early avant-garde (Dada, Futurism) to gay and lesbian drama (Lillian Hellmann, Joe Orton, Tony Kushner) to post-liberation Queer performance and video (Split Britches, Carmelita Tropicana, Kalup Linzy). Theorists include Judith Butler, Michel Foucault, and Eve Kosofsky Sedgwick. Same as: TAPS 164T, TAPS 364T.

**FEMST 153. Women and the Creative Imagination. 4-5 Units.**

Examines the nature of artistic imagination, considering the relationship among muses, mentors and models for women engaged painting, music, theatre, film, creative writing, dance, etc We will study how gender relations and sexual identity have affected women's art across various cultures, lands and times. We will critically examine gender roles in music, visual art and literature. Active student participation (in writing, discussion as well as in attendance at performances, exhibits and readings) is the heart of the class. Same as: FEMST 253.

**FEMST 166. Feminist Theories of Knowledge. 4 Units.**

Feminist critique of traditional approaches in epistemology and alternative feminist approaches to such topics as reason and rationality, objectivity, experience, truth, the knowing subject, knowledge and values, knowledge and power. Same as: PHIL 184F, PHIL 284F.

**FEMST 188N. Imagining Women: Writers in Print and in Person. 4-5 Units.**

Gender roles, gender relations and sexual identity explored in contemporary literature and conversation with guest authors. Weekly meetings designated for book discussion and meeting with authors. Interest in writing and a curiosity about diverse women's lives would be helpful to students. Students will use such tools as close reading, research, analysis and imagination. Seminar requires strong voice of all participants. Oral presentations, discussion papers, final projects.

**FEMST 191Q. Writing Women's Lives. 2 Units.**

Creative writing through dialogue focusing on prose about the lives of women in different cultures and generations. Novels, short stories, and micro-narrative including fiction and memoir. Students produce work using research, memory, imagination, and metaphor.

**FEMST 195. Directed Reading. 1-15 Units.**

May be repeated for credit. (Staff).

**FEMST 203. Feminist Theories and Methods Across the Disciplines. 2-5 Units.**

The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research. Same as: FEMST 103, PHIL 153, PHIL 253.

**FEMST 206. Queer Studies Colloquium. 1 Unitss.**

What is Queer Studies? What kind of work is being done in Queer Studies at Stanford and beyond? Weekly interdisciplinary lectures focus on issues of gender, sexuality, and queer theory. Scholars across programs and departments cover topics such as international queer social movements, queer literary studies, and queer theory and the environment, among others. No prior knowledge of Queer Studies required. Same as: FEMST 106.

**FEMST 210. Queer Almodovar. 3-5 Units.**

Focus on the representation of non-normative sexualities and genders in films by Pedro Almodóvar, one of the most recognizable auteur directors in Europe today. Analysis of his hybrid and eclectic visual style complemented by critical and theoretical readings in queer studies. Taught in English.

Same as: ILAC 210.

**FEMST 238. Violence Against Women: Theory, Issues, and Prevention. 3-4 Units.**

Course offers an interdisciplinary feminist perspective on the causes of gender violence, addresses the multi-leveled approaches to ending gender violence, and explores the relationship between violence against women and other forms of oppression: racism, economic exploitation, heterosexism and social class. Framework examines institutional barriers maintaining gender violence in our culture and considers multi-dimensional solutions. Students from every discipline, women and men, apply theoretical perspectives to professional goals and an optional service-learning project. Service Learning Course (certified by Haas Center)

Same as: FEMST 138.

**FEMST 253. Women and the Creative Imagination. 4-5 Units.**

Examines the nature of artistic imagination, considering the relationship among muses, mentors and models for women engaged painting, music, theatre, film, creative writing, dance, etc We will study how gender relations and sexual identity have affected women's art across various cultures, lands and times. We will critically examine gender roles in music, visual art and literature. Active student participation (in writing, discussion as well as in attendance at performances, exhibits and readings) is the heart of the class.

Same as: FEMST 153.

**FEMST 258. Topics in the History of Sexuality: Sexual Violence. 4-5 Units.**

Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.

Same as: AMSTUD 258, CSRE 192E, FEMST 358, HISTORY 258, HISTORY 358.

**FEMST 260. Seminar in Women's Health: Women and Disabilities. 5 Units.**

Explores visible and invisible disabilities, women's psychological as well as physical health, issues of access, caretaking, self-definition and the diversity of disabled women's identities. Disabilities covered include blindness, multiple sclerosis, diabetes, arthritis, emotional and learning disabilities, and conditions requiring wheelchairs and other forms of physical assistance. Prerequisite: consent of instructor.

Same as: FEMST 360.

**FEMST 261F. Gender and Sexuality in Asian American Literature. 5 Units.**

How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations; that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings will include literary criticism, feminist and queer theory.

Same as: AMSTUD 261F, ASNAMST 188, ENGLISH 261F, FEMST 361F.

**FEMST 358. Topics in the History of Sexuality: Sexual Violence. 4-5 Units.**

Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.

Same as: AMSTUD 258, CSRE 192E, FEMST 258, HISTORY 258, HISTORY 358.

**FEMST 360. Seminar in Women's Health: Women and Disabilities. 5 Units.**

Explores visible and invisible disabilities, women's psychological as well as physical health, issues of access, caretaking, self-definition and the diversity of disabled women's identities. Disabilities covered include blindness, multiple sclerosis, diabetes, arthritis, emotional and learning disabilities, and conditions requiring wheelchairs and other forms of physical assistance. Prerequisite: consent of instructor.

Same as: FEMST 260.

**FEMST 361F. Gender and Sexuality in Asian American Literature. 5 Units.**

How writers and representations dialogue, challenge, resist, and complicate such formative constructions of gendered/sexual identities. How queer Asian Americans face multiple negations; that include potential expulsion from their own families and from various communities. Authors include Bharati Mukherjee, Russell Leong, Suki Kim, Shawn Wong, Louis Chu, Lawrence Chua, Catherine Liu, Jessica Hagedorn, Timothy Liu, Shani Mootoo, David Mura, among others. Secondary readings will include literary criticism, feminist and queer theory.

Same as: AMSTUD 261F, ASNAMST 188, ENGLISH 261F, FEMST 261F.

**FEMST 389E. Queer of Color Critique: Race, Sex, Gender in Cultural Representations. 3-5 Units.**

Examines major questions and issues that arise in considering race, sex, and gender together. Focus on critical and theoretical texts queering ethnic and diaspora studies and bringing race and ethnicity into queer studies. Close reading of texts in a variety of media negotiating racialized sexualities and sexualized identities. How is desire racialized? How is racial difference produced through sex acts? How to reconcile pleasure and desire with histories of imperialism and (neo)colonialism and structures of power?

Same as: CSRE 289E, ILAC 389E.

## Film Production Courses

**FILMPROD 10AX. Filmmaking. 2 Units.**

Fundamentals of digital video production. Process of expressing ideas in an audio-visual medium from the concept stage through post-production. Examples of narrative, documentary, and experimental work screened and discussed. Hands-on experience in directing, shooting, editing on Final Cut Pro, sound design, and a fuller understanding of film production.

**FILMPROD 11AX. Intro to Visual Writing. 2 Units.**

Intro to Visual Writing is a screenwriting workshop that takes students from basic visual literacy to scene writing and longer sequences, culminating in a completed short screenplay or beginning of a feature film. Students will engage in exercises in basic visual literacy (composition, shot selection, camera movement) and more advanced visual thinking (storyboarding); learn the fundamentals of writing in screenplay form (both format and content); and complete a number of scene writing exercises which build toward longer sequential storytelling. Throughout the course students will learn to give and take constructive criticism in a writing workshop, a crucial skill for the collaborative world of film.

**FILMPROD 101. Screenwriting. 5 Units.**

Priority to Film and Media Studies majors. Craft, form, and approaches to writing for the screen. Prerequisites: 1) ENGLISH 90, 2) ENGLISH 190F or FILMPROD 104, and 3) consent of instructor.

Same as: FILMPROD 301.

**FILMPROD 104. Visual Writing. 4 Units.**

A writing workshop that is an exploration of visual storytelling. Beginning with visual literacy, the class progresses from basic cinematic techniques through scene exercises to revisions and ultimately to connecting scenes in order to build sequences of script pages. Open to all majors; may substitute for ENGL 190F prerequisite for FP101.

**FILMPROD 105. Script Analysis. 4 Units.**

Analysis of screenplay and film from the writer's perspective, with focus on ideation, structure, and dramatic tension in narrative features. Sources include screenplays and screenings.

Same as: FILMPROD 305.

**FILMPROD 110. Advanced Screenwriting. 5 Units.**

Advanced writing workshop in which students develop and complete a feature-length screenplay. Prerequisites: FP101 Screenwriting and approval of the instructor. Enrollment is limited.

**FILMPROD 114. Introduction to Film and Video Production. 5 Units.**

Hands-on. Techniques of film and video making including conceptualization, visualization, story structure, cinematography, sound recording, and editing. Enrollment limited to 12 students. Priority to junior/senior Film & Media Studies majors.

**FILMPROD 301. Screenwriting. 5 Units.**

Priority to Film and Media Studies majors. Craft, form, and approaches to writing for the screen. Prerequisites: 1) ENGLISH 90, 2) ENGLISH 190F or FILMPROD 104, and 3) consent of instructor.

Same as: FILMPROD 101.

**FILMPROD 305. Script Analysis. 4 Units.**

Analysis of screenplay and film from the writer's perspective, with focus on ideation, structure, and dramatic tension in narrative features. Sources include screenplays and screenings.

Same as: FILMPROD 105.

**FILMPROD 400. Film/Video Writing and Directing. 4 Units.**

Restricted to M.F.A. documentary students. Emphasis is on the development of the research, conceptualization, visualization, and preproduction skills required for nonfiction filmmaking. Prerequisite: consent of instructor.

**FILMPROD 401. Nonfiction Film Production. 4 Units.**

Restricted to M.F.A. documentary students. 16mm production techniques and concepts. Final project is a short black-and-white film with multitrack sound design. Prerequisite: consent of instructor.

**FILMPROD 402. Digital Video. 4 Units.**

Restricted to M.F.A. documentary students. Fundamentals of digital storytelling. Working with small format cameras, interviewing techniques, and nonlinear editing skills. Prerequisite: consent of instructor.

**FILMPROD 403. Advanced Documentary Directing. 4 Units.**

Restricted to M.F.A. documentary students. Further examination of structure, emphasizing writing and directing nonfiction film. Prerequisite: consent of instructor.

**FILMPROD 404. Advanced Film and Video Production. 4 Units.**

Restricted to M.F.A. documentary students. Techniques of visual storytelling and observational shooting. Final quarter of professional training in 16mm motion picture production. Prerequisite: consent of instructor.

**FILMPROD 405. Producing Practicum. 4 Units.**

Restricted to M.F.A. documentary students. Advanced producing principles through the preproduction of the M.F.A. thesis project, including development of a professional film proposal. Practical training in fundraising. Prerequisite: consent of instructor.

**FILMPROD 406A. Documentary M.F.A. Thesis Seminar I. 4 Units.**

Restricted to M.F.A. documentary students. Production of film or video project. Focus is on shooting strategies, ethical challenges, and practical production issues. Prerequisite: consent of instructor.

**FILMPROD 406B. Documentary M.F.A. Thesis Seminar II. 4 Units.**

Restricted to M.F.A. documentary students. Editing and post-production of film or video project. Emphasis is on aesthetic choices (structure, narration, music), distribution, contracts, and audience. Prerequisite: consent of instructor.

## Film Studies Courses

**FILMSTUD 4. Introduction to Film Study. 5 Units.**

Formal, historical, and cultural issues in the study of film. Classical narrative cinema compared with alternative narrative structures, documentary films, and experimental cinematic forms. Issues of cinematic language and visual perception, and representations of gender, ethnicity, and sexuality. Aesthetic and conceptual analytic skills with relevance to cinema.

**FILMSTUD 4S. Language of Film. 4 Units.**

This course familiarizes students with various elements of film language (cinematography, editing, sound, etc.) and introduces them to a range of approaches to cinematic analysis (authorship, genre, close formal reading, socio-historical considerations). Different types of films (narrative, documentary, and experimental) will be surveyed. Classical narrative cinema will be compared with alternative modes of story-telling.

**FILMSTUD 6. Introduction to Digital Media. 5 Units.**

Media beyond the horizon of cinema and television present unique problems of definition and analysis. Taking the digital - information represented as discrete values - as a reasonable approximation of the mechanics and fantasies of computation, course surveys theoretical approaches to code, networks, and cyberspace. Taking familiar formations like web sites and video games as objects by which to learn how thinkers have understood and envisioned emerging media from the mid-20th century to the present. Students to develop own methodological tools for becoming more critical users of digital media.

**FILMSTUD 7. Introduction to Television Studies. 5 Units.**

Television is arguably the most influential and ubiquitous mass medium of the last half century. Because of its familiarity and popularity, it is also often the medium most overlooked, dismissed, and maligned. Drawing from the history of television and of television scholarship, this course builds a theoretical framework for understanding this pivotal cultural form. Course covers interdisciplinary approaches to studying TV texts, TV audiences, and TV industries, including questions of the boundaries of television (from independent and avant-garde video to convergence). In the process students develop methodological tools as critical television viewers.

**FILMSTUD 100A. History of World Cinema I, 1895-1929. 4 Units.**

From cinema's precursors to the advent of synchronized sound. Same as: FILMSTUD 300A.

**FILMSTUD 100B. History of World Cinema II, 1930-1959. 4 Units.**

The impact of sound to the dissolution of Hollywood's studio system. Same as: FILMSTUD 300B.

**FILMSTUD 100C. History of World Cinema III, 1960-Present. 4 Units.**

From the rise of the French New Wave to the present. Same as: FILMSTUD 300C.

**FILMSTUD 101. Fundamentals of Cinematic Analysis. 4 Units.**

The close analysis of film. Emphasis is on formal and narrative techniques in structure and style, and detailed readings of brief sequences. Elements such as cinematography, mise-en-scène, composition, sound, and performance. Films from various historical periods, national cinemas, directors, and genres. Prerequisite: FILMSTUD 4 or equivalent. Recommended: ARTHIST 1 or FILMSTUD 102. Course can be repeated twice for a max of 8 units.

Same as: FILMSTUD 301.

**FILMSTUD 102. Theories of the Moving Image. 4 Units.**

Major theoretical arguments and debates about cinema: realism, formalism, poststructuralism, feminism, postmodernism, and phenomenology.

Prerequisites: ARTHIST 1, FILMSTUD 4.

Same as: FILMSTUD 302.

**FILMSTUD 114. Comics. 4 Units.**

The modern medium of comics, a history that spans 150 years. The flexibility of the medium encountered through the genres of humorous and dramatic comic strips, superheroes, undergrounds, independents, journalism, and autobiography. Innovative creators including McCay, Kirby, Barry, Ware, and critical writings including McCloud, Eisner, Groensteen. Topics include text/image relations, panel-to-panel relations, the page, caricature, sequence, seriality, comics in the context of the fine arts, and relations to other media.

Same as: FILMSTUD 314.

**FILMSTUD 115. Documentary Issues and Traditions. 4 Units.**

Issues include objectivity/subjectivity, ethics, censorship, representation, reflexivity, responsibility to the audience, and authorial voice. Parallel focus on form and content.

Same as: FILMSTUD 315.

**FILMSTUD 116. International Documentary. 4 Units.**

Historical, aesthetic, and formal developments of documentary through nonfiction films in Europe, Asia, Latin America, and Africa.

Same as: FILMSTUD 316.

**FILMSTUD 132. East Asian Cinema. 4 Units.**

Social, historical, and aesthetic dimensions of the cinemas of Japan, Hong Kong, Taiwan, mainland China, and Korea. Topics such as nation and gender, form and genre, and local and transnational conditions of practice and reception. Screenings include popular and art films from the silent to contemporary eras, including, Zhang Yimou, Wong Kar-wai, Hou Hsiao-hsien, Ozu Yasujiro, Kurosawa Akira, and Im Kwon-taek.

Same as: FILMSTUD 332.

**FILMSTUD 133. Contemporary Chinese Auteurs. 4 Units.**

New film cultures and movements in Taiwan, Hong Kong, and mainland China in the 80s. Key directors including Jia Zhangke, Wu Wenguang, Tsai Ming-liang, Hou Hsiao-hsien, Wong Kar-wai, Ann Hui. Topics include national cinema in the age of globalization, the evolving parameters of art cinema, and authorship.

Same as: FILMSTUD 333.

**FILMSTUD 136. Gender and Sexuality in Chinese Cinema. 4 Units.**

Representations of gender and sexuality in the cinemas of China, Taiwan, and Hong Kong, covering key periods and genres such as the golden age of Shanghai film, Hong Kong action pictures, opera films, post-socialist art films, and new queer cinema. Historical and contemporary perspectives on cinematic constructions of femininity, masculinity, and sexuality as they relate to issues of nationalism, modernity, globalization, and feminist and queer politics. Weekly screening required.

Same as: FILMSTUD 336.

**FILMSTUD 137. European New Wave Cinemas. 4 Units.**

An exploration of the major currents, movements, and schools in the European cinema of the post-war era from the late 1940s to the 1970s. A mixture of historical, aesthetic, and theoretical concerns will inform the study of French New Wave, British Free Cinema, Italian cinema in the 1960s, the New German Cinema of the 1970s, and more.

Same as: FILMSTUD 337.

**FILMSTUD 140. Film Aesthetics: Editing. 4 Units.**

Practical and theoretical approaches to editing and montage. The role of editing in film meaning, and cognitive and emotional impact on the viewer. Developments in the history and theory of cinema including continuity system, Soviet montage, French new wave, postwar and American avant garde. Aesthetic functions, spectatorial effects, and ideological implications of montage. Film makers include Eisenstein, Godard, and Conner.

Same as: FILMSTUD 340.

**FILMSTUD 141. Music Across Media: Music Video to Postclassical Cinema. 4 Units.**

What makes music videos, YouTube clips and musical numbers in today's films engaging? What makes them tick? This course emphasizes aesthetics and close reading. We will try to figure out how music videos and its related forms work. To do so, we consider uses of the body, how visual iconography operates, what lyrics and dialogue can do, how and what music can say, and how it can work with other media. We will be concerned with questions of representation; how class, ethnicity, gender, race and nationality function. The course also examines viewership and industry practices.

Same as: FILMSTUD 341, MUSIC 185, MUSIC 385.

**FILMSTUD 145. Politics and Aesthetics in East European Cinema. 4 Units.**

From 1945 to the mid-80s, emphasizing Polish, Hungarian, Czech, Slovak, and Yugoslav contexts. The relationship between art and politics; postwar establishment of film industries; and emergence of national film movements such as the Polish school, Czech new wave, and new Yugoslav film.

Thematic and aesthetic preoccupations of filmmakers such as Wajda, Jancso, Forman, and Kusturica.

Same as: FILMSTUD 345.

**FILMSTUD 150. Cinema and the City. 4 Units.**

Utopian built environments of vast perceptual and experiential richness in the cinema and city. Changing understandings of urban space in film. The cinematic city as an arena of social control, social liberation, collective memory, and complex experience. Films from international narrative traditions, industrial films, experimental cinema, documentaries, and musical sequences. Recommended: 4 or equivalent.

Same as: FILMSTUD 350.

**FILMSTUD 155. Comics and the City. 4 Units.**

Urban history and life informs the history, stories, structures and aesthetics of the comics. The development of comics into a mass medium coincides with the emergence of the modern metropolis in America and Europe and is rooted in the same industrial, commercial, and social transformations. Comics and cartoons were fixtures of urbane humor publications of the 19th century and became a valued fixture of the American newspaper in the very earliest part of the 20th. The characters in early comic strips were often denizens of the urban world, whether immigrants fresh off the boat or the nouveau riche. Many strips were grounded in quotidian urban experience. Later comics use the city as setting, aesthetic, and metaphor. The mean streets of Jacques Tardi's noirish cities about the rather sunnier and shinier example of Superman's Metropolis. Science fiction comics and manga give us the impacted and often destructed cities of the future. The city is mapped at all levels, from elevated, panoramic views to the hidden substructures beneath the city's streets. Superheroes are paradigmatic urban dwellers, using the scale of the city to escape notice in their secret identities, while mastering its complexity through the exercise of special powers. Comics creators have also drawn inspiration from urban forms and structures. The graphic novel adaptation of Paul Auster's *City of Glass* maps the grid pattern of the comics page onto the gridded streets of Manhattan. Chris Ware's *Building Stories* series uses one apartment building to follow the myriad and sometimes intersecting lines found therein. Other examples of the entwined histories of cities and comics to be considered include the construction of alternative urban histories and urban reportage and memoir. Assigned readings include many comics alongside urban and comics scholarship. Artists to be considered include Outcault, Swinnerton, McCay, Eisner, Katchor, Tatsumi, Doucet, Tardi, Otomo, Hergé, Mazzucchelli, Chaykin, Miller, Ware, Pekar, Crumb, Gloeckner.

Same as: FILMSTUD 355.

**FILMSTUD 164A. Technology and the Visual Imagination. 4 Units.**

An exploration of the dynamic relationship between technology and the ways we see and represent the world. The course examines technologies from the Renaissance through the present day, from telescopes and microscopes to digital detectors, that have changed and enhanced our visual capabilities as well as shaped how we imagine the world. We also consider how these technologies influenced and inspired the work of artists. Special attention is paid to how different technologies such as linear perspective, photography, cinema, and computer screens translate the visual experience into a representation; the automation of vision; and the intersection of technology with conceptions of time and space.

Same as: ARTHIST 164A, ARTHIST 364A, FILMSTUD 364A.

**FILMSTUD 208D. Technology and Religion in South Asia. 3-5 Units.**

The history of technology (depending on how we choose to define the term) in South Asia is deeply connected to the history of colonialism and the practice of religion. In this class we will trace the arrival of the printing press, cinematic technology and television in the subcontinent and look at the impact it had on the practice of religion, national identity and consumption. This seminar is inter-disciplinary in approach and will study the intertwining of Hinduism and visual culture through Indian literary texts, sculpture, painting, dance, theatre and film, with a focus on the visual and the modern. No attempt will be made to comprehensively survey all related modes and texts; rather the seminar will focus on specific forms based on their relation to contemporary themes of technology, the self, the popular, divinity and power. Each body of material will be placed within its specific socio-economic, historical, religious and artistic context.

Same as: RELIGST 108D.

**FILMSTUD 210N. Darkness in Light: The Filmic Imagination of Horror. 3 Units.**

From its very beginnings, the cinema evinced an affinity with the phantom realm of specters, ghosts, and supernatural beings. Not only does horror have deep and diverse roots in the international history of film; it emerges as a trope of film itself, as a medium of shadows, dematerialized presence, life drained of substance. This course offers an overview of filmic imaginations of horror across the span of the twentieth century, with a focus on the US, Europe, and Japan. We will read and discuss theories of horror - from the fantastic to the uncanny - and unpack these in light of key moments in the genre's development. We will debate the merits of vampires versus zombies. And we will trace, through the lens of horror, ongoing debates about cinematic representation, from Andre Bazin's idea of the "mummy complex" to Linda Williams' thesis of "body genres" to Jeffrey Sconce's notion of "haunted media." The course will serve as an introduction to film analysis and interpretation; no prior experience in film studies is required or expected. In addition to regular class meetings, there will be a required weekly screening.

**FILMSTUD 235. Emotions of Japanese Cinema (Postindustrial Version). 4 Units.**

Seminar aims to elucidate the affective terrain of postindustrial Japan and to rethink affect theory from the perspective of Japanese cinema. Films have English subtitles and core readings are in English. Additional readings for those with access to Japanese.

Same as: JAPANGEN 125, JAPANGEN 225.

**FILMSTUD 240A. History and Poetics of Cinematography. 5 Units.**

The history of cinematographic devices and styles through the work of such cinematographers as Billy Bitzer, Eduard Tisse, Greg Toland, Kazuo Miyagawa, John Alton, James Wong Howe, Sergei Urusevskii, Raoul Coutard, and Jack Cardiff.

**FILMSTUD 251. Media in Transition. 5 Units.**

In a culture obsessed with new media, we are bombarded with hype about the present as a revolutionary phase of convergence. But everything old was once new, and pioneering media of the past also had to negotiate existing technologies, ideologies, and fantasies. This seminar is organized around case studies of transitional media moments from the long 20th century, including proto-cinema, ham radio, early television, hypertext, and digital film. In exploring the material and discursive aspects of remediation through theoretical, historical, and media archaeological readings, we will ask: what is a medium and how do they emerge and evolve.

**FILMSTUD 279. Asian American Experiences and Documentary Practice. 5 Units.**

Focus is on documentary cinema as a technology for understanding Asian Americans in the U.S. The social and historical context of the formation of the Asian American filmmaker, an authorial position that emerges in the 60s and 70s as part of the civil rights movement. Works include films by Loni Ding, Bob Nakamura and Curtis Choy; readings about the establishment of Asian American media industries and Asian American film criticism as a multi-genre. Social issue documentaries that represent new ethnographies of social experience including transnational adoption (*Daughter From Danang*), refugee experience (*AKA Don Bonus*), and sex tourism (*The Women Outside*). Readings include analyses of the implications of these works for cinema studies, ethnic studies, and the politics of film in everyday life. Experimental documentaries and their interrogation of the limits of the documentary form in representing identities and social problems. How does representation matter within and for Asian America in framing the complexities of race and racial identity? Screenings include works by Marlon Fuentes, Rea Tajiri and Trinh T. Minh-ha.

Same as: ASNAMST 179, CSRE 179.



**FILMSTUD 290. Movies and Methods. 5 Units.**

Open to graduate students and advanced undergraduates (permission of instructor required); capstone course for majors (senior seminar). Topics vary year to year. Focus is on historiography and theory.

**FILMSTUD 297. Honors Thesis Writing. 1-5 Units.**

May be repeated for credit.

**FILMSTUD 299. Independent Study: Film and Media Studies. 1-15 Units.**

May be repeated for credit.

**FILMSTUD 300A. History of World Cinema I, 1895-1929. 4 Units.**

From cinema's precursors to the advent of synchronized sound.

Same as: FILMSTUD 100A.

**FILMSTUD 300B. History of World Cinema II, 1930-1959. 4 Units.**

The impact of sound to the dissolution of Hollywood's studio system.

Same as: FILMSTUD 100B.

**FILMSTUD 301. Fundamentals of Cinematic Analysis. 4 Units.**

The close analysis of film. Emphasis is on formal and narrative techniques in structure and style, and detailed readings of brief sequences. Elements such as cinematography, mise-en-scène, composition, sound, and performance. Films from various historical periods, national cinemas, directors, and genres. Prerequisite: FILMSTUD 4 or equivalent.

Recommended: ARTHIST 1 or FILMSTUD 102. Course can be repeated twice for a max of 8 units.

Same as: FILMSTUD 101.

**FILMSTUD 302. Theories of the Moving Image. 4 Units.**

Major theoretical arguments and debates about cinema: realism, formalism, poststructuralism, feminism, postmodernism, and phenomenology.

Prerequisites: ARTHIST 1, FILMSTUD 4.

Same as: FILMSTUD 102.

**FILMSTUD 314. Comics. 4 Units.**

The modern medium of comics, a history that spans 150 years. The flexibility of the medium encountered through the genres of humorous and dramatic comic strips, superheroes, undergrounds, independents, journalism, and autobiography. Innovative creators including McCay, Kirby, Barry, Ware, and critical writings including McCloud, Eisner, Groenstee. Topics include text/image relations, panel-to-panel relations, the page, caricature, sequence, seriality, comics in the context of the fine arts, and relations to other media.

Same as: FILMSTUD 114.

**FILMSTUD 316. International Documentary. 4 Units.**

Historical, aesthetic, and formal developments of documentary through nonfiction films in Europe, Asia, Latin America, and Africa.

Same as: FILMSTUD 116.

**FILMSTUD 332. East Asian Cinema. 4 Units.**

Social, historical, and aesthetic dimensions of the cinemas of Japan, Hong Kong, Taiwan, mainland China, and Korea. Topics such as nation and gender, form and genre, and local and transnational conditions of practice and reception. Screenings include popular and art films from the silent to contemporary eras, including, Zhang Yimou, Wong Kar-wai, Hou Hsiao-hsien, Ozu Yasujiro, Kurosawa Akira, and Im Kwon-taek.

Same as: FILMSTUD 132.

**FILMSTUD 333. Contemporary Chinese Auteurs. 4 Units.**

New film cultures and movements in Taiwan, Hong Kong, and mainland China in the 80s. Key directors including Jia Zhangke, Wu Wenguang, Tsai Ming-liang, Hou Hsiao-hsien, Wong Kar-wai, Ann Hui. Topics include national cinema in the age of globalization, the evolving parameters of art cinema, and authorship.

Same as: FILMSTUD 133.

**FILMSTUD 336. Gender and Sexuality in Chinese Cinema. 4 Units.**

Representations of gender and sexuality in the cinemas of China, Taiwan, and Hong Kong, covering key periods and genres such as the golden age of Shanghai film, Hong Kong action pictures, opera films, post-socialist art films, and new queer cinema. Historical and contemporary perspectives on cinematic constructions of femininity, masculinity, and sexuality as they relate to issues of nationalism, modernity, globalization, and feminist and queer politics. Weekly screening required.

Same as: FILMSTUD 136.

**FILMSTUD 337. European New Wave Cinemas. 4 Units.**

an exploration of the major currents, movements, and schools in the European cinema of the post-war era from the late 1940s to the 1970s. A mixture of historical, aesthetic, and theoretical concerns will inform the study of French New Wave, British Free Cinema, Italian cinema in the 1960s, the New German Cinema of the 1970s, and more.

Same as: FILMSTUD 137.

**FILMSTUD 340. Film Aesthetics: Editing. 4 Units.**

Practical and theoretical approaches to editing and montage. The role of editing in film meaning, and cognitive and emotional impact on the viewer. Developments in the history and theory of cinema including continuity system, Soviet montage, French new wave, postwar and American avant garde. Aesthetic functions, spectatorial effects, and ideological implications of montage. Film makers include Eisenstein, Godard, and Conner.

Same as: FILMSTUD 140.

**FILMSTUD 341. Music Across Media: Music Video to Postclassical Cinema. 4 Units.**

What makes music videos, YouTube clips and musical numbers in today's films engaging? What makes them tick? This course emphasizes aesthetics and close reading. We will try to figure out how music videos and its related forms work. To do so, we consider uses of the body, how visual iconography operates, what lyrics and dialogue can do, how and what music can say, and how it can work with other media. We will be concerned with questions of representation, how class, ethnicity, gender, race and nationality function. The course also examines viewership and industry practices.

Same as: FILMSTUD 141, MUSIC 185, MUSIC 385.

**FILMSTUD 345. Politics and Aesthetics in East European Cinema. 4 Units.**

From 1945 to the mid-80s, emphasizing Polish, Hungarian, Czech, Slovak, and Yugoslav contexts. The relationship between art and politics; postwar establishment of film industries; and emergence of national film movements such as the Polish school, Czech new wave, and new Yugoslav film.

Thematic and aesthetic preoccupations of filmmakers such as Wajda, Jancso, Forman, and Kusturica.

Same as: FILMSTUD 145.

**FILMSTUD 350. Cinema and the City. 4 Units.**

Utopian built environments of vast perceptual and experiential richness in the cinema and city. Changing understandings of urban space in film. The cinematic city as an arena of social control, social liberation, collective memory, and complex experience. Films from international narrative traditions, industrial films, experimental cinema, documentaries, and musical sequences. Recommended: 4 or equivalent.

Same as: FILMSTUD 150.

**FILMSTUD 355. Comics and the City. 4 Units.**

Urban history and life informs the history, stories, structures and aesthetics of the comics. The development of comics into a mass medium coincides with the emergence of the modern metropolis in America and Europe and is rooted in the same industrial, commercial, and social transformations. Comics and cartoons were fixtures of urbane humor publications of the 19th century and became a valued fixture of the American newspaper in the very earliest part of the 20th. The characters in early comic strips were often denizens of the urban world, whether immigrants fresh off the boat or the nouveau riche. Many strips were grounded in quotidian urban experience. Later comics use the city as setting, aesthetic, and metaphor. The mean streets of Jacques Tardi's noirish cities about the rather sunnier and shinier example of Superman's Metropolis. Science fiction comics and manga give us the impacted and often destructed cities of the future. The city is mapped at all levels, from elevated, panoramic views to the hidden substructures beneath the city's streets. Superheroes are paradigmatic urban dwellers, using the scale of the city to escape notice in their secret identities, while mastering its complexity through the exercise of special powers. Comics creators have also drawn inspiration from urban forms and structures. The graphic novel adaptation of Paul Auster's *City of Glass* maps the grid pattern of the comics page onto the gridded streets of Manhattan. Chris Ware's *Building Stories* series uses one apartment building to follow the myriad and sometimes intersecting lines found therein. Other examples of the entwined histories of cities and comics to be considered include the construction of alternative urban histories and urban reportage and memoir. Assigned readings include many comics alongside urban and comics scholarship. Artists to be considered include Outcault, Swinnerton, McCay, Eisner, Katchor, Tatsumi, Doucet, Tardi, Otomo, Hergé, Mazzucchelli, Chaykin, Miller, Ware, Pekar, Crumb, Gloeckner. Same as: FILMSTUD 155.

**FILMSTUD 364A. Technology and the Visual Imagination. 4 Units.**

An exploration of the dynamic relationship between technology and the ways we see and represent the world. The course examines technologies from the Renaissance through the present day, from telescopes and microscopes to digital detectors, that have changed and enhanced our visual capabilities as well as shaped how we imagine the world. We also consider how these technologies influenced and inspired the work of artists. Special attention is paid to how different technologies such as linear perspective, photography, cinema, and computer screens translate the visual experience into a representation: the automation of vision; and the intersection of technology with conceptions of time and space. Same as: ARTHIST 164A, ARTHIST 364A, FILMSTUD 164A.

**FILMSTUD 404. Postwar American Avant Garde Cinema. 5 Units.**

History and theory of post-WW II American independent and experimental film. Emphasis is on issues of audiovisual form, structure, and medium specificity. Films and writings include Maya Deren, Stan Brakhage, Michael Snow, and Hollis Frampton.

**FILMSTUD 406. Montage. 5 Units.**

Graduate seminar in film aesthetics. Theoretical and practical approaches to editing/montage. Stylistic, semiotic, epistemological, and ideological functions of montage considered in film-historical contexts including: development of the continuity system of editing; flourishing of the Soviet montage school; and achievements of the post-war new waves. Filmmakers include D. W. Griffith, Sergei Eisenstein, Jean-Luc Godard, and Dusan Makavejev.

**FILMSTUD 410A. Documentary Perspectives I. 4 Units.**

Restricted to M.F.A. documentary film students. Topics in nonfiction media. Presentations and screenings by guest filmmakers. Prerequisite: consent of instructor.

**FILMSTUD 410B. Documentary Perspectives II. 4 Units.**

Restricted to M.F.A. documentary film students. Continuation of 410A. Topics in nonfiction media. Presentations and screenings by guest filmmakers. Prerequisite: consent of instructor.

**FILMSTUD 414. Comics. 5 Units.**

Long derided as neither literature nor art, the medium of comics, with its complex juxtapositions of word and image and of images with one another, is increasingly understood as a supple and sophisticated mode of communication and expression. Dynamic new work is appearing on a weekly basis, and lavish reprint projects have made comics history more available for study and pleasure. This seminar simultaneously explores the aesthetic and historical parameters of the medium as well as the shape of comics scholarship. As comics are something of a hybrid form, the seminar will necessarily be interdisciplinary in approach. The treatment of time, rhythm, and tempo will be considered alongside explorations of line, panel, sequence, page, story, and seriality. The flexibility of the medium will be encountered by reading broadly in comic strips (humorous and dramatic), superheroes, undergrounds and independents, political satire and pedagogy, autobiography, experimental works, and children's comics, as well as recent iterations of the graphic novel.

**FILMSTUD 436. Chinese Cinema. 5 Units.**

Course surveys a range of critical perspectives and debates on Chinese cinema. It is organized on the basis of weekly topics, such as genre, historiography, gender, modernity, and the idea of national cinema. Consent of instructor required.

**FILMSTUD 620. Area Core Examination Preparation. 5 Units.**

For Art History Ph.D. candidates. Prerequisite: consent of instructor.

**FILMSTUD 660. Independent Study. 1-15 Units.**

For graduate students only. Approved independent research projects with individual faculty members.

**FILMSTUD 660E. Extended Seminar. 4 Units.**

May be repeated for credit. (Staff).

## Finance Courses

**FINANCE 201. Managerial Finance. 4 Units.**

This course covers the foundations of finance with an emphasis on applications that are vital for corporate managers. We will discuss many of the major financial decisions made by corporate managers, both within the firm and in their interactions with investors. Essential in most of these decisions is the process of valuation, which will be an important emphasis of the course. Topics include criteria for making investment decisions, valuation of financial assets and liabilities, relationships between risk and return, capital structure choice, payout policy, the use and valuation of derivative securities (e.g., options and convertible securities), and risk management. This course is targeted to those students who are new to finance and for those with little quantitative background.

**FINANCE 204. Managerial Finance - Accelerated. 4 Units.**

This course covers the foundations of finance with an emphasis on applications that are vital for corporate managers. We will discuss many of the major financial decisions made by corporate managers, both within the firm and in their interactions with investors. Essential in most of these decisions is the process of valuation, which will be an important emphasis of the course. Topics include criteria for making investment decisions, valuation of financial assets and liabilities, relationships between risk and return, capital structure choice, payout policy, the use and valuation of derivative securities (e.g., options and convertible securities), and risk management. This accelerated course is designed for those students who are relatively new to finance but who possess solid quantitative skills.

**FINANCE 211. Corporate Finance: Applications, Techniques, and Models. 3 Units.**

The focus of this course is to apply the fundamental ideas and tools of corporate finance to real-world corporate decisions. This course (in either its basic or accelerated format) is designed to be the second course in a standard finance sequence; that is, it is designed to be the natural follow-up to the Winter Managerial Finance course. This course will develop and extend standard tools and techniques of financial analysis, valuation, and model-building, and apply these methods to a wide range of cases. Case topics will include capital structure, valuation, mergers and acquisitions, private equity and venture capital, international finance, hostile takeovers and leveraged buyouts, financial distress and bankruptcy. Students will be expected to develop detailed model-based analyses for the cases using the tools and techniques we develop in this course, and to employ their analyses to reach and defend specific recommendations for these cases.

**FINANCE 214. Accelerated Corporate Finance: Applications, Techniques, and Models. 3 Units.**

The focus of this course is to apply the fundamental ideas and tools of corporate finance to real-world corporate decisions. This course (in either its basic or accelerated format) is designed to be the second course in a standard finance sequence; that is, it is designed to be the natural follow-up to the Winter Managerial Finance course. This course will develop and extend standard tools and techniques of financial analysis, valuation, and model-building, and apply these methods to a wide range of cases. Case topics will include capital structure, valuation, mergers and acquisitions, private equity and venture capital, international finance, hostile takeovers and leveraged buyouts, financial distress and bankruptcy. Students will be expected to develop detailed model-based analyses for the cases using the tools and techniques we develop in this course, and to employ their analyses to reach and defend specific recommendations for these cases.

**FINANCE 221. Finance for Non-MBAs. 3 Units.**

This course, intended for graduate students and advanced undergraduates, covers the foundations of finance with applications in corporate finance and investment management. It discusses many of the major financial decisions made by managers and investors, emphasizing the process of valuation. Topics include criteria for making investment decisions, risk and return, market efficiency, capital structure, and the valuation of derivative securities (e.g., options). The course also provides coverage of the major financial instruments issued by corporations including debt, equity, and convertible securities. Prerequisite: ability to use spreadsheets, knowledge of basic probability and statistics concepts, including random variables, expected value, variance, covariance, and simple estimation and regression. For registration questions about this course, please contact the Graduate School of Business at [academic\\_operations@gsb.stanford.edu](mailto:academic_operations@gsb.stanford.edu).

**FINANCE 229. Sloan: Finance. 4 Units.**

This course covers the foundations of corporate finance including the management of liquidity, capital structure, financial forecasting, dividend policy, financial distress, cost of capital and capital budgeting. It discusses the major financial decisions made by corporate managers and the impact of those decisions on investors and the value of the firm. Topics include criteria for understanding the valuation of financial assets and liabilities, relationships between risk and return, market efficiency, and the role of derivative securities including options. The course also provides coverage of the role of financial markets in the operations of the firm.

**FINANCE 310. Managerial Finance - Advanced. 4 Units.**

This course covers the foundations of finance with an emphasis on applications that are vital for corporate managers. We will tackle most of the important financial decisions made by corporate managers, both within the firm and in their interactions with investors. Essential in most of these decisions is the process of valuation, which will be an important emphasis of the course. Topics include criteria for making investment decisions, valuation of financial assets and liabilities, relationships between risk and return, capital structure choice, payout policy, the use and valuation of derivative securities (e.g., options and convertible securities), and risk management. This advanced course is targeted to those with a strong background in finance and (at least) solid quantitative skills.

**FINANCE 319. Private Equity Investing Seminar. 4 Units.**

This seminar focuses on private equity investing, including investments with control, buyouts, and minority investments at various stages in a company's life. Private equity investing activity has grown significantly over the past decade. This seminar explores selected topics in private equity investing for those MBA students who take the corequisite course FINANCE 321, Investment Management and Entrepreneurial Finance. Private equity includes both established and early stage companies. The course extends and deepens the entrepreneurial finance area for those with an interest in private equity, venture capital and principal investing, taking a global view. Utilization will be made of original case studies and lecture-discussions, building on the framework of FINANCE 321. The Seminar meets with outstanding investors. All those registered in F321.1 will also be registered in F319. See yellow Term Sheet put in MBA Boxes in early May. All those registered in F321.2 will also be registered in F329. See yellow Term Sheet.

**FINANCE 320. Debt Markets. 4 Units.**

This course is intended for those who plan careers that may involve debt financing for their businesses or other investments, or involve trading or investing in debt instruments and their derivatives, including money-market instruments, government bonds, repurchase agreements, interest-rate swaps, mortgage-backed securities (MBS), corporate bonds, structured credit products, and credit derivatives. We will emphasize institutional features of the markets, including trading, pricing, and hedging. There is a special focus on distressed debt. Most lectures will start with a cold-called student presentation of an un-graded short homework calculation. There will also be a series of graded homework, an in-class mid-term, and about six graded 'pop quizzes' of 10 minutes or less.

**FINANCE 321. Investment Management and Entrepreneurial Finance. 3 Units.**

Equity investment in companies, common stocks, early/growth stage ventures, deals, partnerships, hedge funds, or other entrepreneurial opportunities will be immediately or eventually important for most MBAs--either on the investing side or on the fund-raising financing side. This investment course discusses many practical and conceptual factors influencing the analysis and value of companies and deals, including publicly listed and private equity investments, and on success of investment approaches. The focus of this course is on quoted and private equity investments and on entrepreneurial finance. The format of the class is primarily case discussions and lecture discussions led by the professor and investors/principals who were involved in the case. This course enables MBA students to learn a broad investing skill-set and to study outstanding investors. See yellow Term Sheet put in MBA Boxes in early May.

**FINANCE 322. Financial Intermediaries and Capital Markets. 4 Units.**

This course focuses on financial markets, institutions, and instruments. We consider when and how firms raise capital through the life cycle, beginning with the capital-raising decisions and transactions for young firms and then discussing the decisions facing older, listed firms. We concentrate mainly on the firm's perspective while also considering the perspective of financial intermediaries. Issues to be considered in this course include the role of financial intermediaries like banks, the decision to go public, the pricing and role of investment banks in IPOs, bank debt, project finance, public debt, private placements, securitizations, convertibles, and markets for junk bonds.

**FINANCE 324. Practical Corporate Finance. 4 Units.**

The focus of this course is to apply the fundamental ideas of corporate finance to real-world problems. This course is a follow-up to the Fall course in Managerial Finance in which the basics of finance and valuation were covered. We will explore both how to make the acquired knowledge practical as well as to deepen our understanding of the core principles of finance. During the course we will analyze cases covering a wide range of topics such as capital structure, private equity and venture capital, mergers and acquisitions, hostile takeovers and leveraged buyouts, as well as bankruptcy and financial distress. These cases provide an opportunity to bridge the gap between theory and real-life situations. Students are expected to develop their own spreadsheets and provide recommendations based on their analysis of the case material. This course was formerly known as FINANCE 224. An accelerated version of this course is offered as FINANCE 331.

**FINANCE 326. Derivative Securities. 4 Units.**

This course is an introduction to options, futures and other derivative securities. The goal is to learn a core set of principles that underlie the pricing and use of derivatives. In particular, we will cover the valuation and use, both for risk management and for speculation, of forwards, futures, swaps, and options; the Black-Scholes option-pricing formula; delta-hedging; credit derivatives; financial risk management; and the role of derivatives in the recent financial crisis.

**FINANCE 327. Financial Markets. 4 Units.**

The aim of this course is to develop a thorough understanding of financial markets. We explore how investors make decisions about risk and return, how financial markets price risky assets in equilibrium, and how financial markets can sometimes malfunction. The course puts particular emphasis on the role of real-world imperfections that are absent from the standard textbook view of financial markets. For example, we explore the role of illiquidity: Why are there liquid markets for some types of assets but not for others? Why does liquidity often disappear in times of market turmoil? We will also study recent insights from behavioral finance about investor psychology and market inefficiencies. Moreover, we will look at financial innovations such as credit-default swaps, securitization, and hedge funds that play important roles in financial markets these days. We use cases to develop these topics in the context of practical decision-problems in the areas of asset allocation, risk management, and financing.

**FINANCE 329. Investment Seminar. 4 Units.**

"Global Principal Investing/Hedge Funds" is a seminar on selected topics in masterful investing in publicly traded and private equity/venture capital investments, with focus on the principal's point of view. We study hedge funds and mutual funds and meet with outstanding investors. The scope and context is global including emerging markets. The Seminar is taught by a founding director of one of the largest international investment funds. All those registered in F321.1 will also be registered in F319. See yellow Term Sheet put in MBA Boxes in early May. All those registered in F321.2 will also be registered in F329. See yellow Term Sheet.

**FINANCE 330. Investment Management: Asset Allocation and Asset/Manager Selection. 4 Units.**

This course covers strategic and tactical asset allocation in investment portfolios as well as specific asset and manager selection issues. We consider challenges that are unique to the various asset classes that comprise broad-based portfolios, including: public equities, fixed income securities, private equity (both buyout and venture capital), hedge funds, and real assets (real estate, energy, timber, and commodities). We also consider challenges that are specific to various geographies (e.g., domestic, developed international and emerging markets) across the various asset classes. The portfolio optimization framework employed considers the perspective of different types of investors that vary along such dimensions as risk preference, investment horizon, tolerance for illiquidity, tax status, social objectives, and special asset-specific relationship, information or skill advantages. More specifically, our framework considers: tradeoffs between seeking diversification to control risks, and making concentrated bets where there appears to be outsized return prospects (whether due to one-off proprietary investment opportunities or the market appearing to value certain sectors improperly); tradeoffs between passive investment (at low administrative cost and complexity) and active investment designed to produce premium returns (despite the incremental cost and complexity); distinctions between investing as principals and delegating to managers, and the importance of aligning incentives among all parties; the importance of liquidity in driving the pricing, risk and expected returns to various asset classes and the importance of identifying which parties are natural suppliers of liquidity and which the natural demanders; the importance of effective underwriting and ongoing monitoring of investment opportunities; the importance of tax considerations in the pricing and expected returns to various asset classes; and the importance of identifying which parties form the natural clientele in each asset class. For a number of the sessions, we will invite domain experts to add spice and depth to a portion of the class discussion.

**FINANCE 331. Practical Corporate Finance. 4 Units.**

(Note: this course was formerly known as FIN 230) The main aim of this course is to enable students to apply the fundamental ideas of finance to problems in the area of corporate finance with all the complexities the real world entails. The course is a follow-up to the Fall Managerial Finance course where students learnt basics of valuation techniques and various finance applications. We will explore both how to make all this knowledge practical as well as how to deepen our knowledge of fundamental finance ideas. The main focus of this course is on the corporate financial manager and how he/she reaches decisions as to investments, dividends and financing of all sorts. Topics include leveraged buyouts, hostile takeovers, private equity financing and venture capital, financial distress and bankruptcy, mergers and acquisitions, managing working capital. The cases will be used to motivate our discussion of how to bridge the gap between rigorous finance theory and its application to practical problems in corporate finance. The course is case-based and more advanced than FINANCE 324. "Advanced" means that we will discuss a lot of subtle qualitative issues as well as explore deeper fundamental applications of core finance ideas. The course is intensive and will require students to prepare carefully all cases, read and understand a lot of materials, and actively participate in the class discussion. The main teaching method is cold calling.

Same as: Accelerated.

**FINANCE 335. Corporate Valuation, Governance and Behavior. 4 Units.**

This course will develop a detailed knowledge of corporate valuation techniques, together with an understanding of the role such valuations play in a wide range of corporate financing decisions. First, the course will carefully consider different valuation techniques, the assumptions that underlie each of these methods, how they are applied in practice, how they are related to one another, and how to decide which method of valuation is appropriate for a given application. After developing these tools, they will then be applied to a wide range of corporate finance settings. Among the applications to be considered are mergers and acquisitions, international valuation, corporate governance, financial distress, agency conflicts, asymmetric information, and overvaluation. For all of these applications, this course will emphasize the central importance of valuation to understanding observed phenomena and to guiding optimal decision making, as well as the unique challenges to valuation posed by the particular application.

**FINANCE 341. Modeling for Investment Management. 3 Units.**

This course will combine practical and up-to-date investment theory with modeling applications. Understanding beautiful theory, without the ability to apply it, is essentially useless. Conversely, creating state-of-the-art spreadsheets that apply incorrect theory is a waste of time. Here, we try to explicitly combine theory and application. The course will be divided into 6 modules, or topics. The first day of each module will be a lecture on an investment topic. Also provided is a team modeling project on the topic. The second day of each module will be a lab. The lab day will begin with modeling concepts (tips) designed to help you use Excel to implement the module's investment topic. After the tips are provided, the remainder of the lab day is devoted to teams working on their modeling project and allowing for Q&A. On the third day of each module will be presentations and wrap-up.

**FINANCE 345. History of Financial Crises. 4 Units.**

Financial crises are as old as financial markets themselves. There are many similarities between historical events. The recent credit crisis, for example, is far from unique. More often than not financial crises are the result of bubbles in certain asset classes or can be linked to a specific form of financial innovation. This course gives an overview of the history of financial crises, asset price bubbles, banking collapses and debt crises. We start with the Tulip mania in 1636 and end with the recent credit and debt crises. The purpose of the course is to understand the causes of past crises and to develop a conceptual framework that ties common elements together. We will discuss the lessons that we can draw for financial markets today.

**FINANCE 346. Institutional Money Management. 4 Units.**

The object of this course is to study the money management industry from the perspective of the user --- an investor who wants to invest money. This course will study the main components of the money management industry: mutual funds, hedge funds, private equity funds and venture capital funds. It will also examine important users of the industry such as non profits, endowments and defined benefit pension funds. The emphasis of the course will not be on how fund managers make money, but rather on how the industry is organized, how managerial skill is assessed, how compensation is determined, and how economic rents are divided between managers and investors. The course will explore how competitive market forces interact with managerial skill and other market frictions to give rise to the observed organization of the industry.

**FINANCE 350. Corporate Financial Modeling. 4 Units.**

The course will take the perspective of a mid-level manager or decision-maker who is responsible for collecting, analyzing, and utilizing financial information in the context of a major transaction. The class will integrate theories presented throughout courses in the core, particularly accounting and finance. In addition to providing an important context for application of these theories, the seminar will also incorporate various methodologies that will enhance a manager's ability to develop and review financial models. Students will work on a series of cases and build models that can be used for earnings and pro-forma financial statement forecasts, valuation, the assessment of financing needs, merger analysis, and LBO evaluation. Students will also gain experience presenting financial models and critically assessing them. By the conclusion of the course, students will develop the skills to construct complex financial models and the logical frameworks to utilize them for various organizational applications.

**FINANCE 351. Advanced Corporate Financial Modeling. 4 Units.**

Students will engage in the development of corporate financial modeling cases and solutions. Students will also develop materials to aid others in building financial models, and serve as case leaders during lab workshops. Extensive background in financial modeling and experience with Excel is required.

**FINANCE 361. Behavioral Finance. 4 Units.**

This course provides an introduction to behavioral finance, a discipline which integrates insights from psychology into the study of financial decisions and markets. There will be a focus on understanding the psychological underpinnings of financial decision-making as well as the institutional frictions that may allow these psychological mechanisms to influence economic outcomes. Applications include the pricing of assets relative to fundamental value, trading strategies, managerial behavior, and household savings and investment decisions. Conceptual issues will be emphasized through a mix of case discussions and lectures, and quantitative exercises will serve to develop analytical tools for making financial choices.

**FINANCE 373. Entrepreneurial Finance. 4 Units.**

This course is focused on the financial decision-making process for start-up firms. The course takes a two-pronged approach: First, we analyze principles of corporate finance, valuation, control of firms, and investment decisions with an eye toward developing these concepts of corporate finance in an entrepreneurial context. Second, we use cases with firms at different stages of their life cycle from initial angel or venture capital investments through exit decisions to see the issues that arise when these principles are applied in practice. In some cases we take the viewpoint of the entrepreneur and in others the viewpoint of the investor. Entrepreneurial finance and private equity investing are intrinsically linked. As an entrepreneur, you cannot negotiate effectively without understanding the investor's motivations. Conversely, you cannot evaluate a potential investment opportunity without appreciating the entrepreneur's perspective and incentives.

**FINANCE 381. Private Equity in Frontier Markets: Creating a New Investible Asset Class. 4 Units.**

In 2001, Jim O'Neil of Goldman Sachs wrote a research note which underscored the importance of so-called Emerging Markets to a well-balanced investment portfolio. Still today, most investors have little or no investment exposure beyond North America, Europe, Japan and more recently India, China and Brazil. All of this is just beginning to change. The not yet fully formed investment category called frontier market private equity is emerging and within the next decade is likely to be an asset class of its own. Private equity investments are being made in southeast Asia, in MENA (Middle East/ North Africa), in sub-Saharan countries beyond South Africa and in Latin America. Even fund of funds are appearing across these markets. At the same time, investors face a world of diminished returns expectations in developed economies just as aging demographics and the need for continued growth, innovation and infrastructure renewal places increasing demands for payout. Suffice it to say, investors will be looking beyond traditional asset classes and geographies for sources of return. This new course is designed to expose you to the still emerging, not yet fully formed world of frontier market private equity. To set the context we will start by reviewing the fundamentals of economic growth and development globally. In addition we will discuss the fundamental concepts involved in constructing and evaluating the performance of a large scale investment portfolio. We will then review cases on the elements of the private equity cycle/process and specifically address the special demands of frontier markets in general. We will also focus on issues that are specific to various markets (e.g. Nigeria, Vietnam, etc.). Students taking the course will be given the opportunity to make important contributions to the knowledge base of this still very young field by working in small teams to research topics of personal and general interest, the results of which will be reported to the rest of the class.

**FINANCE 385. Angel and Venture Capital Financing and Decision Making. 3 Units.**

This course covers all the stages of investment in early stage high-growth companies, from the seed funding of a novel idea to venture capital rounds to a successful exit, be it an M&A or an IPO. We will concentrate on how investors and entrepreneurs make and should make important decisions at different stages. Some questions that we will discuss are: How do angels and VCs generate and process their deal flow and select companies? What are typical mistakes of entrepreneurs in raising capital and negotiating with financiers? How do VC funds operate and make decisions? How are VCs involved in business decisions such as recruiting talent and replacing CEOs? What are the important provisions of financial contracts between VCs and founders? How to value early-stage companies? The course is mostly case-based and as a part of the course we will also simulate angel group and VC partners meetings. The course is for those who want to become entrepreneurs and thus likely consumers of angel and VC financing and those who want to pursue a career in the financial services industry. No prior knowledge of the VC industry is needed.

**FINANCE 562. Financial Trading Strategies. 2 Units.**

The purpose of this course is to familiarize students with the different types of trading strategies employed by various money management institutions. These financial trading strategies are used to manage the risk and return profiles of specific portfolios. Throughout the sessions, students will be challenged to understand and explore the application and implementation of these different strategies. This course specifically focuses on the execution, mechanics, and measurement of financial trading strategies. It does not, for example, teach students "how to make money playing the market." The decision making and analytical process of investing (finding alpha strategies) is a distinct process that is somewhat removed from implementation and measurement (how to execute and evaluate your alpha strategies). The focus of the course concepts will include, but not be limited to: \* Market Microstructure and Market Liquidity- VWAP, sourcing liquidity, and algorithmic strategies \* Portfolio Hedging and Risk Management- portfolio insurance and delta hedging \* Hedge Fund Strategies- inter-listed arbitrage, risk-arbitrage, trading volatility Trading simulations employed on the Rotman Interactive Trader and Rotman Portfolio Manager (using real market data and computer generated data) will be used extensively in this course as a way to learn and test different strategies. All classes will be held in the new "Real-time Analytics and Investment Lab" (the GSB's own Hi-speed R.A.I.L), located on the third floor of the Bass Building (B312). Students are expected to attend all sessions. Students will be graded based on their in-class trading results and two assignments. Final grades will be given on a pass/fail basis. Kevin Mak is the co-inventor of the Rotman Interactive Trader and Rotman Portfolio Manager applications. Previously, he has taught in various courses relating to financial securities, risk management, and trading at the University of Toronto's Rotman School of Management. Kevin also develops and delivers trading simulations and trading models for various financial institutions.

**FINANCE 587. Private Equity - Understanding the Deal. 2 Units.**

This 2-unit elective in the MBA Program is an analytical review and simulation of a private equity transaction from the viewpoint of the private equity partnership. The course looks at all aspects of a "deal" and may be of interest to five groups of students: (i) students who may be interested in working in private equity as a career; (ii) students who plan to be employed by operating companies that are owned by private equity firms; (iii) students who may invest in private equity partnerships as a limited partner; (iv) students who find private equity to be an interesting part of the financial community in general (v) students who expect to participate in corporate business development or mergers and acquisitions. The course will meet for nine classes, most for a duration of 90 minutes. One class will be a mock investment review committee presentation as a final project.

**FINANCE 620. Financial Markets I. 3 Units.**

This course is an introductory PhD level course in financial economics. We begin with individual choice under uncertainty, then move on to equilibrium models, the stochastic discount factor methodology, and no-arbitrage pricing. We will also address various empirical puzzles relating to asset markets, and explore the models that have been developed to try to explain them.

**FINANCE 621. Financial Markets II. 4 Units.**

This course continues F620 in covering some of the main concepts of asset pricing. Among the topics covered: (i) Dynamic asset pricing models in discrete and continuous time (i) Rational Expectation models and their foundations (iii) strategic trading models.

**FINANCE 622. Dynamic Asset Pricing Theory. 4 Units.**

This course is an introduction to multiperiod models in finance, mainly pertaining to optimal portfolio choice and asset pricing. The course begins with discrete-time models for portfolio choice and security prices, and then moves to a continuous-time setting. The topics then covered include advanced derivative pricing models, models of the term structure of interest rates, the valuation of corporate securities, portfolio choice in continuous-time settings, and general-equilibrium and over-the-counter asset pricing models. Students should have had some previous exposure to general equilibrium theory and some basic courses in investments. Strong backgrounds in calculus, linear algebra, and probability theory are recommended. Problem assignments are frequent and, for most students, demanding. Prerequisite: F620 or permission of instructor.

**FINANCE 624. Corporate Finance Theory. 4 Units.**

This course considers a wide range of topics in theoretical corporate finance (broadly interpreted). Topics include capital structure decisions, agency conflicts in the firm, dividend policy, security design, optimal financial contracting, the theory of the firm, the market for corporate control, and banking and financial intermediation, among others. The primary focus is on how asymmetric information, agency conflicts, strategic interactions, and incomplete contracting affect corporate financial decision-making. The course aims both to familiarize students with influential papers and current research, and to promote new research ideas in the area.

**FINANCE 625. Empirical Asset Pricing. 3 Units.**

This course is an introduction to empirical research in asset pricing. The focus of the course is on applications of econometric methods in asset pricing and financial markets research. We cover applications of time-series (macro) econometrics to asset pricing, but also some key issues in panel data (micro) econometrics. Topics include tests of asset pricing models, return predictability in time-series and cross-section, empirical studies of asset market imperfections, studies of individual and professional investor behavior. The aim is to familiarize students with essential econometric methods and with important empirical facts and areas of current research interest.

**FINANCE 626. Advanced Corporate Finance. 3 Units.**

This is a course on contemporary theoretical and empirical issues in corporate finance. Building upon the first-year courses in corporate finance theory and empirical methods in finance, we will examine issues in asset pricing applications to corporate finance, dynamic capital structure (dynamic financing decisions), financial distress, financing and investment interactions, and behavioral corporate finance. Both conceptual economic frameworks and econometric methods will be developed as needed. A requirement for this course is that students complete two written projects, one theoretical and one empirical, and at least one of these projects will be presented to the class.

**FINANCE 628. Finance Pre-Seminar Reading Course. 1 Unitss.**

Finance Pre-Seminar Reading.

**FINANCE 630. Empirical Corporate Finance. 3 Units.**

This course provides an introduction to empirical research in corporate finance, with an emphasis on the application of cross-sectional and panel data econometric techniques for causal inference. Topics include investment policy, financing decisions, firm ownership, corporate governance, managerial incentives, financial contracting, and the structure and internal organization of firms. Selected topics in behavioral finance will also be covered. The course assumes knowledge of econometrics at the level of MGTECON 603.

**FINANCE 632. Empirical Dynamic Asset Pricing. 4 Units.**

This course explores the interplay between dynamic asset pricing theory, statistical assumptions about sources of risk, and the choice of econometric methods for analysis of asset return data. Therefore, the lectures will be a blend of theory, econometric method, and critical review of empirical studies. Both arbitrage-free and equilibrium preference-based pricing models will be discussed, with particular emphasis given to recent developments and outstanding puzzles in the literature. The prerequisites for F632 are MGTECON 603 - 604, Finance 620, Finance 622, and Finance 625. In particular, I will assume familiarity with dynamic asset pricing theory, at the level of F622; and large-sample theory for least-squares, generalized method-of-moments, and maximum likelihood estimation methods. We will review these methods in the context of specific applications, but this material will not be developed in depth.

**FINANCE 633. Advanced Empirical Corporate Finance. 4 Units.**

This class is devoted to recent developments in the empirical corporate finance literature. Topics include: financial contracting, liquidation and renegotiation, taxation and capital structure, the role of labor markets, leveraged buyouts, executive compensation, the causes and consequences of the financial crisis, and implications of finance for the public sector. The class is very interactive. Many of the sessions will consist of student presentations about the papers from the reading list. We will also further explore empirical methods relevant for applied research in corporate finance, with a focus on identification and panel data issues.

**FINANCE 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, GSBGEN 691, HRMGT 691, MGTECON 691, MKTG 691, OB 691, OIT 691, POLECON 691, STRAMGT 691.

**FINANCE 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, GSBGEN 692, HRMGT 692, MGTECON 692, MKTG 692, OB 692, OIT 692, POLECON 692, STRAMGT 692.

**FINANCE 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, GSBGEN 802, HRMGT 802, MGTECON 802, MKTG 802, OB 802, OIT 802, POLECON 802, STRAMGT 802.

## French General Courses

### French Language Courses

**FRENLANG 1. First-Year French, First Quarter. 5 Units.**

Proficiency-based. Development of discourse appropriate in French and Francophone contexts.

**FRENLANG 1A. Accelerated First-Year French, Part 1. 5 Units.**

Completes first-year language sequence in two rather than three quarters. Recommended for students with previous knowledge of French who place into FRENLANG 1A on the placement test or who are familiar with another Romance language. FRENLANG 2A fulfills the University foreign language requirement. Prerequisite: Placement Test or consent of instructor.

**FRENLANG 1G. Accelerated First-Year Business French, Part 1. 4 Units.**

For GSB students only. Limited enrollment.

**FRENLANG 2. First-Year French, Second Quarter. 5 Units.**

Continuation of FRENLANG 1. Proficiency-based. Development of discourse appropriate in French and Francophone contexts. Prerequisite: Placement Test, FRENLANG 1 or equivalent.

**FRENLANG 2A. Accelerated First-Year French, Part 2. 5 Units.**

Continuation of FRENLANG 1A. Completes first-year language sequence in two rather than three quarters. Recommended for students with previous knowledge of French who place into FRENLANG 1A on the placement test or who are familiar with another Romance language. Fulfills the University foreign language requirement. Prerequisite: FRENLANG 1A, Placement Test or consent of instructor.

**FRENLANG 2G. Accelerated First-Year Business French, Part 2. 4 Units.**

For GSB students only. Limited enrollment.

**FRENLANG 3. First-Year French, Third Quarter. 5 Units.**

Continuation of FRENLANG 2. Proficiency-based. Development of discourse appropriate in French and Francophone contexts. Prerequisite: Placement Test, FRENLANG 2 or equivalent. Fulfills the language requirement.

**FRENLANG 3G. Accelerated First-Year Business French, Part 3. 4 Units.**

For GSB students only. Limited enrollment.

**FRENLANG 5A. Intensive First-Year French, Part A. 5 Units.**

Same as FRENLANG 1. Accelerated. Written exercises, compositions, conversational practice, and daily work. Only Stanford graduate students restricted to 9 units may register for 205A,B,C.

**FRENLANG 5B. Intensive First-Year French, Part B. 5 Units.**

Same as FRENLANG 2. Continuation of 5A. Written exercises, compositions, conversational practice, and daily work. Only Stanford graduate students restricted to 9 units may register for 205A,B,C. Prerequisite 1 or 5A.

**FRENLANG 5C. Intensive First-Year French, Part C. 5 Units.**

Same as FRENLANG 3. Continuation of 5B. Written exercises, compositions, conversational practice, and daily work. Only Stanford graduate students restricted to 9 units may register for 205A,B,C. Fulfills the University language requirement. Prerequisite 2 or 5B.

**FRENLANG 10. Beginning French Oral Communication. 2 Units.**

For students who have completed FRENLANG 2 or equivalent. Emphasis is on speaking skills, vocabulary, and pronunciation. May be repeated once for credit.

**FRENLANG 15. Intermediate French Oral Communication. 2 Units.**

For students who have completed the first-year language requirement. May be repeated once for credit.

**FRENLANG 15S. Intermediate Conversation: French in Everyday Life. 3 Units.**

Same content as 15. May be repeated once for credit. Prerequisite: one year of college French or equivalent.

**FRENLANG 20A. France and Francophonie. 2 Units.**

Second-year French conversation based on themes from the regions of France and the Francophone world. Intermediate-level speaking skills and advanced-level functions. Topics include travel, food, and crosscultural comparisons. Students returning from study abroad programs are encouraged to enroll. May be repeated once for credit. Prerequisite: FRENLANG 21C or equivalent.

**FRENLANG 20B. French Cinema. 2 Units.**

Second-year French conversation based on films. Intermediate-level speaking skills and advanced-level functions. Themes include: French filmmakers, stars, and trends. Required film viewing in and outside class in French. May be repeated once for credit. Prerequisite: FRENLANG 21C or equivalent.

**FRENLANG 20C. Contemporary French Language. 2 Units.**

Second-year French conversation. Intermediate-level speaking skills and advanced-level functions for formal and informal situations. Useful for students planning to travel or study abroad. May be repeated once for credit. Prerequisite: FRENLANG 21C or equivalent.

**FRENLANG 21C. Second-Year French: Cultural Emphasis, First Quarter. 4-5 Units.**

Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socio culturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: Placement Test, one year of college French or consent of coordinator.

**FRENLANG 22C. Second-Year French: Cultural Emphasis, Second Quarter. 4-5 Units.**

Continuation of FRENLANG 21C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socio culturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: Placement Test, FRENLANG 21C or consent of coordinator.

**FRENLANG 23C. Second-Year French: Cultural Emphasis, Third Quarter. 4-5 Units.**

Continuation of FRENLANG 22C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socio culturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: placement Test, FRENLANG 22C or consent of coordinator.

**FRENLANG 24C. Second-Year French: Literary Texts. 3-4 Units.**

Proficiency oriented. Discussion, writing, reading, and listening comprehension based on literary texts. Prerequisite: 23.

**FRENLANG 24R. Second-Year French: International Relations, Political Science, and Economics Emphasis. 3-4 Units.**

Proficiency-based. Discussion, writing, reading, and listening comprehension based on political, economic, and social topics. Prerequisite: 23.

**FRENLANG 60A. Beginning French Conversation. 1 Unitss. (AU).****FRENLANG 60B. Intermediate French Conversation. 1 Unitss. (AU) (Staff).****FRENLANG 60C. Advanced French Conversation. 1 Unitss. (AU).****FRENLANG 60D. French Viticulture. 1 Unitss.**

See <http://www.stanford.edu/class/frenlang60d/>. Prerequisite: 21 or older. (AU).

**FRENLANG 60E. French Cooking. 1 Unitss. (AU).****FRENLANG 60F. French Cinema. 1 Unitss. (AU).****FRENLANG 60N. French cheese. 1 Unitss.****FRENLANG 60P. Advanced Viticulture. 1 Unitss. (AU).**

Prerequisite: Completion of 60D. (AU).



**FRENLANG 60T. Teaching French Conversation. 1 Units.**  
(AU).

**FRENLANG 120. Advanced French Oral Communication. 3 Units.**  
Speaking skills and functions including narration, description, supporting opinions, and hypothesizing about current events and issues in France. May be repeated once for credit. Prerequisites: FRENLANG 23C or equivalent, or consent of instructor.

**FRENLANG 121. Introduction to French Texts. 3-4 Units.**  
Readings of major literary figures and themes from medieval times to the present. Prerequisite: 23 or consent of coordinator. Recommended: 124.

**FRENLANG 122. Introduction to French Culture and Civilization. 3-4 Units.**  
Discussion of French art, geography, history, political change, and social institutions. Prerequisite: 23 or equivalent.

**FRENLANG 123. French Creative Writing. 3-4 Units.**  
Advanced. Model texts introduce students to genres and styles; review of grammar and vocabulary. Discussion of original writing by students. Prerequisite: 23 or equivalent.

**FRENLANG 124. Mastering Advanced French Grammar: Grammar through Contemporary Literature and Culture. 4-5 Units.**  
Required for students majoring or minoring in French; recommended for students planning to take literature courses. Review of difficulties in French. Grammatical and logical analysis. Prerequisite: FRENLANG 23C or equivalent.

**FRENLANG 125. French Phonetics. 3-4 Units.**  
For majors and other students who plan to enroll in advanced courses. Study and practice of the French language sound system. Language lab. Prerequisite: 23 or equivalent.

**FRENLANG 199. Language Specials. 1-5 Units.**  
Prerequisite: consent of instructor.

**FRENLANG 205A. Intensive First-Year French for Stanford Grads, Part A. 3-5 Units.**  
FRENLANG 205A. Same as FRENLANG 1. For Stanford graduate students only. Accelerated. Written exercises, compositions, conversational practice, and daily work. Stanford graduate students restricted to 9 units may take 205A,B,C for a total of 9 units or 2 of the courses for a total of 9 units.

**FRENLANG 205B. Intensive First-Year French for Stanford Grads, Part B. 3-5 Units.**  
For Stanford graduate students only. Continuation of 205A. Accelerated. Written exercises, compositions, conversational practice, and daily work. Prerequisite 205B or equivalent. Stanford graduate students restricted to 9 units may take 205A,B,C for a total of 9 units or 2 of the courses for a total of 9 units. Prerequisite 205A or equivalent.

**FRENLANG 205C. Intensive First-Year French for Stanford Grads - Part C. 3-5 Units.**  
For Stanford graduate students only. Continuation of 205B. Accelerated. Written exercises, compositions, conversational practice, and daily work. Stanford graduate students restricted to 9 units may take 205A,B,C for a total of 9 units or 2 of the courses for a total of 9 units. Prerequisite 205B or equivalent.

**FRENLANG 250. Reading French. 4 Units.**  
For seniors or graduate students seeking to meet the University reading requirement for advanced degrees. Reading strategies for comprehension of secondary literature for academic research. Fulfills the University foreign language requirement for advanced degrees if student earns a grade of 'B.' Prerequisite: one year or reading proficiency in another Romance language.

**FRENLANG 250S. Reading French. 2-4 Units.**  
For seniors or graduate students seeking to meet the University reading requirement for advanced degrees. Reading strategies for comprehension of secondary literature for academic research. Fulfills the University foreign language requirement for advanced degrees if student earns a grade of 'B.' Prerequisite: one year or reading proficiency in another Romance language.

**FRENLANG 394. Graduate Studies in French Conversation. 1-3 Units.**  
Prerequisite: consent of the instructor.

**FRENLANG 395. Graduate Studies in French. 2-5 Units.**  
Prerequisite: consent of instructor.

## French Literature Courses

**FRENCH 65N. Nation in Motion: Film, Race and Immigration in Contemporary French Cinema. 3 Units.**

An examination of the current debates in France regarding national identity, secularism, and the integration of immigrants, notably from the former colonies. Confronts films' and other media's visual and discursive rhetorical strategies used to represent ethnic or religious minorities, discrimination, citizens' resistance to government policies, inter-racial marriages, or women's rights within immigrant communities. By embodying such themes in stories of love, hardships, or solidarity, the motion pictures make the movements and emotions inherent to immigration tangible: to what effect? Taught in French. Films in French with English subtitles.  
Same as: CSRE 65N.

**FRENCH 112. Oscar Wilde and the French Decadents. 3-5 Units.**  
Close reading of Oscar Wilde's work together with major texts and authors of 19th-century French Decadence, including Symbolism, l'art pour l'art, and early Modernism. Points of contact between Wilde and avant-garde Paris salons; provocative, creative intersections between (homo)erotic and aesthetic styles, transgression; literary and cultural developments from Baudelaire to Mallarmé, Huysmans, Flaubert, Rachilde, Lorrain, and Proust compared with Wilde's Salomé, Picture of Dorian Gray, and critical writings; relevant historical and philosophical contexts. All readings in English; all student levels welcome.  
Same as: COMPLIT 112, COMPLIT 312, FRENCH 312.

**FRENCH 118. Literature and the Brain. 5 Units.**  
Recent developments in and neuroscience and experimental psychology have transformed the way we think about the operations of the brain. What can we learn from this about the nature and function of literary texts? Can innovative ways of speaking affect ways of thinking? Do creative metaphors draw on embodied cognition? Can fictions strengthen our "theory of mind" capabilities? What role does mental imagery play in the appreciation of descriptions? Does (weak) modularity help explain the mechanism and purpose of self-reflexivity? Can the distinctions among types of memory shed light on what narrative works have to offer?  
Same as: ENGLISH 118, ENGLISH 218, FRENCH 318, PSYCH 118F.

**FRENCH 120. Coffee and Cigarettes: The Making of French Intellectual Culture. 4-5 Units.**  
Examines a quintessential French figure "l'intellectuel" from a long-term historical perspective. We will observe how this figure was shaped over time by such other cultural types as the writer, the artist, the historian, the philosopher, and the moralist. Proceeding in counter-chronological order, from the late 20th to the 16th century, we will read a collection of classic French works. As this course is a gateway for French studies, special emphasis will be placed on oral proficiency. Taught in French; readings in French.

**FRENCH 125. Religion, The Self, and Society in 20th-Century French Novels and Film. 3-5 Units.**

Survey course on religion, the self, and society in 20th-century French novels and film. Readings may include: Gide, Camus, and Bernanos for the novels, and films by Robert Bresson and others. Taught in French.

**FRENCH 130. Introduction to Medieval and Renaissance French Literature. 4 Units.**

Introduction to the Middle Ages and the Renaissance. The birth of a national literature and its evolution. Literature as addressing cultural, philosophical, and artistic issues which question assumptions on love, ethics, art, and the nature of the self. Readings: epics (La Chanson de Roland), medieval romances (Tristan, Chrétien de Troyes' Yvain), post-Petrarchan poetics (Du Bellay, Ronsard, Labé), and prose humanists (Rabelais, Montaigne). Taught in French. Prerequisite: FRENLANG 124 or consent of instructor.

**FRENCH 131. Absolutism, Enlightenment, and Revolution in 17th- and 18th-Century France. 4 Units.**

The literature, culture, and politics of France from Louis XIV to Olympe de Gouges. How this period produced the political and philosophical foundations of modernity. Readings include Corneille, Molière, Racine, Lafayette, Voltaire, Diderot, Rousseau, Beaumarchais, and Gouges. Taught in French. Prerequisite: FRENLANG 124 or consent of instructor.

**FRENCH 132. Literature, Revolutions, and Changes in 19th- and 20th-Century France. 4 Units.**

Major literary genres, and social and cultural contexts. Focus is on the emergence of new literary forms such as *surréalisme*, *nouveau roman*, and *nouveau théâtre*. Topics of colonization, decolonization, and feminism. Readings include Balzac, Baudelaire, Césaire, Colette, and Ionesco. Taught in French. Prerequisite: FRENLANG 124 or consent of instructor.

**FRENCH 133. Literature and Society in Africa and the Caribbean. 4 Units.**

The course is reading, analysis and discussion of some of the most representative texts by 20th century Francophone writers from a variety of locations: the French Caribbean, Africa North and South of the Sahara. These works convey the changing aspects of Francophone Africa and the French Caribbean societies and cultures: from oral to written, colonization and changes, tradition competing with modernity, particularly for women, building new identities immigration narrative. The course aims to broaden knowledge of the Francophone societies and cultures, as well as improve skills in speaking and writing in French. Lectures and discussions are conducted in French, most required readings and background material are in French as well. Reading in fiction, poetry and theater include Laye Camara, Ferdinand Oyono, Maryse Condé, Aimé Césaire, Leïla Sebbar, Mariama Ba, and others. Taught in French. Prerequisite: FRENLANG 124 or consent of instructor.

**FRENCH 140. Paris: Capital of the Modern World. 4-5 Units.**

This course explores how Paris, between the eighteenth and twentieth centuries, became the political, cultural, and artistic capital of the modern world. It considers how the city has both shaped and been shaped by the tumultuous events of modern history- class conflict, industrialization, imperialism, war, and occupation. It will also explore why Paris became the major world destination for intellectuals, artists and writers. Sources will include films, paintings, architecture, novels, travel journals, and memoirs. Same as: FRENCH 340, HISTORY 230C.

**FRENCH 145. French Theatromania: From Great Classics to Private Theater in 17th & 18th Century France. 3-5 Units.**

For French majors and minors. Explore the French passion for theater in the 17th and 18th centuries, from the great classics to private theater. A selection of plays from the official and the private repertory will be used to illustrate the evolution of French theater as a genre and to discuss its role in the sociopolitical shifts of the period. All readings, discussions, and assignments will be in French.

**FRENCH 154. Film & Philosophy. 4 Units.**

Issues of freedom, morality, faith, knowledge, personal identity, and the value of truth explored through film; philosophical investigation of the filmic medium itself. Screenings to include *Twelve Monkeys* (Gilliam), *Ordet* (Dreyer), *The Dark Knight* (Nolan), *Vicky Cristina Barcelona* (Allen), and *Eternal Sunshine of the Spotless Mind* (Kaufman). Taught in English.

Same as: COMPLIT 154A, ITALIAN 154, PHIL 193C, PHIL 293C.

**FRENCH 181. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English. Same as: CLASSGEN 81, COMPLIT 181, ENGLISH 81, GERMAN 181, ITALIAN 181, PHIL 81, SLAVIC 181.

**FRENCH 190Q. Parisian Cultures of the 19th and Early 20th Centuries. 4 Units.**

Preference to sophomores. Political, social, and cultural events in Paris from the Napoleonic era and the Romantic revolution to the 30s. The arts and letters of bourgeois, popular, and avant garde cultures. Illustrated with slides. Taught in English.

**FRENCH 199. Individual Work. 1-12 Units.**

Restricted to French majors with consent of department. Normally limited to 4-unit credit toward the major. May be repeated for credit.

**FRENCH 204. Revolutions in Prose: The 19th-Century French Novel. 3-5 Units.**

The French Revolution was not just a haunting memory in nineteenth-century France: it was the decisive structure around which French politics, but also French culture and the arts more generally, were centered. As some historians have argued, the French Revolution might not even have really ended until 1880. In this course, we will examine both literary representations of the French Revolution, as well as the literary analyses of a society constantly dealing with the fears (or hopes) of a new Revolution. Primary readings by Stendhal, Balzac, Flaubert, Zola. Taught in French.

**FRENCH 219. The Renaissance Body in French Literature and Medicine. 3-5 Units.**

If the Renaissance is famous for discovering unknown continents and ancient texts the body too was a new territory of conquest. How did literature respond to the rise of an anatomical gaze in the arts and in medicine and how did it stage the aesthetic religious philosophical and moral issues related to such a promotion or deconstruction of the body? Does literature aim at representing the body or does it use it instead as a ubiquitous signifier for intellectual emotional and political ideas? The locus of desire, pleasure and disease, the body also functioned as a reminder of human mortality and was caught in the web of gender issues, religious controversies and new norms of behavior. Texts from prose fiction (Rabelais) poetry (Scève Ronsard Labé D' Aubigné) essays (Montaigne) and emblem literature. Extra documents include music scores tapestries paintings philosophical and anatomical plates from medical treatises. Taught in English. Visit the Web site: [renaissancebodyproject.stanford.edu](http://renaissancebodyproject.stanford.edu) Same as: FRENCH 319.

**FRENCH 228. Science, Technology, and Society in the Face of the Looming Disaster. 3-5 Units.**

The major topic will be the indeterminacy regarding the survival of humankind. With the advent of the atomic bomb humankind became potentially the maker of its own demise. Will combine a number of significant case studies (environmental disasters, industrial catastrophes, threat of nuclear devastation, technological risks) with the lessons drawn from a form of literature that is at the intersection of STS and the Humanities, in particular the early warnings made by such thinkers as Ivan Illich, Martin Heidegger, Hans Jonas, Günther Anders, and Hannah Arendt. Same as: ITALIAN 228, POLISCI 233F.

**FRENCH 234. Courtly Love: Deceit and Desire in the Middle Ages. 3-5 Units.**

A comparative seminar on medieval love books and their reception. We will examine and question the notion of "amour courtois," which arose in the lyrics and romances of medieval France and was codified in Romantic-era criticism. Primary readings will be enriched by thinking about this notion through the lens of modern theories of desire, such as those of Girard, Lacan, and Žižek. Conducted in English with readings in translation. Same as: COMPLIT 221A, ITALIAN 234.

**FRENCH 235. Nation in Motion: Film, Race, and Immigration in Contemporary French Cinema. 3-5 Units.**

An examination of the current debates in France regarding national identity, secularism, and the integration of immigrants, notably from the former colonies. Course confronts films' and other media's visual and discursive rhetorical strategies used to represent ethnic or religious minorities, discrimination, citizens' resistance to government policies, inter-racial marriages, or women's rights within immigrant communities. By embodying such themes in stories of love, hardships, or solidarity, the motion pictures make the movements and emotions inherent to immigration tangible: to what effect? Taught in English. Films in French with English subtitles. Consent of instructor for undergraduates. Same as: CSRE 235, FRENCH 335.

**FRENCH 242. Seasons in North African Cinema and Literature. 3-5 Units.**

This course explores the emergence of Francophone cinema and literature from North Africa (Algeria, Tunisia, Morocco) in the post-independence era: aesthetics, language métissage and hybridization, ethnic interactions, gender relations, collective imagination and collective memory, nationalism, popular culture, religion, urbanism, post-colonialism, migration, and the Arab Spring will be covered. Special attention will be given to judeo-maghrebi history, and to the notions of francophone/maghrebi/"beur"/diasporic cinema and literature. Readings from Franz Fanon, Albert Memmi, Kateb Yacine, Albert Camus, Reda Bensmaïa, Assia Djebar, Colette Fellous, Abdelkebir Khatibi, Michel de Certeau, Leïla Sebbar, Benjamin Stora, Lucette Valensi, Abdelwahab Meddeb. Movies include Viva Laldjerie, Tenja, Le Chant des Mariées, Française, Bled Number One, Omar Gatlato, Casanegra, Le Silence des Palais, Les Sabots en Or, Harragas, La Saison des Hommes, L'Homme de Cendres, Mascarades. Taught in French. Films in French and Arabic with English subtitles.

**FRENCH 248. Literature, History and Memory. 3-5 Units.**

Analysis of literary works as historical narratives. Focus on the relationship history, fiction, and memory as reflected in Francophone literary texts that envision new ways of reconstructing or representing ancient or immediate past. Among questions to be raised: individual memory and collective history, master narratives and alternative histories, the role of reconstructing history in the shaping or consolidating national or gender identities. Readings include fiction by Glissant, Kane, Condé, Schwarz-Bart, Djebar, Perec, as well as theoretical texts by Ricoeur, de Certeau, Nora, Halbwachs, White, Echevarría. Taught in English. Same as: COMPLIT 250.

**FRENCH 251. Writing, Memory, and Self-Fashioning. 3-5 Units.**

Writing is not a mere recording of the past, but a selection and reinvention of our experiences. We will look at how writing is central to the philosophical project of fashioning the self, even as it reveals that much of what we call the self is a fictional construct. Materials include fiction and memoirs (Primo Levi, Michel Tournier, Melania Mazzucco, Jonathan Littell), and theoretical works in philosophy (Bergson, James, Freud, Jung, Derrida, Wyschogrod, Nehamas), psycholinguistics, and neuroscience. Taught in English. Same as: ITALIAN 251.

**FRENCH 293A. Topics in French Literature and Philosophy. 2 Units.**

Five-week course. May be repeated for credit. Taught in French.

**FRENCH 293B. Topics in French Literature and Philosophy. 2 Units.**

Five-week course. May be repeated for credit. Taught in French.

**FRENCH 312. Oscar Wilde and the French Decadents. 3-5 Units.**

Close reading of Oscar Wilde's work together with major texts and authors of 19th-century French Decadence, including Symbolism, l'art pour l'art, and early Modernism. Points of contact between Wilde and avant-garde Paris salons; provocative, creative intersections between (homo)erotic and aesthetic styles, transgression; literary and cultural developments from Baudelaire to Mallarmé, Huysmans, Flaubert, Rachilde, Lorrain, and Proust compared with Wilde's Salomé, Picture of Dorian Gray, and critical writings; relevant historical and philosophical contexts. All readings in English; all student levels welcome. Same as: COMPLIT 112, COMPLIT 312, FRENCH 112.

**FRENCH 316. Understanding and Staging Molière Theatre. 3-5 Units.**

Devoted to an in depth analysis of Molière's major plays, as well as a study of contemporary productions of his work. Taught in French. Same as: TAPS 368S.

**FRENCH 318. Literature and the Brain. 5 Units.**

Recent developments in and neuroscience and experimental psychology have transformed the way we think about the operations of the brain. What can we learn from this about the nature and function of literary texts? Can innovative ways of speaking affect ways of thinking? Do creative metaphors draw on embodied cognition? Can fictions strengthen our "theory of mind" capabilities? What role does mental imagery play in the appreciation of descriptions? Does (weak) modularity help explain the mechanism and purpose of self-reflexivity? Can the distinctions among types of memory shed light on what narrative works have to offer? Same as: ENGLISH 118, ENGLISH 218, FRENCH 118, PSYCH 118F.

**FRENCH 319. The Renaissance Body in French Literature and Medicine. 3-5 Units.**

If the Renaissance is famous for discovering unknown continents and ancient texts the body too was a new territory of conquest. How did literature respond to the rise of an anatomical gaze in the arts and in medicine and how did it stage the aesthetic religious philosophical and moral issues related to such a promotion or deconstruction of the body? Does literature aim at representing the body or does it use it instead as a ubiquitous signifier for intellectual emotional and political ideas? The locus of desire, pleasure and disease, the body also functioned as a reminder of human mortality and was caught in the web of gender issues, religious controversies and new norms of behavior. Texts from prose fiction (Rabelais) poetry (Scève Ronsard Labé D'Aubigné) essays (Montaigne) and emblem literature. Extra documents include music scores tapestries paintings philosophical and anatomical plates from medical treatises. Taught in English. Visit the Web site: [renaissancebodyproject.stanford.edu](http://renaissancebodyproject.stanford.edu) Same as: FRENCH 219.

**FRENCH 327. Genres of the Novel. 5 Units.**

Provides students with an overview of major genres in the history of the modern novel. Novels might include works by Cervantes, Defoe, Lafayette, Radcliffe, Goethe, Balzac, Woolf, and Marquez, coupled with theory by Lukacs, Bakhtin, Jameson and Barthes.  
Same as: COMPLIT 327.

**FRENCH 335. Nation in Motion: Film, Race, and Immigration in Contemporary French Cinema. 3-5 Units.**

An examination of the current debates in France regarding national identity, secularism, and the integration of immigrants, notably from the former colonies. Course confronts films' and other media's visual and discursive rhetorical strategies used to represent ethnic or religious minorities, discrimination, citizens' resistance to government policies, inter-racial marriages, or women's rights within immigrant communities. By embodying such themes in stories of love, hardships, or solidarity, the motion pictures make the movements and emotions inherent to immigration tangible: to what effect? Taught in English. Films in French with English subtitles. Consent of instructor for undergraduates.  
Same as: CSRE 235, FRENCH 235.

**FRENCH 340. Paris: Capital of the Modern World. 4-5 Units.**

This course explores how Paris, between the eighteenth and twentieth centuries, became the political, cultural, and artistic capital of the modern world. It considers how the city has both shaped and been shaped by the tumultuous events of modern history- class conflict, industrialization, imperialism, war, and occupation. It will also explore why Paris became the major world destination for intellectuals, artists and writers. Sources will include films, paintings, architecture, novels, travel journals, and memoirs.  
Same as: FRENCH 140, HISTORY 230C.

**FRENCH 368. Imagining the Oceans. 5 Units.**

How has Western culture constructed the world's oceans since the beginning of global ocean exploration? How have imaginative visions of the ocean been shaped by marine science, technology, exploration, commerce and leisure? Readings might include voyage accounts by Cook and Darwin, sailors' narratives by Equiano and Dana, poetry by Coleridge, Bishop and Walcott, novels by Melville, Verne, Conrad and Woolf. Visual culture might include paintings by Turner and Redon, and films by Jean Painlevé, Kathryn Bigelow, Jerry Bruckheimer and James Cameron. Critical texts will be drawn from interdisciplinary theorists of modernity and mobility, such as Schmitt, Wallerstein, Corbin, Latour, Deleuze + Guattari, and Cresswell.  
Same as: COMPLIT 368.

**FRENCH 369. Introduction to Graduate Studies: Criticism as Profession. 5 Units.**

A number of faculty will present published work and discuss their research and composition process. We will read critical, theoretical, and literary texts that address, in different ways, "What is a World?" Taught in English.  
Same as: COMPLIT 369, DLCL 369, GERMAN 369, ITALIAN 369.

**FRENCH 395. Philosophical Reading Group. 1 Unitss.**

Discussion of one contemporary or historical text from the Western philosophical tradition per quarter in a group of faculty and graduate students. For admission of new participants, a conversation with H. U. Gumbrecht is required. May be repeated for credit. Taught in English.  
Same as: COMPLIT 359A, ITALIAN 395.

**FRENCH 399. Individual Work. 1-12 Units.**

For students in French working on special projects or engaged in predissertation research.

**FRENCH 802. TGR Dissertation. 0 Unit.**

## GSB General Interdisciplinary Courses

**GSBGEN 10SC. Lives of Consequence. 2 Units.**

This course examines how exceptionally creative individuals from a variety of domains (including the arts, sciences, politics, technology, and society) found a sense of purpose in their lives and then successfully pursued that purpose. In the creative domain, for example, we examine the lives of filmmaker George Lucas, Apple CEO Steve Jobs, lifestyle designer Martha Stewart, and master chef Thomas Keller. In the political sphere, we examine the lives of Margaret Thatcher, Martin Luther King, and Robert F. Kennedy. We also explore the work of individuals engaged in philanthropic efforts around the globe, including Melinda Gates and Paul Farmer. We complement the study of these individuals, and others, with a variety of readings from the social science literature on happiness, meaning, and creativity. Students interested in psychology, philosophy, creativity, the arts and sciences, or business should find the course particularly useful and engaging. Students, working individually and in small groups, will have a chance to apply the course concepts to their own lives, using a series of reflective writing exercises. Students will complete an independent research project on a topic or person of interest to them. They will make a presentation to the class on the basis of their research. The course is designed to be highly discussion-oriented and interactive. Students may take this course for either a letter grade or on a pass/fail basis. Letter grades for the course will be based upon the quality of the independent library research and class presentation, along with the quality and consistency of class participation. Both components (research and class participation) are equally weighted.

**GSBGEN 111Q. Seminar in Entrepreneurial Communication. 3 Units.**

College campuses have been the incubators for thousands of new business ventures. What makes the difference between a successful entrepreneur and an initial failure out of the gate? It's often not the quality of the idea, but rather the ability of the entrepreneurs to successfully communicate their vision to potential investors, employees, and customers. This seminar will explore successful and failed entrepreneurial communication. Students will learn the basics of persuasive oral and written communication, and then apply these principles to their own ideas.

**GSBGEN 112Q. Leading Out Loud: an Exploration of Leadership Communication through an LGBT Lens. 3 Units.**

Students of all sexual orientations are invited to apply for this unique new seminar looking at the distinct challenge LGBT leaders have faced in communicating effectively. Through the years, many individuals have led the struggle for gay rights and inclusion through a variety of different communication strategies and tactics; some were successful while others were not. This seminar course will explore some of the key leaders in the LGBT community and how they chose to communicate. Together we will search through a variety of film clips, transcripts, news reports, and other historical elements to see how the message, media, and moments work together. A number of guest speakers will also share their perspective on what it means to "Lead Out Loud." Heterosexual identified students as well as LGBT students are encouraged to apply; in fact, we seek to have a true diversity of opinions in the room as we explore this topic. All students will benefit from this exploration of how to communicate about controversial, sensitive, and personal subjects with greater strength and purpose.

## French Literature Courses

**GSBGEN 199. Curricular Practical Training for PhD Students. 3 Units.**

GSB students are eligible to report on work experience that is relevant to their core studies under the direction of the Director of the PhD Program. Registration for this work must be approved by the Director of the PhD Program and is limited to students who present a project which in judgment of the Advisor may be undertaken to enhance the material learned in PhD courses. It is expected that this research be carried on by the student with a large degree of independence and the expected result is a written report, due at the end of the quarter in which the course is taken. Because this course runs through the summer, reports are due the 2nd week of October. Units earned for this course do not meet the requirements needed for graduation.

**GSBGEN 202. Critical Analytical Thinking. 2 Units.**

The Critical Analytical Thinking (CAT) course provides a setting for students to further develop and hone the skills needed to analyze complex issues and make forceful and well-grounded arguments. In 16-18 person sections, you will analyze, write about, and debate a set of topics that encompass the types of problems managers must confront. In doing this CAT will enhance your ability to identify critical questions when exploring challenging business issues. The emphasis will be on developing reasoned positions and making sound and compelling arguments that support those positions.

**GSBGEN 203. Managing in the Global Context. 1 Unitss.**

The economies of the world are ever more closely linked. Record levels of international trade and investment are achieved every year. Cross-border mergers and acquisitions are booming. The foreign exchange markets handle trillions of dollars of volume daily. Offshore provision of services has grown immensely. Host governments and non-governmental organizations operating internationally affect how companies do business far from their home bases and close to home. Nearly all businesses today are somehow connected to the world economy, and it is quite likely that the process of globalization will continue apace. To succeed as a leader in your career, you will need to be able to think systematically about the challenges and opportunities brought about by globalization. This course is designed to help you develop as a leader in this international environment. Our objectives are to help you: 1. To develop an analytic framework that you can use to understand how countries are different or similar in ways that matter to the globalization of business. 2. To understand how corporate strategies can deal with these differences and similarities, resulting in competitive advantage.

**GSBGEN 208. Ethics in Management. 2 Units.**

With leadership comes responsibility. This course explores the numerous ethical duties faced by managers and organizations. It combines analytical frameworks with the latest findings on human behavior to inform a wide range of ethical decisions and strategies. Readings include case studies, insights from experimental psychology and economics, and excerpts from or about major works of moral philosophy. Through online and in-class exercises, discussions, and personal reflection, you will reveal and assess your ethical intuitions, compare them with more explicit modes of ethical thought, and learn how to use ethics in business settings. A diverse set of ethical viewpoints will be considered with an emphasis on not only their implications for ethical behavior but also on the social and cognitive pitfalls that undermine the ability of business leaders to fulfill their ethical duties.

**GSBGEN 239. Sloan: Executive Communication Strategies. 2 Units.**

Communication is crucial to the success of all leaders, but as you climb within an organization the ability to write and speak effectively is magnified. This course will explore how individuals can develop and execute effective communication strategies for a variety of business settings. This course introduces the essentials of communication strategy and persuasion at an executive level. We will study: audience analysis, communicator credibility, message construction and delivery. Deliverables will include written documents and oral presentations and you will present both individually and in a team. You will receive continuous feedback to improve your communication effectiveness. Through this highly interactive course, you will see why ideas, data and advocacy are combined for a professional, persuasive presentation. This practical course helps students at all levels of communication mastery develop confidence in their speaking and writing through weekly presentations and assignments, lectures and discussions, guest speakers, simulated activities, and filmed feedback. This section is specifically designed with the needs of a senior leader in mind and is only open to Sloan Students. Students who elect to take this course in the fall should not also take strategic communication in the winter or spring; the courses will have sufficient overlap in concepts and assignments.

**GSBGEN 259. Sloan: Ethics. 1 Unitss.**

With leadership comes responsibility. This course explores the numerous ethical duties faced by managers and organizations. It combines analytical frameworks with the latest findings on human behavior to inform a wide range of ethical decisions and strategies. Readings include case studies, insights from experimental psychology and economics, and excerpts from or about major works of moral philosophy. Through online and in-class exercises, discussions, and personal reflection, you will reveal and assess your ethical intuitions, compare them with more explicit modes of ethical thought, and learn how to use ethics in business settings. A diverse set of ethical viewpoints will be considered with an emphasis on not only their implications for ethical behavior but also on the social and cognitive pitfalls that undermine the ability of business leaders to fulfill their ethical duties.

**GSBGEN 299. The Core Curriculum in the Workplace. 1 Unitss.**

GSB students are eligible to report on work experience that is relevant to their core studies under the direction of the Senior Associate Dean responsible for the MBA Program. Registration for this work must be approved by the Director of the MBA Program and is limited to students who present a project which, in judgment of the Advisor, may be undertaken to enhance the material learned in the first year core required courses. It is expected that this research be carried on by the student with a large degree of independence and the expected result is a written report, due at the end of the quarter in which the course is taken. Because this course runs through the summer, reports are typically due in early October. Units earned for this course do not meet the requirements needed for graduation.

**GSBGEN 306. Real Estate Investment. 4 Units.**

The major objective of this course is to provide the student with a comprehensive understanding of the general fundamentals of real estate investment. Various aspects of real estate are covered including economics, market analysis, finance, taxation, appraisal, investment analysis, investment vehicles, development, planning and design. Major land uses are discussed including apartments, retail, office, and industrial projects. This course is designed for both the investor and the general manager to better understand real estate as an asset class.

**GSBGEN 313. Advanced Seminar on Social Entrepreneurship and Global Poverty. 3 Units.**

As an "advanced" seminar, this course is designed for students with strong backgrounds or interests in social entrepreneurship as a tool for solving social problems. The learning format is based on active engagement. For most of the classes, students will be required to lead off the class discussions. The ultimate goal of this course is to make students (and the instructor) smarter about the strengths and limits of social entrepreneurship as a tool for social change. To this end, we will focus on global poverty reduction as a testing ground. During this process we will explore different theories, concepts, frameworks, and guidelines for effective social entrepreneurship to see whether, when and how these help. The course is organized into three modules. The first focuses on how social entrepreneurship fits in a broader framework of social change and social innovation. The second module provides a brief overview of issues, debates, and theories about poverty and development. The third module focuses on specific entrepreneurial interventions aimed at addressing some of the conditions that keep people poor or make them poor. This course allows us to dig into the complexities and challenges of effective social entrepreneurship. It will be taught in a discussion style. The reading will be demanding. So if you are not prepared to dig into the reading or to engage in active discussion, or if you don't feel like you bring relevant knowledge to add to the mix of discussion, this is not the course for you. It is not meant to be an introduction to social entrepreneurship. If everyone contributes, we will all emerge from the course with new perspectives and frameworks for advancing practice in this field. Only take this course if you are ready for an intellectual adventure and ready to make the investment it requires. This course will be taught by Greg Dees, his bio can be found here: <http://www.caseatduke.org/about/caseteam/#greg>.

**GSBGEN 314. Creating High Potential Ventures in Developing Economies. 3 Units.**

This course addresses the distinctive challenges and opportunities of launching high-potential new ventures in developing economies. Developing economies are attractive targets for entrepreneurs because many of these markets are just starting to move up the growth curve. They offer low-cost operating environments and can be great development laboratories for potentially disruptive innovations. They increase in attractiveness when their political institutions stabilize and they become more market-friendly. At the same time, developing economies pose serious challenges. Pioneering entrepreneurs take on significant risks to gain early mover advantages. Specifically, they will not be able to count on the same kind of supportive operating environments that we take for granted in the developed world. They often face cumbersome permit and licensing processes, poorly developed financial and labor markets, problematic import and export procedures, unreliable local supply chains, weak infrastructure, petty corruption, currency risks, and more. The course is designed to help would-be entrepreneurs better understand and be prepared for the complex issues as they pursue the opportunities and address the challenges to start, grow, and harvest or exit their ventures in these environments. The core of the course is an intense team-based exercise involving the development of a new venture proposal for a particular developing country. Interested students must come in willing to be team-players and do the work necessary to complete this exercise across the full quarter. Each team member's contributions will be assessed by fellow team members. Teams will be formed on the first day. Each team will either select or be assigned a developing economy. The teams will then identify what they think would be a high potential opportunity for innovative entrepreneurship in their assigned economy, considering its distinctive assets and challenges. If you can come to the course with an idea, a country, and a team, that is a plus. The team will outline, in a final report, how their proposed venture capitalizes on the assets and addresses the greatest challenges. While a detailed business plan will not be required, in depth analysis and recommendations for next steps will be. In effect, the team will answer the question: why do they think this new proposed venture is viable in the specific developing economy/country, and how would the group go about actually starting and growing the business? Our goal is to make this the best course of its kind in the world. Since this is the first year of the course, we particularly want to attract students who would enjoy helping further develop the course- in fact, we only want students who are willing to contribute to such enhancements. We will come with frameworks, readings, and cases, but this is an arena that begs for new approaches and material. We will be refining and developing our approaches as we go, with heavy student input. This course will relate to the work being done in the Stanford Institute for Innovation in Developing Economies (SEED), under the theory that healthy entrepreneurship and innovation will improve the overall economy and (at least indirectly, if not directly) reduce poverty. Most countries that have successfully grown out of poverty did not do it by focusing only on Bottom of Pyramid (BoP) businesses, but by promoting healthy business growth overall. Helping entrepreneurs build successful new ventures in a developing economy is an essential element of an overall strategy for moving a country out of poverty. BoP businesses have tended to grow slowly, and struggle to raise capital, often be forced to pay low wages, etc. Without complementing these businesses with strong high-potential, high-growth, profit making businesses, none of these developing economies will progress economically or eliminate poverty. A prosperous business with a solid plan will help the country, the economy, and ultimately the poor. Since this is a new course for the GSB, interested students are encouraged to contact Steve Ciesinski ([sjc21@stanford.edu](mailto:sjc21@stanford.edu)) for further information. Attendance and Participation: Mandatory Prerequisite: some work experience or academic coursework in new venture formation desired, not required. Group Project: Yes Exam: No.

**GSBGEN 315. Strategic Communication. 4 Units.**

Business leaders have marketing strategies, expansion strategies, finance strategies, even exit strategies. Successful leaders, however, also have communication strategies. This course will explore how individuals and organizations can develop and execute effective communication strategies for a variety of business settings. This course introduces the essentials of communication strategy and persuasion: audience analysis, communicator credibility, message construction and delivery. Deliverables will include written documents and oral presentations and you will present both individually and in a team. You will receive feedback to improve your communication effectiveness. In the final team presentation, your challenge is to craft an oral presentation that will persuade your audience to accept your strategic recommendations. By doing this, you will see why ideas, data and advocacy are combined for a professional, persuasive presentation. This practical course helps students develop confidence in their speaking and writing through weekly presentations and assignments, lectures and discussions, guest speakers, simulated activities, and videotaped feedback. An important new feature of this course is that a team of external communications coaches work in concert with the professor to ensure that students get rigorous and individualized coaching and feedback. In this course you will learn to: - Create communication strategies at an individual and organizational level - Develop clearly organized and effective presentations and documents - Diagnose and expand your personal writing and oral delivery style - Adapt your delivery style to different material and audiences - Enhance oral delivery through effective visual aids Students at all levels of comfort and expertise with public speaking and business writing will benefit from this course. In the 2012-2013 academic year this course will only be offered once in the winter and once in the spring term. Waitlists have been long for this course and you're encouraged to keep that in mind as you make your super round selections.

**GSBGEN 334. Family Business. 3 Units.**

Family-controlled private and public companies are the dominant form of enterprise worldwide. Despite their prominence, teaching and research have traditionally focused on analyzing the widely-held model of the firm. The family business management and valuation course explores the unique challenges and opportunities faced by family firms. The course is taught by Leo Linbeck III, Lecturer since 2005 at the GSB and President and CEO of Aquinas Companies, LLC. The course balances managerial perspectives with general frameworks. The course is intended for four main audiences: (1) Students whose family owns a business. (2) Students who are considering working for a family firm. (3) Students who are interested in acquiring a private firm either directly (search funds, minority investments, etc) or indirectly (private equity, etc). (4) Students who seek to consult or provide professional services to closely held firms or their owners (wealth management solutions, management consulting, etc). The main objectives of this course are three. First, to understand the unique challenges and characteristics of family firms. Second, to provide a coherent and consistent set of tools to evaluate the most relevant decisions faced by family firms. Third, to focus on decision-making. The course uses a combination of case studies, guest speakers, and student presentations to explore the central ideas of the course.

**GSBGEN 336. Energy Markets and Policy. 4 Units.**

Transforming the global energy system to reduce climate change impacts, ensure security of supply, and foster economic development of the world's poorest regions depends on the ability of commercial players to deliver the needed energy at an affordable price at scale. Technological innovation is a necessary but not sufficient condition for this to occur. The complex institutional frameworks that regulate energy markets in the United States and around the world will play a major role in determining the financial viability of firms in the energy sector. In this course we survey the economic, regulatory and technological constraints facing energy enterprises of all types and consider what kinds of business models work in each setting. We study in detail how markets function for carbon (assessing the advantages and disadvantages of different policy tools and considering in particular California's implementation of A.B. 32); electricity markets (with a focus on understanding how both retail and wholesale electricity prices are determined and how market participants hedge short-term price risk); renewable energy technologies (focusing on ways to manage intermittency and on how renewable energy businesses respond to government incentives); nuclear power (as a case study of how the regulatory process affects investment decisions); oil and natural gas (treating both conventional and unconventional resources and emphasizing the key role of risk management in an industry characterized by uncertainty and high capital requirements); transportation fuels (discussing biofuels incentives, fuel efficiency standards, and other policy tools to lower carbon intensity in the transportation sector); and energy for low-income populations, for which affordability and distribution pose special challenges. The objective of the course is to provide a robust intellectual framework for analyzing how a business can most constructively participate in any sector like energy that is heavily affected by government policy. Instructors: Frank A. Wolak, Director, Program on Energy and Sustainable Development Mark Thurber, Associate Director, Program on Energy and Sustainable Development.

**GSBGEN 340. Financial Crises in the U.S. and Europe. 4 Units.**

This lecture course will explore the U.S. financial crisis of 2008 and the European debt crisis of 2011-12. We will examine the causes of both crises, policies implemented during the crisis, and options for reform. This is an economic policy course rather than a pure economics course. It will focus on the practical intersection of economics, financial markets and institutions, policy, and politics. Topics we will examine include the following for the 2008 crisis: - Did a global savings glut, international savings flows, or Fed policy cause the credit bubble? - What caused the housing and mortgage bubbles? - How does a bad mortgage turn into a toxic financial asset? - Why and how did large financial institutions fail? What's the difference between a solvency crisis and a liquidity crisis? - What is Too Big To Fail? Is it real? Why was Bear Stearns bailed out but not Lehman? - Was the global financial system on the verge of meltdown in September 2008? How? Why? - What was the TARP? The TALF? The CPP? The stress tests? - What can we learn from comparing the US financial crisis with that in other major economies? - How effective were various policy tools during the crisis? - How have policies enacted and implemented since the crisis changed the outlook for the future? For the European debt crisis we will examine: - The fiscal and economic situations in various European countries; - The structures and history of the Eurozone; - Policy options to address problems in troubled European economies; - The interaction between European financial institutions and European governments; and - Options for longer-term reform of the Eurozone. There will be no exams. Students will write an individual memo and a group memo.

**GSBGEN 346. Comparing Institutional Forms: Public, Private, and Nonprofit. 4 Units.**

For students interested in the nonprofit sector, those in the joint Business and Education program, and for Public Policy MA students. The focus is on the missions, functions, and capabilities of nonprofit, public, and private organizations, and the managerial challenges inherent in the different sectors. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials. Same as: EDUC 377, PUBLPOL 317, SOC 377.

**GSBGEN 348. The Economics of Higher Education. 4 Units.**

Topics: the worth of college and graduate degrees, and the utilization of highly educated graduates; faculty labor markets, careers, and workload; costs and pricing; discounting, merit aid, and access to higher education; sponsored research; academic medical centers; and technology and productivity. Emphasis is on theoretical frameworks, policy matters, and the concept of higher education as a public good. Stratification by gender, race, and social class.

**GSBGEN 349. Introduction to the Politics of Education. 4 Units.**

The relationships between political and economic analysis and policy formulation in education; focus is on alternative models of the political process, the nature of interest groups, political strategies, policy efficiency, the external environment of organizations, and the implementations of policy. Applications to policy analysis, implementation, and politics of reform. (APA).

**GSBGEN 350. International Internship. 1-2 Units.****GSBGEN 359. Leading Your Life. 4 Units.**

This course takes conventional managerial perspectives on the "strategic leadership" of organizations and applies them to the design and management of your life. Fundamental notions of "purpose" and "vision" are translated to the personal level in the form of "dreams" and "aspirations." Basic elements of strategy such as "scope" and "competitive advantage" are applied to help you evaluate fundamental choices about how you lead your life. Constructs such as "priorities," "commitments" and "resource allocation" all have analogues in individual life - as does the core objective of performance and success. The class begins with a hard-nosed and broad-based self-assessment of the quality of your life along a variety of dimensions including relationships, career, money, spirituality and health. Based on this assessment you will develop a strategy and a set of concrete goals for enhancing the quality of your life in targeted domains. The course consists of five intensive sessions designed to help you develop the skills and knowledge- but more importantly the insight and capacity - to be more strategic (in best sense of the term) and effective in how you lead your personal and professional life - meaning actively guiding, stewarding, and driving your results to create a life that is truly exceptional. Substantively, the course draws on a variety of different traditions including existential, humanistic, and positive psychology; personal growth, adult development, and the human potential movement; as well as the practice of life and executive coaching. Central themes and learning objectives include: \* The development of self-awareness, self-acceptance, and self-control \* An understanding of the power of choice and "authoring" one's life \* The essential role of dreams and aspirations \* The art and discipline of knowing and speaking your truth \* The challenges and self-limiting impact of negative thoughts and self-theories \* Developing a stance towards oneself and others that is rooted in grace and wisdom NB: While we expect the class to be helpful and of interest to a wide range of students, it involves a substantial commitment of time and emotional and intellectual energy. It is not for the faint of heart or those who are ambivalent about introspection, feedback, or constructive confrontation.

**GSBGEN 360. Sports Business Management. 4 Units.**

This course will examine the diverse management challenges facing the sports industry. The course will cover issues at the league level, the team level, the athlete/agent level, and the college level. The diverse constituencies with interests in sports issues (athletes, fans, media companies, advertisers, and legislators to name a few) will be discussed. Sports issues at a global level (the IOC) and both U.S. and outside U.S. will be covered. There will be coverage of evolving business ventures related to the sports industry (such as venture backed sports companies and sports networks). A key focus is on how the sports industry is similar to and different from other industries. Key concepts underlying the course are: value creation/value sharing; revenue ecosystem; virtuous circles and vicious circles; disruptive technologies; growth facilitators and growth inhibitors; leveragable assets/inherited liabilities; and entrepreneurship/new product innovations. Over 80% of the sessions typically will include a guest co-lecturer from the sporting industry.

**GSBGEN 363. Fiscal Policy. 4 Units.**

Almost one of every four dollars in the American economy will be spent by the federal government this year. This course will examine how federal spending, taxes, deficits and debt affect the U.S. economy and global financial markets, and how the economy affects the federal budget. We will look inside the federal budget to understand entitlement spending, what causes it to grow so fast, how it could be reformed, and why that's so hard to do. We'll understand where the money goes -- how much goes to infrastructure, education, housing, health care, energy and the environment, parks, scientific research, national defense, and other needs. We'll look at the stimulus vs. austerity debate, both within the U.S. and between the U.S. and Europe. We'll look beyond partisan battle lines and explore various fiscal philosophies that sometimes split the political parties. We'll cover the federal budget process from developing the President's budget to enacting individual spending and tax bills, and discuss process reforms including spending and deficit reduction targets, a balanced budget amendment, and line item veto. We'll cover the major players in the budget debate and understand where the big and small budget decisions are made. We'll look at federal taxation, where the money comes from, how it affects the economy, and how it might be restructured. We'll examine the recommendations of the President's budget commission and see if we can predict what will become of its recommendations. And we'll see if we, as a class, can solve our nation's fiscal problems as Washington has so far been unable to do.

**GSBGEN 370. Social Innovation Project. 2 Units.****GSBGEN 376. Work and Family. 3 Units.**

This course examines the strategies that highly educated women and men use to combine work and family and the strategies that managers and policy makers can use to help others strike a balance. Topics include the tradeoffs in becoming a stay-at-home parent, the economic value of unpaid labor, the consequences of balancing two high-powered careers and children, the economics of marriage, fertility, child care, and elder care, the gendered division of labor in the home, time-management, workplace innovations, and policy initiatives. Guest speakers add their own perspectives on these issues and describe the roles their organizations play.



**GSBGEN 381. Strategic Philanthropy. 3 Units.**

Appropriate for any student driven to effect positive social change from either the for-profit or nonprofit sector, Strategic Philanthropy (GSBGEN 381/ EDUC 377C) will challenge students to expand their own strategic thinking about philanthropic aspiration and action. In recent decades, philanthropy has become an industry in itself - amounting to nearly \$300 billion in the year 2011. Additionally, the last decade has seen unprecedented innovation in both philanthropy and social change. This course explores the key operational and strategic distinctions between traditional philanthropic entities, such as community foundations, private foundations, and corporate foundations; and innovative models, including funding intermediaries, open-source platforms, technology-driven philanthropies, and venture philanthropy partnerships. Course work will include readings and case discussions that encourage students to analyze both domestic and global philanthropic strategies as they relate to foundation mission, grant making, evaluation, financial management, infrastructure, knowledge management, policy change, and board governance. Guest speakers will consist of high profile philanthropists, foundation presidents, social entrepreneurs and Silicon Valley business leaders creating new philanthropic models. The course will culminate in an individual project in which students will complete a business plan for a \$10 million private foundation.

**GSBGEN 382. Thinking Like a Lawyer. 3 Units.**

Open to all non-law graduate students at the University, this course will provide non-law students an analytical framework for understanding the core concepts of the law and familiarize students with how lawyers analyze and structure their work. This course will be taught by Vice Dean Mark Kelman and Law School faculty in their areas of expertise, with one to two classes devoted to each topic. It will introduce students to some of the foundational principles of law and will review topics such as contracts, litigation, intellectual property, securities and employment law. No previous study of law or legal systems is required and there are no pre-requisites. It will be offered in the Winter 2012-13 quarter (1/8/13 - 3/13/13), with lectures twice weekly on Tuesdays and Thursdays from 1:30 - 3:00 pm at the Law School. Additional mandatory TA-led discussion sections will be taught on Tuesday and Thursday - students must also attend one of these TA sessions each week. Students will indicate their availability for specific sections on forms passed out at the first lecture. Readings and assignments will be posted to Coursework; there is no textbook. Grading: The class is graded on a pass/fail basis. There will be no final exam, but completion of problem sets on various topics as well as attendance at discussion sections will be used to determine grading. All students must complete 4 problem sets. Two specific problem sets are required of all students and the other assignments can be chosen from a list of available assignments.

**GSBGEN 390. Individual Research. 1-4 Units.**

Need approval from sponsoring faculty member and GSB Registrar.

**GSBGEN 507. Impact Investing: Strategies and Tools. 2 Units.**

This course will explore how investment capital and financial tools can be applied to deliver both financial returns and impact (benefit) for our communities and environment. The class will be organized around a set of guest lectures from impact investing firms across a spectrum of investment strategies & returns expectations. Through these examples, we'll explore how impact investing is applying the basics of investing to different objectives: - arbitraging market inefficiencies - valuing and pricing risk - determining how each party in a transaction may see the value created on different scales and aligning these objectives - the role of public policy in these markets The class will emphasis applying these concepts and examples to create, in groups, your own impact investment fund or instrument.

**GSBGEN 510. Taking Stock and Moving Forward. 1 Unitss.**

This spring quarter elective is designed to help you prepare for a challenging, fulfilling, and meaningful future. GSBGEN 510 seeks to: 1). Provide you with the opportunity and tools to take stock of what you have learned about yourself as a person and as a leader over the last 18 months at the GSB 2).Expose you to research on personal and professional development and help you apply it 3). Encourage you to reflect on what matters most to you, personally and professionally, and begin to determine how to achieve it, and 4). Prepare you for the challenges and transition immediately ahead and, in so doing, learn how to manage life's big transitions in the future. We will address four major life and career themes: - Learning from Choices - Fulfillment and Meaning - Failure and Resilience - Transitions and Renewal This class is limited to 36 students. Each class will begin with conceptual input and an overview of that session's topic in the main classroom. Students will then be divided into three twelve-person break-out groups during the remainder of the class time. These groups are NOT T-groups, for those of you who took Interpersonal Dynamics, but rather discussion groups. Discussion will be of a reflective and personal nature. Each group will have 2 Group Leaders who are experienced executive coaches specializing in helping people through life and career transitions.

**GSBGEN 512. Funding Social Impact: Methods and Measurement. 2 Units.**

Traditional philanthropy consists of outright grants to organizations to achieve the grantors' social and environmental objectives. However, the past decade has seen an increasing interest in impact investments--financial investments that seek to generate monetary returns at the same time as they further the investors' social objectives. Throughout the course, we ask: how investors can (1) measure the social impact of the organizations they invest in, and (2) assess whether their own loans or capital contributions actually make a difference in increasing the organizations' impact. We begin by reviewing the domains from which impact investing draws: grantmaking to maximize social impact and financial investing to maximize financial return. We then consider examples of impact investing, ranging from below-market equity investments and loans, to investments intended to create social value while achieving risk-adjusted market returns or better. We consider the role of impact investing at various stages, from R&D to start-ups to growing and mature enterprises. We explore these issues through case studies of impact investing both in the U.S. and developing countries. We examine how investors can identify and assess impact investments, the information, knowledge and skills needed to make impact investments, and the role of fund managers and advisors. We also consider novel impact investing vehicles, such as social impact bonds and B-corporations. Time permitting, we will also touch on the related issue of using negative screens for socially responsible investing. This course will be taught by Paul Brest, his bio can be found here: <http://www.hewlett.org/about-the-william-and-flora-hewlett-foundation/foundation-staff/paul-brest>.

**GSBGEN 515. Essentials of Strategic Communication. 2 Units.**

Successful leaders understand the power of authentic, memorable communication. This course uses the lens of oral communication and presentations, to introduce the essential elements of the strategic communication strategies that make authentic, memorable communication work. Focusing on oral communication and presentation, we introduce the essentials of communication strategy and persuasion: audience analysis, message construction, communicator credibility, and delivery. Deliverables include written documents, focusing on individual and team presentations, with students receiving continuous feedback to improve their communication effectiveness, and to sharpen their authentic leadership voice. This highly interactive, practical course, is focused on feedback to help students at all levels of communication mastery develop confidence in their speaking and writing. Course includes presentations, assignments, lectures, discussions, simulated activities, in-class feedback, and filmed feedback. In this course you will learn to: -Recognize strategically effective communication -Implement the principles of strategic communication across different platforms -Develop clearly organized and effective presentations and documents -Diagnose and expand, your personal authentic communication style Select the course format that will best meet your needs: autumn term offers a new immersive experience, in a compressed version of the course, in the winter a half-term version is offered, and in the spring the full term format is offered. All versions of the course offer the same opportunities for individual and group presentations and feedback with approximately the same amount of class time spread over two weeks (fall), five weeks (winter), or ten weeks (spring). As you make your super round selection, keep in mind that waitlists have been long for this course.

**GSBGEN 516. Using Neuroscience to Influence Human Behavior. 1 Unit.**

Why is it so difficult to change human behavior? Why is it that more than 80% of individuals who sign up for fitness classes drop out within a few weeks, even a few days? Why is it that despite the dramatic increase in devices and apps that are geared for changing behaviors, people still struggle to adopt and maintain new behaviors? The issue is not about a desire to change—it is about using the right methods and techniques to bring about habit change. The primary goal of this seminar is to gain a rich understanding of changing behaviors through frameworks and concepts that are grounded in neuroscience. In this seminar, we will examine (1) ways of characterizing different domains of behavior change, each requiring different methods and techniques, (2) why methods that often work in one domain are often unsuccessful in others and (3) how companies create habits in users and how one can leverage the power of technology to bring about behavior change.

**GSBGEN 520. The Frinky Science of the Human Mind. 2 Units.**

The exponential growth in our understanding of the workings of the human brain has led to a rather startling and maybe embarrassing (even depressing) conclusion. While the human brain is unique among species in its ability to strategize, conceptualize, hypothesize, etc., it is now undeniable that most of our decisions, behaviors and experiences are shaped by the instinctual brain. Thus, constituting the broad goals of this seminar, it behooves us to first understand the workings of the instinctual brain and then leverage this understanding to craft solutions for real-world issues from the vantage points of the "firm" as well you as an individual, a leader and an innovator. Topics that will be covered from the firm's vantage point include crafting the customer value proposition, fostering an innovative culture and developing incentives to increase employee engagement. Topics from your vantage point include decision making, leadership skills and personal effectiveness.

**GSBGEN 521. Managing Under Uncertainty. 2 Units.**

Uncertainty with changing opportunity sets and adjustment costs shapes investment planning whether in financial firms, corporations or entities such as pension funds, venture capital and private equity, and, in particular, in non-traded assets or securities. We will develop an approach to understanding (1) capital allocation issues; (2) capital structure planning; (3) optimization policies with changing opportunity sets and adjustment costs; and, (4) the selection of levels of risk taking. These relate to planning for uncertainty. The following three areas relate to managerial effectiveness: (1) developing feedback mechanisms to adjust policies; (2) reporting mechanisms for management and investors to adopt policies; and, (3) compensation planning and business structure. These internal risks must be integrated with external risks such as geopolitical issues and fiscal and monetary policies in a global setting. I plan to discuss each of these topics from both a theoretical and applied perspective. I will provide selective reading on each topic and questions to provide follow on discussion during class. Students will work with me to flesh out not only the answers to these questions, but also provide additional questions and discover additional readings that are germane to expanding understanding and to following developments in each of these areas.

**GSBGEN 524. Compassion and Leadership. 2 Units.**

The course explores the role of compassion in the workplace, and the contribution of compassion to leadership. Topics addressed will include: Is compassion in the business world a strength, or a weakness? Are compassion and profit motives fundamentally incompatible, or can they support each other? What does compassionate leadership look like? Can compassion be trained at the individual level, and built into company policy? How does self-compassion support effective leadership and recovery from setbacks? Each class meeting will feature a guest speaker. Guests from the corporate or non-profit sectors will discuss the challenges of integrating compassion into business strategy and the work environment. Guests from the scientific field will discuss research on compassion as it relates to real-world challenges. Students will be expected to respond in writing to lectures as well as relevant readings, and actively contribute to in-class discussion. This course is offered in partnership with the Stanford Center for Compassion and Altruism Research and Education.

**GSBGEN 525. From Business Concept to Business Plan. 2 Units.**

The creation of a business plan is a useful process for entrepreneurs to evaluate and think through a business concept. The business plan is also a standard tool to present the business to investors when seeking funding. Business plans are as important for innovators who think through new business models and their implementation in established companies. This short course will focus on the process of going from a business concept to a business plan. The course will be hands-on, and it will start from a concept accompanied by preliminary market research (this means students don't have to come up with their own business ideas). It will then go through the analysis which leads, by the end of the course, to a business plan.

**GSBGEN 528. Creativity, Problem Solving, and Innovation. 2 Units.**

This course is designed to expose second-year MBAs to research on creativity in problem-solving. The course has straightforward practical goals: it will explore ways in which individuals, groups, and organizations can become more creative, in useful ways. In order to do this effectively, we will study hard-nosed research on problem-solving. We will not read articles entitled "The five-fold path to creativity." If there really were recipes or algorithms for reliably increasing creativity, I would certainly teach them. (Or more likely, I wouldn't need to: they would routinely be taught in the core curriculum of every MBA program.) Instead, we will study what cognitive and social scientists have discovered about novelty and effectiveness in problem-solving. Some of this work--e.g., Scott Page's examination of the value of cognitive diversity in teams--will have relatively direct action-implications. The pragmatic implications of other research--e.g., on organizational norms for resolving conflict--will be more indirect. Because the course's practical goal is easy to state but hard to achieve, some patience is required. As indicated above, we will study creativity at three levels: individuals, groups and organizations. Because there is pretty good evidence that different kinds of factors are prominent at these different levels, the course's approach is multi-disciplinary. We will read articles and books by cognitive psychologists and cognitive scientists, social psychologists, organization theorists, and perhaps historians who have studied industrial innovation. Disciplinary boundaries are irrelevant: any work that articulates a significant claim about pragmatically useful creativity and backs up that claim with a good argument is grist for our mill. Because the course focuses on creativity that makes a difference--i.e., that ultimately makes some organizational stakeholder better off--we will also study how innovations get selected. This inevitably means studying how new ideas get criticized and sometimes discarded. This process is less fun than generating new ideas, but given that brand-new ideas are usually flawed in one way or another, critical and hard-headed scrutiny of innovations is vital. Hence, we will examine psychological, political, and organizational obstacles to the effective criticism and evaluation of novel solutions, and we will also look at some ideas on how these obstacles might be reduced. Classes will be run seminar-style: they'll focus on examining the readings closely and critically. Understanding what a study does not establish is sometimes just as important as understanding what it does establish. Hence, I will expect everyone to read carefully; skimming won't cut it. This effort will probably result in a rather deep and sophisticated comprehension of the topic. Given the importance of creativity and innovation in modern organizations, that should be adequate return for hard effort.

**GSBGEN 530. Learning from Experience. 1 Unitss.**

It is commonly believed that experience is a great teacher. But is it? Do we always learn what we can or should from experience? Research on this question suggests that the answer is no. Often we do not learn all that experience has to teach us and often the lessons we draw from experience are the wrong ones. This seminar examines what research suggests about how managers and others learn and don't learn from experience. Among the questions we will consider are: (1) How does experience teach? (2) What are the impediments to learning from experience? (3) How can we learn better from our experiences? (4) How can we have better learning experiences; that is, design and structure our experience and that of others so that it produces better learning?.

**GSBGEN 531. Global Trip Leadership. 2 Units.**

This course is open only to leaders of the Service Learning Trips or Global Study Trips. The course will meet eight times during the first four weeks of Fall Term. In addition, the teams have the option of making use of a Master Coach just before their trip to review how they are operating as a team. There will be a 10th meeting during Winter term where the Winter Trip leaders will share their experience with the Spring Trip leaders. The purpose of this course is to help trip leaders in the planning and conducting of the trip so as to maximize the learning for the trip participants and the trip leaders as well as increasing the overall success of the trip. A range of topics will be covered including: articulating a vision for the trip, developing their team as a high performing team, making quality decision, resolving interpersonal issues (within the team and with participants), understanding how to make full use of the faculty member and dealing with the myriad of issues that are likely to arise. Class time will mainly be spent discussing and role-playing a series of short cases that have been developed around issues that have come up in past trips. These will be supplemented by short lectures to provide the conceptual underpinning. There will be a very modest reading list.

**GSBGEN 532. Cleantech: Business Fundamentals and Public Policy. 2 Units.**

This course examines trends in the cleantech sector related to energy and carbon emissions with an emphasis on the interaction between technological developments, economic fundamentals and regulatory policy. We develop a framework to compare the cost competitiveness of alternative energy sources including low-carbon fossil fuels, solar power and biofuels. The final part of the course will focus on issues of technology commercialization, in particular the 'Valley of Death' and the emerging role of information technology for the cleantech sector.

**GSBGEN 533. Sustainability as Market Strategy. 2 Units.**

The increasing social emphasis on environmental sustainability creates both dilemmas and opportunities for firms. Recognizing that sustainability means a focus on not just the environment, but also on broader issues of corporate social responsibility, we will examine the ways in which some companies are developing a "sustainability strategy." We will also consider the way in which companies are profiting from such a strategy with an eye toward understanding the conditions under which such a strategy can generate profits for firms. We will also focus on the way in which many companies are partnering with non-governmental organizations to develop business strategies that focus not only on profits, but also on the environment and social responsibility.

**GSBGEN 535. Emerging Network-Based Consumer Services. 1 Unitss.**

This seminar will examine the development, growth and economics of emerging networks that use technology to connect people and businesses. It will first study the role of network platforms including Facebook, Twitter, LinkedIn, Google+ and some emerging networks. In the remaining three days, each day will focus on a network theme starting with a leading company and then examining the evolution and future prospects for the broader space. At present, we contemplate the following themes: - Network utilities (e.g., Dropbox) - Interest-based networks (e.g., Pinterest, Instagram, Foodspotting, Soundcloud) - Payment networks (e.g., Square) This course contains a significant overlap with OIT 356 - Electronic Business. Students who have taken OIT 356 may not enroll in GSBGEN 535.

**GSBGEN 537. The Role of Business in Sustainable Food Systems. 1 Units.**

The food system in the United States has contributed to a number of societal and ecological problems, from increasing rates of diet- and food-related illnesses, to "food deserts" in our inner cities, to the loss of farmland to urban sprawl, to agricultural chemical runoff into our water sources, to unjust farm labor practices, to the overuse of antibiotics, to an enormous amount of food waste, to questionable animal husbandry practices, and more generally to a diminishing level of diversity among the people, plants, and animals on whom we rely for our sustenance. These problems create both dilemmas and opportunities for business. This course will focus on how some companies (both for-profit and non-profit) are working to try to repair the damaged food system in the United States. Topics include (but are not limited to): organic and biodynamic agriculture, the economic demise of the family farm, the health effects of our current system of food production and the habits it has engendered, and opportunities for entrepreneurship and new modes of food distribution. We will have several guest speakers, field trips, and cooking/food preparation workshops and demonstrations.

**GSBGEN 538. Energy Policy, Markets, and Climate Change. 2 Units.**

This course will consider world energy markets as well as national and international policy challenges for the energy sector, in the context of climate change and its probable impacts. Case studies, readings, and class discussions will explore the history of fossil fuel price changes and their effects on trade, the influence of subsidies and tax incentives on the prospects for renewable alternative sources, and the role of governments in setting import and export policies. The class will consider such questions as: What policies are adopted when energy developments confront other land values, or are associated with human or environmental risks? What role do Public Utility Commissions play and how do international agreements influence the sector? How do new technologies for improving energy yield, building efficiency, and transportation affect use? What is the role of regulation in establishing patterns of energy use? Cases may require students to play such roles as: (1) an executive director of an environmental non-governmental organization considering approval for construction of a large solar-thermal facility in the Mojave Desert; (2) the chief executive officer of a company drilling shale deposits for natural gas developing his case for a governor; (3) a Senator evaluating her position on converting a port to permit US coal to be exported to China.

**GSBGEN 542. How to Tell a Story. 1 Units.**

"Tell me the facts and I'll learn. Tell me the truth and I'll believe. But tell me a story and it will live in my heart forever." Stories are all around us. Stories move us, make us feel alive, inspire us to be more than we would be otherwise. As famed screenwriting coach and author of the screenwriting bible, *Story*, McKee says: "Story is not only our most prolific art form, but rivals all activities - work, play, eating, exercise - for our waking hours. We tell and take in stories as much as we sleep - and even then we dream." \*\* Despite our love for stories, most of us leave stories to "storytellers" - fiction writers, journalists, and film makers. But we all have this skill. We simply need to hone it. The question is - how can we hone it? In this seminar, we will break down the basic elements of storytelling, elucidate the power of the verbal as well as the visual, and discuss how storytelling helps build brands and organizations. For the final project, you will create tell a 3 minute story about (a) your organization, (b) your brand, or (c) you. Thus, the goals for this class: (1) Understand what makes bad stories, okay stories, and great stories. (2) Learn how to create storyboards (3) Gain practice in crafting and telling a compelling 3 minute story about yourself. You will get feedback by filmmakers on what went well, went poorly, and how to take the story to level further. \*\* Robert McKee, *Story*, (Regan Books: 1997), p. 11.

**GSBGEN 543. The Power of Stories in Business. 1 Units.**

Stories can be a powerful tool for persuasion and leadership. Traditionally, business people persuade using only the left side of the brain, or reason. However, persuasion occurs, just as much (if not more) through emotion. By developing the right side of the brain, engagement can be better built through "uniting an idea with an emotion." \*\* A critical tool is storytelling. In this seminar, we will illuminate the power of story in business by revealing the key elements of storytelling, elucidate the power of the verbal as well as the visual, and discuss how storytelling helps build brands and organizations. The goal of the class will be to: (1) Understand what are the four more important stories to tell in business. (2) Learn how to create a story bank; a repository of stories that you will use as a leader. By creating powerful stories and then communicating them in your own way, you'll see how brands, careers and businesses can gain momentum. Note, this second year seminar compliments *How to Tell a Story*. First, we'll focus on application to build on the basic course that developed fundamentals in storytelling. Second, rather than working on just one personal story, you will be exposed to and develop four discrete stories each day, all tailored for use in business. \*\* "Storytelling That Moves People: A Conversation with Screenwriting Coach Robert McKee", *Harvard Business Review*, June 2003, p. 6.

**GSBGEN 544. The Role of the Modern General Counsel. 2 Units.**

The news is filled with reports of one corporate crisis after another - names like BP, Goldman Sachs, Bank of America, AIG, Siemens, Toyota, and issues like backdating, bribery, antitrust violations, insider trading, procurement fraud, health and safety violations, consumer class actions and the like. And often the cry is heard - where are the lawyers? This course explores the evolution of the role of the general counsel of major American public companies and, more broadly, the expanding role of in-house counsel. These are the lawyers in the trenches, on the front lines of American businesses. Each week, we'll review another dimension of the general counsel's job. We'll consider how general counsel today play an important role on the executive team of major companies and explore the different ways in which general counsels manage large corporate legal departments and direct functional legal areas like litigation, IP, corporate and securities, M&A, environmental and employment law. We will also examine the professional responsibilities and legal obligations of the general counsel -- including the delicate and sometimes conflicting reporting relationships to the CEO and the board of directors -- and consider how an in-house legal department fits into a corporation's organizational structure and how it supports the company's operating units on a day-to-day basis. We will explore the general counsel's role in internal investigations, regulatory investigations and compliance programs, and governmental affairs. We will also consider current practices in how in-house lawyers select, collaborate with and evaluate outside counsel. The class will meet weekly and we will invite current and former general counsels to join us occasionally for our discussions. Each student will be expected to participate actively in class discussions, and will be required to complete two projects, each in collaboration with three other students and submitted as a team, presenting how the team would address a complex set of legal and business issues. The course grade will be based 1/3 on class participation and 1/3 on each of the two team projects.

**GSBGEN 548. Crafting Your Life Story. 1 Unitss.**

This new seminar explores how the "life stories" we tell ourselves influence the choices we make in life, including the personal and professional choices we make, the ambitions we pursue - and, ultimately, our very success.

Together, we will look at the science and art of what might be called "generative autobiography" - finding the particular life story that helps you pursue a more consequential and meaningful life. In developing this idea, you will learn to identify the essential elements of a great life story. You will learn how to craft a better, more creative life story for yourself, and you'll learn also how to tell your life story more effectively to other people in order to engage them more deeply and lead them more effectively. The course will include a series of outstanding readings from psychology, philosophy and literature on how to think more creatively about the life you are living now - and the life you hope to live going forward. One distinctive feature of this new seminar will be the extensive use of materials from award-winning films to illustrate the major themes and dilemmas of telling a good life story. We will examine the lives of a number of fascinating high achievers from business, science, politics and the arts. The course also includes several exercises designed to help you craft, refine, and project your life story. The seminar will be very discussion-oriented and very engaging!.

**GSBGEN 550. Issues in Leadership. 2 Units.**

This seminar will explore the nature and role of leadership in organizations. We will examine such questions as (1) What is leadership? (2) Why is it important? (3) What is it that leaders actually do? (4) How do they do it? (5) How are leaders developed? (6) Why do leaders succeed or fail? (7) What about your potential for leadership and your strategy for developing it? Our primary objective in this seminar is to achieve a deeper understanding of the nature and role of leadership in organizations. Our approach will be to examine a small sample of the literature, together with the amazing story of Ernest Shackleton and his Endurance crew, and then to probe several key questions through lively class discussion. The discussion, informed by the readings and also by our collective experiences, will seek to develop some general principles and observations about leadership - particularly about how you might better develop yourself as a leader.

**GSBGEN 551. Innovation and Management in Health Care Businesses. 2 Units.**

The health care system accounts for over 18% of US GDP and is one of the fastest growing segments of the economy. This two unit class focuses on the interplay and tension between the main players in the health care field - providers of health care services (individual doctors, group practices, integrated health care systems), payors (insurance companies, employers, consumers, and government), patients, and innovator companies (biopharma, medical device, diagnostics, and health care IT). The course is designed for students with a broad diversity of backgrounds and interests who want to better understand the health care business and system. No prior experience in the health care or medical field is assumed or needed. The focus of the class will be primarily on the US health care system, but there will be limited discussion of non-US systems as well. The course is divided into five modules: 1. An overview of the US Health Care System and the interplay between payers, providers, and innovators 2. Provider organization models and incentive structures - The relationship between quality, cost, and access - Integrated systems and fee for service models - New IT technologies, including electronic data records, and incentives for adoption - How the delivery system structure affects technology innovators 3. Innovator business models and issues - Financing and managing new product development and portfolio management - Clinical trial management and gaining regulatory approval - Marketing, communication and sales strategies (both physician and patient communication and sales) to drive product adoption and gain third party reimbursement - Business models to drive innovation 4. New technologies, business opportunities, and business models - Molecular diagnostics - Stem cells and regenerative medicine - Consumer genomics 5. Health care system reform The class will be taught primarily from the perspective of a business person operating a company rather than that of a policy maker, academic, or investor. While there will be a few lectures to provide background and frameworks for course topics, most classes will involve a case discussion and prominent guest speakers from the health care industry. Speakers and panelists in previous years included CEOs and senior executives from Genentech, Intuitive Surgical, UnitedHealth, Jazz Pharmaceuticals, Genomic Health, Practice Fusion, Safeway Health, Onyx Pharmaceuticals, and Venrock.

**GSBGEN 554. Savvy: Crafting Effective Communication. 1 Unitss.**

This course is designed for individuals interested in improving their communication skills. As a leader, you will spend the majority of your time communicating with others - team members, subordinates, clients, and other constituents. Right now, you probably don't spend much time thinking about the way you communicate, nor are you likely, in the corporate setting, to get honest feedback on the messages you send. Yet the quality of your communications will have a large impact on your overall effectiveness. This class will help you appreciate the nature and complexity of communication and provide guidelines for both improving your communication style and recognizing the unique styles of others. The class is based on the assumption that organizations are fundamentally political entities, and interpersonal influence through communication is a key mechanism by which things get done. Effective leaders don't simply lead by fiat - they often must influence and persuade others to go along with their ideas. In each session, we'll consider a number of well-studied tactics of interpersonal communication. For each tactic, we'll talk about why it works, when it works best, and what its limitations might be. We'll discuss how you can put these approaches to work in order to support your attempts at persuasion and how to resist them as an unwilling target of persuasion. After taking this course, you will be better able to: (1) identify strategies for crafting effective communication in the form of everyday conversation, written work, and public presentations, (2) develop techniques for building strong, long-term alliances with your colleagues, and (3) become more persuasive in advancing an agenda, acquiring resources, or eliciting compliance from others. These skills will be invaluable to you throughout your career.

**GSBGEN 557. Authenticity in Markets: The Case of the Wine Industry. 1 Unitss.**

Evidence has mounted that consumer care about issues of authenticity in many kinds of markets. This seminar explores the meanings of authenticity in market contexts. It emphasizes the idea that authenticity attaches as much or more to the characteristics and actions of producers than to characteristics of products. Although these issues arise in many kinds of markets, they are especially intense for food and drink. So the seminar emphasizes these contexts, especially the wine industry. In wine production we see battles over the "soul of wine," what it means for a wine to provide an authentic representation of terroir, national traditions, and so forth. Especially interesting for understanding authenticity is the recent success of biodynamic producers.

**GSBGEN 561. Sports Business Financing. 2 Units.**

Course examines financing and investment issues that face a diverse set of participants in the sports industry. A key theme is using general financial concepts to better structure decision making in the sports industry. Specific topics illustrate the broad set of perspectives considered: Player Payroll Financial Dynamics; Player Salary Management; Asset Appreciation Opportunities; Assessing the Value of Players (& General Managers); Investment Syndicates in Sports; Building a Startup League in Baseball; Financial Valuation of Sporting Clubs; Financial/Strategy Analysis for a Mixed Martial Arts (MMA) Venture; Financial/Strategy Analysis for a New Football (Gridiron) League; On-Line Sports Venture Evaluation.

**GSBGEN 562. Sports Marketing. 2 Units.**

This Sports Marketing course combines (a) a focus on key marketing themes (such as branding, customer attraction/retention, and celebrity power) and (b) an analysis of marketing in diverse areas of the sporting industry: the league level, the team level, the player level, the network level, the advertiser level, the sponsor level, the fan level, and the media level. The nine sessions cover the following: Corporate Sponsorship; Online Marketing; Events as Brand Building Investments; Marketing to Youth; Sports/Entertainment Nexus; Club Marketing Strategies; Brand Revitalization & Strengthening; Motor Sports Marketing; Marketing in a Web 2.0/Social Networking World.

**GSBGEN 565. Political Communication: How Leaders Become Leaders. 2 Units.**

Politics, perhaps like no other arena, provides a rich and dramatic laboratory for studying the art and science of influential communication. Whether it is a local school bond election or a Congressional race, a Presidential debate or a State of the Union Address, the demanding communications of politics provide insights into our own strengths and gaps as a communicator and leader. Political campaigns, by their very nature, are highly visible, oriented toward very specific objectives, and increasingly leverage a variety of new media platforms. They are often emotionally charged, and rife with conflict and drama. The principles of political communications transcend politics, and are useful guides for leaders in business, the non-profit community, as well as government. How candidates communicate vision, values, and experience, as well as how they perform in very fluid environments, not the least of which may be during a crisis, has a great deal to do with their electoral success. In its fifth year, this highly interactive course allows students to explore both theory and practice behind effective positioning and presentation. Students will analyze and evaluate both successful and unsuccessful communications strategies of political campaigns and candidates. They will explore historic examples of US Presidential debates, from Nixon/Kennedy to the present. Further they will experience the 2012 Presidential election firsthand -- with each class drawing lessons from real time events in the campaign. Students will also hone their own strategic communications skills in a final activity requiring both written and spoken communication. This is not a course in political science, American government, or in public speaking. However, the engaged student will gain insights into those areas as well. The course is taught by David Demarest, Vice President of Public Affairs for Stanford University. Demarest has broad communications experience across the public and private sector in financial services, education, and government. After serving as Assistant U.S. Trade Representative, and Assistant Secretary of Labor in the Reagan Administration, in 1988 he served as Communications Director for Vice President George H. W. Bush's successful presidential campaign. He then became a member of the White House senior staff as White House Communications Director. After leaving government in 1993, he spent the next decade leading communications for two Fortune 50 companies, before coming to Stanford in 2005.

**GSBGEN 566. Real-Life Ethics. 2 Units.**

GSBGEN 566 will be an elective course offered to 2nd-year MBA and Sloan students. The goal of this course is to improve students' judgment in confronting ethical situations encountered in the normal course of business activities. Classes use the Socratic method to examine ethical questions and build analytical skills. The course aims to sharpen moral reasoning and build judgment without favoring a particular position. The course will be taught by Mark Leslie and Peter Levine, Lecturers, and will include additional guest lecturers in many of the specific areas. The course, which will be case-based, will involve frequent student-to-student and student-to-instructor role-playing. Cases will be drawn from a wide selection of business situations, including such topics as raising venture capital, managing major industrial customers, product introduction through major retailers, developing financial instruments, sales force management and revenue recognition, etc. This class is for two GSB credits and will be graded on a pass/fail basis. Sixty percent of the final grade will be derived from classroom performance; the remainder will be based on a final written assignment.

**GSBGEN 567. SEEDing Change: Approaches and Innovations in Poverty Alleviation. 2 Units.**

This Bass Seminar is an opportunity to help lay the foundation for the GSB's new initiative on poverty alleviation in developing economies, the Stanford Institute for Innovation in Developing Economies (nicknamed SEED). Following an introduction to the major approaches to poverty alleviation and the role of entrepreneurial activity, the course will be a student-driven seminar. Groups of students will work on focused projects of their choosing within the confines of SEED's mission, which is to stimulate, develop, and disseminate research and innovations that enable entrepreneurs, managers, and leaders to alleviate poverty in developing economies. A particular focus will be given to exploring and assessing the different ways in which SEED can most effectively help entrepreneurs in developing countries grow and scale. Project deliverables can take a variety of forms, including business plans, proofs of concept, case studies, teaching notes, etc.

**GSBGEN 568. Managing Difficult Conversations. 2 Units.**

This elective 2-credit course is offered to 2nd-year, 3rd-year, and 4th-year Medical students, Residents, and Fellows, and to 2nd-year MBA students who aspire to improve their ability to deal effectively with difficult interpersonal situations. The course will be taught at Stanford Medical School by H. Irving Grousbeck, Consulting Professor of Management, Stanford Graduate School of Business, with assistance from Dr. Charles G. Prober, Senior Associate Dean for Medical Education. Teaching techniques that have been successful in helping business school students improve their ability to manage difficult conversations will be used. The course, which will be case-based, will involve frequent student-to-student and student-to-instructor role-playing in actual medical situations. Physician-experts often will be present to participate as class guests. Relevant principles of professionalism, leadership, and psychology underlie the course pedagogy. There will be seven classes held on Wednesdays beginning September 26th and concluding on November 14th. (No class October 24) Each class will begin promptly at 12:30 and end at 2:15, without a break. Due to the abbreviated nature of the class (7 sessions), students will be expected to attend all classes unless excused in advance. Class preparation will include reading of assigned cases; analysis of the cases and recommendations as to how to confront specific difficult conversations (consistent with assigned study questions); and reading of assigned background material. While optional, it is suggested that students form regular study groups. For GSB students, 50% of the final grade will depend on classroom performance; the remainder will be based on a final written assignment of no more than 6 pages. GSB students will be graded on a Pass/Fail basis. The course will be ungraded for Medical School students, Residents and Fellows. All students will be expected to complete the written assignment. Class size will be limited to 35 students per the following: (1) a maximum of 15 MBA2 students and (2) a maximum of 20 2nd-year, 3rd-year and 4th-year Medical Students, Residents, and Fellows.

**GSBGEN 569. Online Financial Training for Managers and Entrepreneurs in Developing Economies. 2 Units.**

Growing and scaling a successful business demands familiarity and comfort with financial principles and decision-making. Yet particularly in developing countries, where the need for growth is greatest, a large fraction of the population, and entrepreneurs and managers in particular, lack this basic knowledge. The goal of this project-based seminar is for teams of students to develop education modules for teaching financial literacy to entrepreneurs in developing economies. We will partner with on the ground organizations who work directly with these entrepreneurs, and who can provide feedback on the user's needs and market validation for project teams' approaches. We will examine research on the effectiveness of credit-linked training and review some existing programs offering similar training. Students will be expected to deliver a short training video at the end of the course.

**GSBGEN 571. Becoming a Leader: Managing Early Career Challenges. 2 Units.**

This course is based on 60 interviews with MBA grads who have been out of the GSB for 4-10 years. These interviews identified a set of common early career challenges that young MBAs faced--and the lessons they learned from these. This 10-session course is based on these critical transitions, formative experiences, and personal conflicts that characterize the challenges young leaders face. The course objective is to help current students better understand some of the pitfalls they are likely to face as they become leaders and to avoid the career-limiting mistakes that these can bring.

**GSBGEN 572. The Art of Damage Control. 2 Units.**

In the Information Age, there are two kinds of leaders, institutions, and organizations: those who have been hit with a crisis and those who haven't been around very long. And of those who have confronted a crisis, the landscape has a few winners, but is crowded with losers who simply did not have what it took to survive the crisis. Crisis is a constant state of nature in our age and if you do not effectively fight back, in the modern spin cycle, you will no longer have your brand, your image, or your reputation. This course will cover the strategies, techniques, and art of damage control. The course will also explore the five fundamental elements responsible for why we live in a state of crisis: the proliferation of media outlets communicating information; the speed in which information travels; the erosion of trust from society related to the quality of information received; the capacity to selectively leverage information; and the community nature of how information is developed and shared. Building from an analysis of these elements, we will explore methods of surviving and thriving in this environment. The course will also offer detailed approaches to managing one's way through a crisis. We will provide case studies of those who failed to master the art of damage control whose mistakes endangered the survival of their company and/or their careers. We will also study cases where those in a crisis handled it deftly. By considering, analyzing, and reviewing these techniques, it is hoped the students will learn how best manage the crisis - and what it takes to survive. The course will co-taught by Chris Lehane and Bill Guttentag. Chris Lehane is one of the nation's leading political consultants with a particular expertise in damage control. He was a Special Assistant Counsel to President Bill Clinton where he was responsible for helping to manage the Clinton White House's damage control operation and later served as Vice President Al Gore's Press Secretary, and has been a top advisor to many who have run for President, Senate, Governor or other elected offices, both in the US and internationally. He consults for numerous Fortune 500 Companies, professional sports leagues and teams, Hollywood studios and high profile individuals. Bill Guttentag is a narrative and documentary film writer, producer, director who has been teaching at the GSB since 2001. He is a two-time Oscar winner, his films have played extensively in the US and internationally, and have premiered at a number of prominent film festivals including Sundance and Cannes. Lehane and Guttentag are the co-authors of *Masters of Disaster: The 10 Commandments of Damage Control*. The book will published this fall by Palgrave/Macmillan and will serve as the principal text for this course.

**GSBGEN 575. Leadership and Crisis Management. 2 Units.**

During this class, you will: \* Challenge your basic beliefs about the nature of crisis \* Learn to scan your business practices for political and social risks \* Anticipate and prepare for potential crises \* Explore techniques for successfully solving problems in high-pressure crisis situations characterized by complex decision environments, time-pressure, high stakes, unanticipated events, and information overload \* Develop strategies for managing stakeholders, public opinion, media relations, and public officials \* Integrate your crisis management approach into your overall business strategy.

**GSBGEN 578. Decisions About the Future. 2 Units.**

How should you decide between now and the future? This course will cover the descriptive and prescriptive theories of intertemporal choice in psychology and economics. Topics will include financial decision making, social (who should you marry?), environmental, and health. The goal of the course is to maximize the long term happiness and effectiveness of yourself and others. Grading will be based on: class participation, a decision diary (in three parts), and an exam.

**GSBGEN 580. Management of Real Estate Investment Portfolios. 2 Units.**

This course is intended for any student interested in a career in managing, developing, or investing in real estate. The course covers cases involving the perspectives of general partners and limited partners; the attributes of successful real property investment firms; analyses of investment portfolios and individual transactions, primarily in the private equity real estate category. Cases will be global. Objectives include: How to construct a private real estate portfolio; How to assess the risks in projects and portfolios; How to perform relative value analyses of differing investments; How to manage troubled investments (when to "hold 'em and when to fold 'em"). The course is divided into three modules with special emphasis on real estate financial analysis for transactions and portfolios. The first module will focus on portfolio construction issues and how to quantify whether the investor has been successful. The second module will focus on underwriting individual transactions and applying a relative value construct in determining the more attractive investments. The third module will focus on the management of troubled investments, including deciding when to "double down" and how to protect investments already in place.

**GSBGEN 585. Social Innovation through Corporate Social Responsibility. 2 Units.**

This course accepts that the (CSR) movement linking business, communities and sustainability has moved past the stage of debate. The last decade has seen an increased awareness in regard to environmental and social issues that has found its way up the corporate ladder and into company boardrooms. How companies incorporate CSR programs and strategies, however, is varied and diverse. The course will utilize reading assignments, case analysis and/or company presentations to provide an overview of CSR, the frameworks and models for developing a CSR strategy and the growing utilization of cross-sector partnerships in CSR and innovation efforts. Particular focus will be on cutting edge business strategies for squaring social and environmental responsibilities with competitive demands. The latter part of the course will examine the role of cross-sector partnerships as a critical lever. Cross-sector collaboration is increasingly desirable as a strategy for addressing many of society's problems; however, research evidence indicates that it is hardly easy. Guests will bring to life the challenges and rewards in working collaboratively to implement social change.

**GSBGEN 586. Poverty, Entrepreneurship, and Development. 2 Units.**

Global poverty is a problem that persists on a massive scale, and its persistence may itself be a major impediment to growth in emerging economies. Recent years have seen a blossoming interest in socially innovative approaches to alleviating poverty and stimulating economic growth in emerging economies. In this short course, we will explore different conceptualizations of the problem of global poverty, the potential role of entrepreneurship in helping to address it, as well as the strengths and weaknesses of different approaches. Some possible areas of focus include: \* Different conceptualizations of the main drivers of persistent, extreme poverty \* The challenges to entrepreneurship posed by the institutional environments of emerging economies \* The appropriate role of entrepreneurship as a means of addressing the concerns of the poor \* The pros and cons of different models (e.g., venture philanthropy, social enterprise, non-profit) \* Ethical issues and concerns associated with different strategies In addition to reading and in-class discussion, the course will also draw on the expertise and experiences of one or more guest speakers.

**GSBGEN 587. Survive and Thrive: The Art of Navigating Crucial Conversations. 2 Units.**

Careers are enjoyed in the good times but truly made when challenging situations are successfully managed throughout every business cycle. Individuals who both perform well and communicate effectively in tense situations, gain the attention of senior management and are relied upon to deliver. A key to this success is the ability to successfully navigate crucial conversations. Crucial conversations are those which not only have a bearing on your firm and business but, also can also enhance or destroy your own personal reputation and credibility by poorly communicated situation analysis, facts and the mode in which you deliver information. Sometimes these conversations take place in minutes while others evolve over the course of days and weeks. Regardless, a professional's ability to read the "tea leaves" and execute a communication plan to address is vitally important to long term career success. This highly interactive course will take you through a series of business inflection points in a simulated firm where you will be expected to navigate different situations and make quick decisions both as an individual and as part of a team. Students can expect to leave this course with a heightened sense of their own gifts as communicators, a greater understanding of the research around effective communication, and specific tools and tactics to use throughout their career when faced with pivotal situations. Attendance at all six sessions is required to pass this course and participation counts for half the grade. Students will regularly give and receive feedback with their peers on their ability to apply course concepts in the simulation as it unfolds. While no prerequisite exists for this course, we expect that students seeking fundamentals of communication consider other course offerings. This course relies on students who are already reasonably comfortable communicating in high-stakes settings seeking greater mastery and nuance in their communication. Required pre-reading will provide the theoretical frameworks and case background necessary for the six-session simulation. One final reflection paper will be due within a week after the final class session. The balance of each student's grade is based on their participation and learning within the simulation and the depth and quality of their feedback to peers. This course is co-created and co-taught by JD Schramm and Steve Mellas. Schramm brings over a decade of MBA communication teaching and coaching to the course along with more than 15 years of professional experience in healthcare, financial services, and education. He founded the GSB's Mastery Initiative and co-founded LOWKeynotes. He is a sought out speaker and coach with two talks in the TED library. Mellas serves as a principal at AQR Capital in Greenwich CT where he oversees operations. Prior to joining AQR he worked for Goldman Sachs as a Managing Director in the Investment Management Division with responsibility for Asset Management Operations worldwide. Before that Mellas was with Morgan Stanley where he managed fixed income trading operations. Schramm and Mellas have teamed up on a number of highly ranked courses at NYU Stern since 2005 and hatched this latest collaboration while delivering a Mastery workshop for the GSB in January 2012.

**GSBGEN 588. Crisis Management on the World Stage. 2 Units.**

In this unique, one-week September Session, Condoleezza Rice, the former U.S. Secretary of State, and David Miliband, the former U.K. Foreign Secretary, will guide students through a series of international challenges that they faced together as their nation's top diplomats on either side of the Atlantic. Students will actively confront crises at the intersection of international politics and the global economy.

**GSBGEN 598. Stanford-Tsinghua Exchange Program. 2 Units.**

This course is open only to students participating in the Stanford-Tsinghua Exchange Program and is required of those students. Requirements include researching and reporting on companies to be visited, attending lectures in preparation for the China visit, attending lectures at Tsinghua, and carrying out and reporting on a project with one or more Tsinghua student. Offered Pass/No Pass only. 2 units. Winter quarter.



**GSBGEN 635. Neuroscience for Business and Economics. 4 Units.**

A growing number of scholars in business and economics are turning to neuroscience for new theoretical insights and new methodologies. This seminar will explore how findings from neuroscience can inform research in business and economics. The objectives of this course are for students to: - Gain an understanding of the basic theories of neuroscience - Gain an understanding of the basic methodologies of neuroscience, including behavioral paradigms, eye-tracking, and fMRI - Survey the key literature at the intersection of business, economics, and neuroscience - Learn how to critically reflect on and evaluate research that uses principles from neuroscience - Learn how to design experiments that utilize principles from neuroscience.

**GSBGEN 641. Advanced Empirical Methods. 3 Units.**

This course covers various advanced quantitative methods with applications in marketing and economics. Topics include simulation-based estimation, dynamic decision processes, and other topics relating to empirical models of demand and supply. The course stresses the conceptual understanding and application of each technique. Students will learn to apply these techniques using Matlab or an equivalent language.

**GSBGEN 645. Communication Strategies for Scholars. 2 Units.**

Educators must be experts in their subject matter, but also effective scholarly communicators. This course will examine the theories for effective communication in the wide range of settings that PhDs will encounter: seminars, academic conferences, job talks, and ultimately in the classroom. This course will provide PhD candidates with the opportunity to practice course principles in simulated communication settings and receive direct and filmed feedback on their performance. Students will benefit from participating in observations of GSB classes (within and beyond their discipline), readings on current education and communication theory and practice, class discussion, and visits from GSB professors. Learning Objectives: By the end of this course students will: -Understand the essentials of oral communication in scholarly settings -Understand the fundamentals of business education including syllabus development, classroom instruction, case method teaching, assessment and grading. - Understand and practice the essential elements of effective presentations - the verbal, vocal, and visual aspects of oral presentation -Articulate essential distinctions of teaching undergraduate, graduate (including MBA), and executive education students, and how to adapt their approach for these audiences -Demonstrate effectiveness as a presenter and growth in the ability to plan and present content in a variety of simulated settings from benchmark to final mock class -Apply course content to job talks, conference presentations, and other professional settings beyond the classroom -Evaluate peers and other educators on their ability to practice effective teaching and presentation delivery.

**GSBGEN 646. Behavioral Decision Making. 3 Units.**

This seminar examines research on the psychology of judgment and choice. Although the normative issue of how decisions should be made is relevant, the descriptive issue of how decisions are made is the main focus of the course. Topics of discussion include choice, judgment heuristics and biases, decision framing, prospect theory, mental accounting, context effects, task effects, regret, and other topics. The goal of the seminar is twofold: to foster a critical appreciation of existing knowledge in behavioral decision theory, to develop the students' skills in identifying and testing interesting research ideas, and to explore research opportunities for adding to that knowledge.

**GSBGEN 652. Online Research Methods. 2 Units.**

This course will cover the practicalities of running research on the internet, including: online research tools, experimental design, online process measures, subject pool selection, detecting and dealing with inattentive participants, basic programming techniques, debugging, data organization, and data cleaning. Class time and assignments will take a hands-on approach, giving you direct experience and practice. As part of the class, you will develop and run an experiment, which you can use for your own research program. Grading will be based on this project, as well as class participation and weekly assignments.

**GSBGEN 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, HRMGT 691, MGTECON 691, MKTG 691, OB 691, OIT 691, POLECON 691, STRAMGT 691.

**GSBGEN 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, HRMGT 692, MGTECON 692, MKTG 692, OB 692, OIT 692, POLECON 692, STRAMGT 692.

**GSBGEN 698. Doctoral Practicum in Teaching. 1-2 Units.**

Doctoral Practicum in Teaching.

**GSBGEN 699. Doctoral Practicum in Research. 1-2 Units.**

Doctoral Practicum in Research.

**GSBGEN 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, HRMGT 802, MGTECON 802, MKTG 802, OB 802, OIT 802, POLECON 802, STRAMGT 802.

## Genetics Courses

**GENE 104Q. Law and the Biosciences. 3 Units.**

Preference to sophomores. Focus is on human genetics; also assisted reproduction and neuroscience. Topics include forensic use of DNA, genetic testing, genetic discrimination, eugenics, cloning, pre-implantation genetic diagnosis, neuroscientific methods of lie detection, and genetic or neuroscience enhancement. Student presentations on research paper conclusions.

**GENE 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**GENE 200. Genetics and Developmental Biology Training Camp. 1 Units.**

Open to first year Department of Genetics and Developmental Biology students, to others with consent of instructors. Introduction to basic manipulations, both experimental and conceptual, in genetics and developmental biology.

Same as: DBIO 200.

**GENE 202. Human Genetics. 4 Units.**

Utilizes lectures and small group discussions to develop a working knowledge of human genetics as applicable to clinical medicine and research. Basic principles of inheritance, risk assessment, and population genetics, illustrated by using clinical examples drawn from diverse areas of medical genetics practice including prenatal, pediatric, adult and cancer genetics. Practical aspects of molecular and cytogenetic diagnostic methods emphasized. Existing and emerging treatment strategies for single gene disorders also covered. Prerequisites: biochemistry; basic genetics.

**GENE 206. Epigenetics. 2 Units.**

For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in *Drosophila* in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42, or GENE 203, or consent of instructor. Same as: BIO 156, BIO 256, PATH 206.

**GENE 209. Current Topics in Human, Population, and Statistical Genomics. 2 Units.**

Intensive seminar/workshop. Topics, drawn from current and past literature, may include: assessing and population genetic analysis of genomic variation; genome-to-phenome mapping; reconstructing demographic history from genome sequence data; domestication genomics; host-pathogen genome evolution; detecting signatures of selection; experimental design in human genetics; linkage and association mapping; ethical and social issues in human, plant, and animal genetics research. Emphasis on analysis and logic or experimental and observational genomics research. Faculty-led discussion with evaluation of response papers, problem sets, and intensive course project. May be repeated for credit.

**GENE 210. Genomics and Personalized Medicine. 3 Units.**

Principles of genetics underlying associations between genetic variants and disease susceptibility and drug response. Topics include: genetic and environmental risk factors for complex genetic disorders; design and interpretation of genome-wide association studies; pharmacogenetics; full genome sequencing for disease gene discovery; population structure and genetic ancestry; use of personal genetic information in clinical medicine; ethical, legal, and social issues with personal genetic testing. Hands-on workshop making use of personal or publicly available genetic data. Prerequisite: GENE 202, Gene 203 or BIOS 200. Same as: DBIO 220.

**GENE 211. Genomics. 3 Units.**

Genome evolution, organization, and function; technical, computational, and experimental approaches; hands-on experience with representative computational tools used in genome science; and a beginning working knowledge of PERL.

**GENE 212. Introduction to Biomedical Informatics Research Methodology. 3 Units.**

Hands-on software building. Student teams conceive, design, specify, implement, evaluate, and report on a software project in the domain of biomedicine. Creating written proposals, peer review, providing status reports, and preparing final reports. Guest lectures from professional biomedical informatics systems builders on issues related to the process of project management. Software engineering basics. Prerequisites: BIOMEDIN 210, 211, 214, 217 or consent of instructor. Same as: BIOE 212, BIOMEDIN 212, CS 272.

**GENE 214. Representations and Algorithms for Computational Molecular Biology. 3-4 Units.**

Topics: introduction to bioinformatics and computational biology, algorithms for alignment of biological sequences and structures, computing with strings, phylogenetic tree construction, hidden Markov models, Gibbs Sampling, basic structural computations on proteins, protein structure prediction, protein threading techniques, homology modeling, molecular dynamics and energy minimization, statistical analysis of 3D biological data, integration of data sources, knowledge representation and controlled terminologies for molecular biology, microarray analysis, machine learning (clustering and classification), and natural language text processing. Prerequisites: programming skills; consent of instructor for 3 units. Same as: BIOE 214, BIOMEDIN 214, CS 274.

**GENE 215. Frontiers in Biological Research. 1 Unit.**

Literature discussion in conjunction with the Frontiers in Biological Research seminar series in which investigators present current work. Students and faculty meet beforehand to discuss papers from the speaker's primary research literature. Students meet with the speaker after the seminar to discuss their research and future direction, commonly used techniques to study problems in biology, and comparison between the genetic and biochemical approaches in biological research. Same as: BIOC 215, DBIO 215.

**GENE 218. Computational Analysis of Biological Information: Introduction to Python for Biologists. 2 Units.**

Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy. Intended for biological and clinical trainees without substantial programming experience. Same as: MI 218, PATH 218.

**GENE 221. Current Issues in Aging. 2 Units.**

Current research literature on genetic mechanisms of aging in animals and human beings. Topics include: mitochondria mutations, insulin-like signaling, sirtuins, aging in flies and worms, stem cells, human progeria, and centenarian studies. Prerequisite: GENE 203 or BIOS 200. Same as: DBIO 221.

**GENE 224. Principles of Pharmacogenomics. 3 Units.**

Introduction to the relevant pharmacology, genomics, experimental methods for high-throughput measurements (sequencing, expression, genotyping), analysis methods for GWAS, chemoinformatics, and natural language processing. Review of key gene classes (cytochromes, transporters, GPCRs), key drugs for which genetics is critical (warfarin, clopidogrel, statins, NSAIDs, neuropsychiatric drugs and cancer drugs). Also reviews resources for pharmacogenomics (PharmGKB, Drugbank, CMAP, and others) as well as issues in doing clinical implementation of pharmacogenomics testing. Reading of key papers, including student presentations of this work.; problem sets; final project selected with approval of instructor. Prerequisites: two of BIO 41, 42, 43, 44X, 44Y or consent of instructor. Same as: BIOMEDIN 224.

**GENE 233. The Biology of Small Modulatory RNAs. 2 Units.**

Open to graduate and medical students. Explores recent progress and unsolved questions in the field of RNA interference and microRNA biology. Students are required to read assigned primary literature before each class and actively participate in guided discussions on related technical and conceptual issues during class meetings. Assignments include critiques of assigned papers and developing a novel research proposal. Same as: MI 233, PATH 233.

**GENE 234. Fundamentals of RNA Biology. 2 Units.**

For graduate or medical students and (if space allows) to active participants from other segments of the Stanford Community (e.g., TGR students); undergraduates by instructor consent. Fundamental issues of RNA biology, with the goal of setting a foundation for students to explore the expanding world of RNA-based regulation. Each week a topic is covered by a faculty lecture and journal club presentations by students. Same as: MI 234, PATH 234.

**GENE 235. C. Elegans Genetics. 2 Units.**

Genetic approaches to *C. elegans*, practice in designing experiments and demonstrations of its growth and anatomy. Probable topics include: growth and genetics, genome map and sequence, mutant screens that start with a desired phenotype, reverse genetics and RNAi screens, genetic duplications, uses of null phenotype non-null alleles, genetic interactions and pathway analysis, and embryogenesis and cell lineage. Focus of action, mosaic analysis, and interface with embryological and evolutionary approaches.

**GENE 243. Intellectual Property: Scientific Evidence in Patent Litigation. 3 Units.**

(Same as LAW 343) Open to clinical MD and graduate students. Explores the role of scientific experts in patent infringement litigation. In other areas of the law where scientific experts are used -- medical malpractice, environmental law, criminal law -- the science itself is often in dispute. In patent cases, however, the parties generally agree on the science. This affects the relationship between the lawyer and the expert and the substantive content of their interactions. Patent experts need to be able to explain science to the judge and jury. But they also must help the litigators choose which legal issues to press and which to concede, and to be aware of how the complications of the science might help, hurt, obscure or reveal how the law should be applied to the facts. The class examines judicial decisions and trial documents involving scientific evidence in patent litigation, followed by work in teams on final projects: simulations of expert testimony in a patent case. Simulations are performed at the end of the quarter before panels of practicing patent lawyers. Prerequisite: graduate students must have completed their required coursework and have TGR status.

**GENE 244. Introduction to Statistical Genetics. 3 Units.**

Statistical methods for analyzing human genetics studies of Mendelian disorders and common complex traits. Probable topics include: principles of population genetics; epidemiologic designs; familial aggregation; segregation analysis; linkage analysis; linkage-disequilibrium-based association mapping approaches; and genome-wide analysis based on high-throughput genotyping platforms. Prerequisite: STATS 116 or equivalent or consent of instructor.

**GENE 245. Computational Algorithms for Statistical Genetics. 2-3 Units.**

Computational algorithms for human genetics research. Topics include: permutation, bootstrap, expectation maximization, hidden Markov model, and Markov chain Monte Carlo. Rationales and techniques illustrated with existing implementations commonly used in population genetics research, disease association studies, and genomics analysis. Prerequisite: GENE 244 or consent of instructor.

Same as: STATS 166, STATS 345.

**GENE 260. Supervised Study. 1-18 Units.**

Genetics graduate student lab research from first quarter to filing of candidacy. Prerequisite: consent of instructor.

**GENE 271. Human Molecular Genetics. 4 Units.**

For genetic counseling students, graduate students in genetics, medical students, residents, and postdoctoral fellows interested in the practice of medical genetics. Gene structure and function; the impact of mutation and polymorphism as they relate to developmental pathways and health and human disease; population based genetics; approaches to the study of complex genetic conditions; GWAS and genome sequencing technologies; variant curation; gene therapy, proteomics, stem cell biology, and pharmacogenetics. Undergraduates require consent of instructor and a basic genetics course.

**GENE 272. Introduction to Medical Genetics. 2-3 Units.**

For genetic counseling students, graduate students in human genetics, medical students, residents, and fellows; undergraduates with consent of instructor. Principles of medical genetics including taking a family history, modes of inheritance, and mathematical principles of medical genetics (Bayes theorem, population genetics). An additional problem set is required for 3 units.

**GENE 273. Introduction to Clinical Genetics Testing. 1 Unitss.**

For genetic counseling students, medical students, residents, and fellows. Uses a combination of case based assignments and online didactic lectures to introduce the laboratory concepts of cytogenetics, molecular genetics and biochemical genetics, and to illustrate common genetic conditions that are diagnosed through such testing, introducing students to skills in case preparation, management and presentation.

**GENE 274A. A Case Based Approach to Clinical Genetics. 2 Units.**

For genetic counseling students, graduate students in genetics, medical students, residents and fellows. Case-based scenarios and guest expert lectures. Students learn skills in case preparation, management, and presentation, as well as content around common genetic disorders.

**GENE 274B. A Case Based Approach to Clinical Genetics. 2 Units.**

For genetic counseling students, graduate students in genetics, medical students, residents, and fellows. Case-based scenarios and guest expert lectures. Students learn skills in case preparation, management, and presentation, as well as content around common genetic disorders.

**GENE 275. Role Play and Genetic Counseling Observations. 2 Units.**

Students role play aspects of genetic counseling sessions and learn through clinical observations. Observation includes genetic counseling sessions in prenatal, pediatric, and cancer settings.

**GENE 276. Genetic Counseling Clinical Rotations. 4-7 Units.**

For genetic counseling students only. Supervised clinical experiences. May be repeated for credit. Prerequisite: GENE 275.

**GENE 278. Prenatal Genetic Counseling. 1 Unitss.**

Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their initial prenatal genetics rotation. Topics include prenatal genetic screening and diagnosis in the first and second trimesters, ultrasound, teratology, and genetic carrier screening.

**GENE 279. Pediatric and Adult Genetic Counseling. 1 Unitss.**

Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their initial general genetics rotation. Topics include: common genetic conditions; assessment of child development and medical history in the context of a genetic workup; dysmorphology; development of a differential diagnosis; and resources for case management and family support.

**GENE 280. Metabolic Genetic Counseling. 1 Unitss.**

Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their metabolic genetics rotation. Topics include: overview of metabolic diseases; common pathways; diagnosis, management, and treatment of metabolic disorders; and newborn screening.

**GENE 281. Cancer Genetic Counseling. 1 Unitss.**

Internet-based course for genetic counseling students, graduate students in genetics, medical students, residents, and fellows; genetic counseling students should take this course in conjunction with their initial cancer genetics rotation. Topics include: cancer biology and cytogenetics; diagnosis and management of common cancer genetic syndromes; predictive testing; psychology of cancer genetic counseling; and topics recommended by ASCO guidelines.

**GENE 282A. Genetic Counseling Research Seminar. 1 Unitss.**

For genetic counseling students only. Facilitated discussions on identifying a topic and mentor for genetic counseling departmental research projects.

**GENE 282B. Genetic Counseling Research Seminar. 1 Unitss.**

For genetic counseling students only. Lectures and facilitated discussions on research methodology for genetic counseling departmental research projects. Prerequisite: GENE 282A.

**GENE 283. Genetic Counseling Research. 1-8 Units.**

Genetic counseling students conduct clinical research projects as required by the department for graduation. May be repeated for credit. Pre- or corequisite: GENE 282.

**GENE 284. Medical Genetics Seminar. 1-2 Units.**

Presentation of research and cases. Students enrolling for 2 units also attend and report on external seminars. May be repeated for credit.

**GENE 285A. Genetic Counseling Seminar. 2-3 Units.**

Year-long seminar primarily for genetic counseling students. Autumn: basics of medical communication; crosscultural and disability sensitive communication about genetics, and principles of providing genetic counseling. Undergraduates may enroll in Autumn Quarter with consent of instructor.

**GENE 285B. Genetics Counseling Seminar. 2-3 Units.**

Year-long seminar primarily for genetic counseling students. Winter: the impact of chronic illness and genetic disease in a developmental manner.

**GENE 285C. Genetic Counseling Seminar. 2-3 Units.**

Year-long seminar primarily for genetic counseling students. Spring: applying therapeutic counseling approaches to the practice of genetic counseling.

**GENE 286. Advanced Genetic Counseling Seminar. 2 Units.**

For genetic counseling students only. Psychosocial issues associated with genetic counseling cases are discussed through presentation of cases that students have seen throughout their training. Professional development topics including: the expanding roles of genetic counselors; billing, reimbursement, and licensing; the role of genetic counseling in the changing healthcare system; the incorporation of genetics into all areas of medicine and public health; and implications of direct-to-consumer genetic testing. Must be taken for 3 quarters. Prerequisites: GENE 285 A,B,C and 276.

**GENE 299. Directed Reading in Genetics. 1-18 Units.**

Prerequisite: consent of instructor.

**GENE 399. Graduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**GENE 801. TGR Project. 0 Unit.****GENE 802. TGR Dissertation. 0 Unit.**

## Geological Environmental Sciences Courses

**GES 1A. Introduction to Geology: The Physical Science of the Earth. 5 Units.**

For non-majors or prospective majors in the Earth Sciences. Lectures, hands-on laboratories, and three one-day weekend field trips. Focus is on the physical and chemical processes of heat and mass transfer within the earth and its fluid envelopes, including deep-earth, crustal, surface, and atmospheric processes. Topics include the dynamics of and interactions between the inner earth, plate tectonics, surface processes, and atmospheric processes such as climate change and global warming. Only one of GES 1A, 1B, or 1C may be taken for credit. Prerequisites: MATH 19 or equivalent.

**GES 1B. Introduction to Geology: California Desert Geology. 4 Units.**

For non-majors and prospective majors or minors in the Earth Sciences. The landscapes and rock formations of California's Death Valley and Owens Valley are used as natural laboratories for studying active geologic processes that shape Earth's surface (earthquakes, mountain building, volcanoes, glaciers) and for tracing a billion years of Earth history, climate change, and historic human impacts. Lectures on these topics and hands-on laboratory exercises involving rock identification and interpreting topographic and geologic maps and satellite imagery provide an introduction to physical geology and the background necessary to appreciate an optional 6-day field trip to these desert areas during Spring Break that can be taken separately as GES183. Only one of GES 1A, 1B, or 1C may be taken for credit. Recommended: high school chemistry.

**GES 1C. Introduction to Geology: Dynamic Earth. 4 Units.**

For non-majors or prospective majors in the Earth Sciences. Integrated lecture-lab includes hands-on activities and local field trips. Focus is on reading the dynamic geological landscape, with an emphasis on California-primarily Bay Area-geology. Topics include plate tectonics, earthquakes and volcanoes, Earth materials, geologic time, stream processes, and climate change over geologic time. Only one of GES 1A, 1B, or 1C may be taken for credit.

**GES 4. Evolution and Extinction: Introduction to Historical Geology. 4 Units.**

Introduction to the basic tools and principles geologists and paleontologists use to reconstruct the history of the Earth. Principles of stratigraphy, correlation, the geological timescale, the history of biodiversity, and the interpretation of fossils. The use of data from sedimentary geology, geochemistry, and paleontology to test theories for critical events in Earth history such as mass extinctions. Two half-day field trips. Same as: EARTHYSYS 4.

**GES 5. Living on the Edge. 1 Unitss.**

A weekend field trip along the Pacific Coast. Tour local beaches, geology, and landforms with expert guides from the Department of Geological and Environmental Sciences. Enjoy a BBQ dinner and stay overnight in cabins along the Santa Cruz coast. Get to know faculty and graduate students in the Earth Sciences. Requirements: Two campus meeting and weekend field trip to Pacific Coast. Enrollment limited to 25. Freshman have first choice.

**GES 7A. An Introduction to Wilderness Skills. 1 Unitss.**

Living, traveling, and working in the wilderness for those planning fieldwork in the back country. Local geology, environmental ethics, trip planning, first aid, and leadership techniques. Four mandatory weekend outings focus on back country travel, minimum impact camping, equipment use and maintenance, rock climbing, and navigation. 7A emphasizes wilderness travel and climbing. 7B emphasizes winter camping skills and back country skiing. Food, group, and major personal gear provided. Guest speakers. Fee. See <http://www.stanford.edu/class/ges7>, or email [oepteachers@lists.stanford.edu](mailto:oepteachers@lists.stanford.edu).

**GES 7B. An Introduction to Wilderness Skills. 1 Unitss.**

Living, traveling, and working in the wilderness for those planning fieldwork in the backcountry. Local geology, environmental ethics, trip planning, first aid, and leadership techniques. Four mandatory weekend outings focus on backcountry travel, minimum impact camping, equipment use and maintenance, rock climbing, and navigation. 7A emphasizes wilderness travel and climbing. 7B emphasizes winter camping skills and backcountry skiing. Food, group, and major personal gear provided. Guest speakers. Fee. See <http://www.stanford.edu/class/ges7>, or email [oepteachers@lists.stanford.edu](mailto:oepteachers@lists.stanford.edu).

**GES 7C. Advanced Wilderness Skills. 1 Unit.**

For students with prior backcountry experience. Backcountry skiing, mountaineering, climbing, first aid, and trip planning. Focus is on outdoor leadership experience and trip management techniques. Food, group, and major personal gear provided. Four mandatory weekend trips. Fee. See <http://www.stanford.edu/class/ges7/> for information or contact oep-teachers@lists.stanford.edu. Prerequisite: application.

**GES 12SC. Environmental and Geological Field Studies in the Rocky Mountains. 2 Units.**

The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and increased demand for its abundant natural resources. These broad topics are integrated into a coherent field-study as we examine earth/ environmental science-related questions in three different settings: 1) the three-billion-year-old rocks and the modern glaciers of the Wind River Mountains of Wyoming; 2) the sediments in the adjacent Wind River basin that host abundant gas and oil reserves and also contain the long-term climate history of this region; and 3) the volcanic center of Yellowstone National Park and the mountainous region of Teton National Park, and the economic and environmental problems associated with gold mining and extraction of oil and gas in areas adjoining these national parks. Students will complete six assignments based upon field exercises, working in small groups to analyze data and prepare reports and maps. Lectures will be held in the field prior to and after fieldwork. Note: This course involves one week of backpacking in the Wind Rivers and hiking while staying in cabins near Jackson Hole, Wyoming. Students must arrive in Salt Lake City on Monday, September 3. (Hotel lodging will be provided for the night of September 3, and thereafter students will travel as a Sophomore College group.) We will return to campus on Friday, September 21.

Same as: EARTHSYS 12SC, EESS 12SC.

**GES 38N. The Worst Journey in the World: The Science, Literature, and History of Polar Exploration. 3 Units.**

Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include *The Worst Journey in the World* by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar)

Same as: EARTHSYS 38N, EESS 38N.

**GES 39N. Forensic Geoscience: Stanford CSI. 3 Units.**

Preference to freshmen. Geological principles, materials, and techniques indispensable to modern criminal investigations. Basic earth materials, their origin and variability, and how they can be used as evidence in criminal cases and investigations such as artifact provenance and environmental pollution. Sources include case-based, simulated forensic exercises and the local environments of the Stanford campus and greater Bay Area. Local field trips; research presentation and paper.

**GES 40N. Diamonds. 3 Units.**

Preference to freshmen. Topics include the history of diamonds as gemstones, prospecting and mining, and their often tragic politics. How diamond samples provide clues for geologists to understand the Earth's deep interior and the origins of the solar system. Diamond's unique materials properties and efforts in synthesizing diamonds.

**GES 42N. Landscapes and Tectonics of the San Francisco Bay Area. 4 Units.**

Active faulting and erosion in the Bay Area, and its effects upon landscapes. Earth science concepts and skills through investigation of the valley, mountain, and coastal areas around Stanford. Faulting associated with the San Andreas Fault, coastal processes along the San Mateo coast, uplift of the mountains by plate tectonic processes, and landsliding in urban and mountainous areas. Field excursions; student projects.

**GES 43Q. Environmental Problems. 3 Units.**

Preference to sophomores. Components of multidisciplinary environmental problems and ethical questions associated with decision making in the regulatory arena. Students lead discussions on environmental issues such as groundwater contamination from point and nonpoint sources, cumulative watershed effects related to timber and mining practices, acid rain, and subsurface disposal of nuclear waste.

**GES 50Q. The Coastal Zone Environment. 3 Units.**

Preference to sophomores. The oceanographic, geological, and biological character of coastal zone environments, including continental shelves, estuaries, and coastal wetlands, with emphasis on San Francisco Bay. Five required field trips examine estuarine and coastal environments, and agencies and facilities that manage these resources. Students present original research. Prerequisite: beginning course in Biology such as BIOSCI 51, Chemistry such as CHEM 30 or 31, Earth Sciences such as GES 1 or 2, or Earth Systems such as EARTHSYS 10.

**GES 55Q. The California Gold Rush: Geologic Background and Environmental Impact. 3 Units.**

Preference to sophomores. Topics include: geologic processes that led to the concentration of gold in the river gravels and rocks of the Mother Lode region of California; and environmental impact of the Gold Rush due to population increase, mining operations, and high concentrations of arsenic and mercury in sediments from hard rock mining and milling operations. Recommended: introductory geology.

**GES 90. Introduction to Geochemistry. 3-4 Units.**

The chemistry of the solid earth and its atmosphere and oceans, emphasizing the processes that control the distribution of the elements in the earth over geological time and at present, and on the conceptual and analytical tools needed to explore these questions. The basics of geochemical thermodynamics and isotope geochemistry. The formation of the elements, crust, atmosphere and oceans, global geochemical cycles, and the interaction of geochemistry, biological evolution, and climate. Recommended: introductory chemistry.

**GES 101. Environmental and Geological Field Studies in the Rocky Mountains. 3 Units.**

Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns. Same as: EARTHSYS 100, EESS 101.

**GES 102. Earth Materials: Introduction to Mineralogy. 3 Units.**

The minerals and materials that comprise the earth and their uses in modern society. How to identify, classify, and interpret rock-forming minerals. Emphasis is on information provided by common minerals about the nature of the Earth's interior and processes such as magmatism and metamorphism that operate there, as well as the major processes of weathering and erosion that link plate tectonics to earth cycles. Prerequisite: introductory geology course. Recommended: introductory chemistry.

**GES 102L. Introductory Mineralogy Laboratory. 1 Unitss.**

One weekly 3-hour laboratory to identify and interpret rock-forming minerals, industrially important minerals, and gems. Introduction to the use of hand lens, petrographic microscope and x-ray diffraction. Prerequisite: GES102 taken concurrently.

**GES 103. Earth Materials: Rocks in Thin Section. 3 Units.**

Use of petrographic microscope to identify minerals and common mineral associations in igneous, metamorphic, and sedimentary rocks. Crystallization histories, mineral growth and reaction relations, deformation textures in metamorphic rocks, and provenance of siliciclastic rocks. Prerequisite 102.

**GES 104. Earth Materials: Introduction to Petrology. 3 Units.**

The origin of different rock types as a function of geologic and plate tectonic setting. How mineral and energy resources occur in rocks. Prerequisite: introductory geology course. Recommended: GES102.

**GES 104L. Introductory Petrology Laboratory. 1 Unitss.**

One weekly 3-hour laboratory on how to identify igneous, metamorphic, and sedimentary rocks, and interpret their mode and conditions of formation using hand lens and petrographic microscope. Prerequisite: GES 102L; GES103; GES104 taken concurrently.

**GES 105. Introduction to Field Methods. 3 Units.**

Two-week, field-based course in the White Mountains of eastern California. Introduction to the techniques for geologic mapping and geologic investigation in the field: systematic observations and data collection for lithologic columns and structural cross-sections. Interpretation of field relationships and data to determine the stratigraphic and deformational history of the region. Recommended: GES 1, GES 102.

**GES 107. Journey to the Center of the Earth. 3 Units.**

The interconnected set of dynamic systems that make up the Earth. Focus is on fundamental geophysical observations of the Earth and the laboratory experiments to understand and interpret them. What earthquakes, volcanoes, gravity, magnetic fields, and rocks reveal about the Earth's formation and evolution. Offered every other year, winter quarter. Same as: GEOPHYS 184, GEOPHYS 274, GES 207.

**GES 110. Structural Geology and Tectonics. 3-5 Units.**

Theory, principles, and practical techniques to measure, describe, analyze, and interpret deformation-related structures on Earth. Collection of fault and fold data in the field followed by lab and computer analysis; interpretation of geologic maps and methods of cross-section construction; structural analysis of fault zone and metamorphic rocks; measuring deformation; regional structural styles and associated landforms related to plate tectonic convergence, rifting, and strike-slip faulting; the evolution of mountain belts and formation of sedimentary basins. Prerequisite: GES 1, calculus. Recommended: 102.

**GES 111. Fundamentals of Structural Geology. 3 Units.**

Techniques for mapping using GPS and differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; measurement and analysis of stress; elastic deformation and properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding and magma dynamics; model development and methodology. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisites: GES 1, MATH 51, 52. Same as: CEE 195.

**GES 115. Engineering Geology and Global Change. 3 Units.**

The application of geology and global change to the planning, design, and operation of engineering projects. Case histories taught in a seminar setting and field trips emphasize the impact of geology and global change on both individual engineering works and the built environment by considering Quaternary history and tectonics, anthropogenic sea level rise, active geologic processes, engineering properties of geologic deposits, site exploration, and professional ethics. Prerequisite: GES 1 or consent of instructor. Same as: CEE 196.

**GES 119. A Solar System Odyssey: Introduction to Planetary Geology. 3 Units.**

How could planetary bodies such as Earth, Moon and Mars form so close together, with such similar starting products have such drastically different outcomes? Did Mars ever have standing water? Does Europa have a subsurface ocean teeming with life? In this course, you will study the formation and evolution of planets and moons, and how differences such as mass and composition have led to a diverse selection of terrain. Through our exploration of selected topics in planetary geology (volcanism, cratering, tectonics), we will actively debate contemporary controversies in planetary geology. GES 1 required or permission of the instructor.

**GES 120. Planetary and Early Biological Evolution Seminar. 2-3 Units.**

Interdisciplinary. For upper division science undergraduates and graduate students. Synthesis of biology, geology, physics, and chemistry. Recent approaches for identifying traces of past life on Earth. How to look for life on other planets such as Mars, Europa, and Titan. May be repeated for credit. Same as: GES 220.

**GES 121. What Makes a Habitable Planet?. 3 Units.**

Physical processes affecting habitability such as large impacts and the atmospheric greenhouse effect, comets, geochemistry, the rise of oxygen, climate controls, and impact cratering. Detecting and interpreting the spectra of extrasolar terrestrial planets. Student-led discussions of readings from the scientific literature. Team taught by planetary scientists from NASA Ames Research Center. Same as: GES 221.

**GES 122. Planetary Systems: Dynamics and Origins. 3-4 Units.**

(Students with a strong background in mathematics and the physical sciences should register for 222.) Motions of planets and smaller bodies, energy transport in planetary systems, composition, structure and dynamics of planetary atmospheres, cratering on planetary surfaces, properties of meteorites, asteroids and comets, extrasolar planets, and planetary formation. Prerequisite: some background in the physical sciences, especially astronomy, geophysics, or physics.

**GES 123. Paleobiology. 4 Units.**

Introduction to the fossil record with emphasis on marine invertebrates. Major debates in paleontological research. The history of animal life in the oceans. Topics include the nature of the fossil record, evolutionary radiations, mass extinctions, and the relationship between biological evolution and environmental change. Fossil taxa through time. Exercises in phylogenetics, paleoecology, biostratigraphy, and statistical methods. Same as: EARTHSYS 122.

**GES 130. Soil Physics and Hydrology. 3 Units.**

The occurrence, distribution, circulation, and reaction of water at the surface and within the near surface. Topics: precipitation, evapotranspiration, infiltration and vadose zone, groundwater, surface water and streamflow generation, and water balance estimates. Current and classic theory in soil physics and hydrology. Urban, rangeland, and forested environments.

**GES 131. Hydrologically-Driven Landscape Evolution. 3 Units.**

Materials of the Earth and hydrologically driven landscape processes.

Topics: hillslope hydrology, weathering of rocks and soils, erosion, flow failures, mass wasting, and conceptual models of landscape evolution.

Current and classic theory in geomorphology.

**GES 150. Senior Seminar: Issues in Earth Sciences. 3 Units.**

Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review.

Same as: GEOPHYS 199.

**GES 151. Sedimentary Geology and Petrography: Depositional Systems. 4 Units.**

Topics: weathering, erosion and transportation, deposition, origins of sedimentary structures and textures, sediment composition, diagenesis, sedimentary facies, tectonics and sedimentation, and the characteristics of the major siliciclastic and carbonate depositional environments. Lab: methods of analysis of sediments in hand specimen and thin section. Field trips. Prerequisites: 1, 102, 103.

**GES 163. Introduction to Isotope Geochemistry. 3 Units.**

Stable, cosmogenic, and radiogenic isotopes; processes that govern isotopic variations. Application of isotopes to geologic, biologic, and hydrologic questions. Major isotopic systems and their applications. Simple modeling techniques used in isotope geochemistry.

Same as: GES 263.

**GES 170. Environmental Geochemistry. 4 Units.**

Solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and chemical interactions. Contrast between natural sources of hazardous elements and compounds and types and sources of anthropogenic contaminants and pollutants. Chemical and physical processes of weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. The release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The impact of contaminants and design of remediation strategies. Case studies. Prerequisite: 90 or consent of instructor.

Same as: EARTHSYS 170.

**GES 171. Geochemical Thermodynamics. 3 Units.**

Introduction to the application of chemical principles and concepts to geologic systems. The chemical behavior of fluids, minerals, and gases using simple equilibrium approaches to modeling the geochemical consequences of diagenetic, hydrothermal, metamorphic, and igneous processes. Topics: reversible thermodynamics, solution chemistry, mineral-solution equilibria, reaction kinetics, and the distribution and transport of elements by geologic processes. Prerequisite: GES 102.

**GES 180. Igneous Processes. 4 Units.**

For juniors, seniors and beginning graduate students in Earth Sciences.

Structure and physical properties of magmas; use of phase equilibria and mineral barometers and thermometers to determine conditions of magmatic processes; melting and magmatic lineages as a function of tectonic setting; processes that control magma composition including fractional crystallization, partial melting, and assimilation; petrogenetic use of trace elements and isotopes. Labs emphasize identification of volcanic and plutonic rocks in thin section and interpretation of rock textures.

Prerequisite 102, 103, or consent of instructor.

**GES 181. Metamorphic Processes. 3-5 Units.**

For juniors, seniors, and beginning graduate students in Earth Sciences.

Thermodynamics and phase equilibria of multiple component systems; use of phase equilibria to determine pressure and temperature of metamorphic assemblages; geochronology of metamorphic rocks; heat flow in the lithosphere; links between tectonics and metamorphism; and the role of heat and mass transfer in the Earth's crust and mantle. Labs emphasize identification of metamorphic rocks and minerals for common pelitic and basic rocks and interpretation of rock textures. May be taken for 3 units without lab. Prerequisites: 102, 103, or consent of instructor.

**GES 183. California Desert Geologic Field Trip. 1 Unitss.**

Field seminar. Four class meetings during Winter quarter followed by a 6-day field trip over Spring Break to Mojave Desert, Death Valley, and Owens Valley. Basin-and-range faulting, alluvial fans, playas, sand dunes, metamorphic rocks, granites of the Sierra Nevada, lava flows and and the deposits of supervolcanic eruptions, hot springs, ore deposits, and desert landscapes. Involves camping and moderate hiking. Recommended: introductory geology. Enrollment limited to 30 students; preference given to students taking GES1B concurrently, freshman and sophomores; additionally graduate students in the School of Earth Sciences.

**GES 185. Volcanology. 3-4 Units.**

For juniors, seniors, and beginning graduate students in earth sciences.

Eruptive processes that create volcanic deposits and landforms; relation to physical properties of magmas. Volcanic hazards and the effects of eruptions on climate; volcanic-hosted geothermal systems and mineral resources. Required 4-day field trip over Memorial Day weekend to study silicic and mafic volcanism in the eastern Sierra Nevada. Those taking the class for 4 units will complete a 3-hour weekly lab involving hand specimen and thin section identification and interpretation, which emphasizes recognizing types of lavas and products of explosive eruptions. Prerequisite: 1, for those taking the course for 3 units; 103 and 104 or equivalent for those taking the course for 4 units.

**GES 186. Geoarchaeology. 5 Units.**

For juniors, seniors, and beginning graduate students with interests in archaeology or geosciences. Geological concepts, techniques, and data in the study of artifacts and the interpretation of the archaeological record. Topics include: sediments and soils; sedimentary settings of site formation; postdepositional processes that disturb sites; paleoenvironmental reconstruction of past climates and landscapes using plant and animal remains and isotopic studies; raw materials (minerals, metals, stone, shells, clay, building materials) and methods used in sourcing; estimating age based on stratigraphic and radiometric techniques. Weekly lab; weekend field trip to local archaeological/geological site.

**GES 190. Research in the Field. 2 Units.**

Two to three-week long courses that provide students with the opportunity to collect data in the field as part of a team-based investigation of research questions or topics under the expert guidance of knowledgeable faculty and graduate students. Topics and locations vary. May be taken multiple times for credit. Prerequisites: GES 1, GES 102, GES 105.

**GES 191. GES Field Trips. 1 Unitss.**

Four- to seven-day field trips to locations of geologic and environmental interest. Includes trips offered during Thanksgiving and Spring breaks. May be repeated for credit. See <http://pangea.stanford.edu/GES/undergraduates/courses/>.

**GES 192. Undergraduate Research in Geological and Environmental Sciences. 1-10 Units.**

Field-, lab-, or literature-based. Faculty supervision. Written reports. May be repeated for credit.

**GES 197. Senior Thesis. 3-5 Units.**

For seniors who wish to write a thesis based on research in 192 or as a summer research fellow. May not be repeated for credit; may not be taken if enrolled in 199.

**GES 198. Special Problems in Geological and Environmental Sciences. 1-10 Units.**

Reading and instruction under faculty supervision. Written reports. May be repeated for credit.

**GES 199. Honors Program. 1-10 Units.**

Research on a topic of special interest. See "Undergraduate Honors Program" above. May be repeated for credit.

**GES 207. Journey to the Center of the Earth. 3 Units.**

The interconnected set of dynamic systems that make up the Earth. Focus is on fundamental geophysical observations of the Earth and the laboratory experiments to understand and interpret them. What earthquakes, volcanoes, gravity, magnetic fields, and rocks reveal about the Earth's formation and evolution. Offered every other year, winter quarter.

Same as: GEOPHYS 184, GEOPHYS 274, GES 107.

**GES 208. Topics in Geobiology. 1 Unit.**

Reading and discussion of classic and recent papers in the field of Geobiology. Co-evolution of Earth and life; critical intervals of environmental and biological change; geomicrobiology; paleobiology; global biogeochemical cycles; scaling of geobiological processes in space and time.

Same as: EESS 208.

**GES 210. Geologic Evolution of the Western U.S. Cordillera. 2-3 Units.**

The geologic and tectonic evolution of the U.S. Cordillera based on its rock record through time. This region provides good examples of large-scale structures and magmatic activity generated during crustal shortening, extension, and strike-slip faulting and affords opportunity to study crustal-scale processes involved in mountain building in context of plate tectonic motions.

**GES 211. Topics in Regional Geology and Tectonics. 2-3 Units.**

May be repeated for credit.

**GES 212. Topics in Tectonic Geomorphology. 2 Units.**

For upper-division undergraduates and graduate students. Topics vary and may include coupling among erosional, tectonic, and chemical weathering processes at the scale of orogens; historical review of tectonic geomorphology; hillslope and fluvial process response to active uplift; measures of landscape form and their relationship to tectonic uplift and bedrock lithology. May be repeated for credit.

**GES 213. Topics in Sedimentary Geology. 2 Units.**

For upper division undergraduates and graduate students. Topics vary each year but the focus is on current developments and problems in sedimentary geology, sedimentology, and basin analysis. These include issues in deep-water sediments, their origin, facies, and architecture; sedimentary systems on the early Earth; and relationships among tectonics, basin development, and basin fill. May be repeated for credit.

**GES 214. Topics in Paleobiology. 2 Units.**

For upper division undergraduates and graduate students. Topics vary each year; focus is on paleontological, sedimentological, and geochemical approaches to the history of life. Topics may include: mass extinction events; evolutionary radiations; the history of global biodiversity; links between evolutionary histories of primary producers and consumers; and the quality of the fossil record. Term paper. May be repeated for credit.

**GES 215. Structural Geology and Rock Mechanics. 4 Units.**

Quantitative field and laboratory data integrated with solutions to boundary value problems of continuum mechanics to understand tectonic processes in Earth's crust that lead to the development of geological structures including folds, faults, fractures and fabrics. Topics include: techniques and tools for structural mapping; differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; traction and stress analysis, conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties; brittle deformation including fracture and faulting; model development and methodology. Data sets analyzed using MATLAB. Prerequisites: GES 1, MATH 53, MATLAB or equivalent. Same as: CEE 297R, GEOPHYS 251.

**GES 216. Rock Fracture Mechanics. 3-5 Units.**

Principles and tools of elasticity theory and fracture mechanics are applied to the origins and physical behaviors of faults, dikes, joints, veins, solution surfaces, and other natural structures in rock. Field observations, engineering rock fracture mechanics, and the elastic theory of cracks. The role of natural fractures in brittle rock deformation, and fluid flow in the earth's crust with applications to crustal deformation, structural geology, petroleum geology, engineering, and hydrogeology. Prerequisite: 215 or equivalent.

**GES 217. Faults, Fractures, and Fluid Flow. 3 Units.**

Process-based approach to rock failure; the microstructures and overall architectures of the failure products including faults, joints, solution seams, and types of deformation bands. Fluid flow properties of these structures are characterized with emphasis on sealing and transmitting of faults and their role in hydrocarbon flow, migration, and entrapment. Case studies of fracture characterization experiments in aquifers, oil and gas reservoirs, and waste repository sites. Guest speakers; weekend field trip. Prerequisite: first-year graduate student in Earth Sciences.

**GES 220. Planetary and Early Biological Evolution Seminar. 2-3 Units.**

Interdisciplinary. For upper division science undergraduates and graduate students. Synthesis of biology, geology, physics, and chemistry. Recent approaches for identifying traces of past life on Earth. How to look for life on other planets such as Mars, Europa, and Titan. May be repeated for credit.

Same as: GES 120.

**GES 221. What Makes a Habitable Planet?. 3 Units.**

Physical processes affecting habitability such as large impacts and the atmospheric greenhouse effect, comets, geochemistry, the rise of oxygen, climate controls, and impact cratering. Detecting and interpreting the spectra of extrasolar terrestrial planets. Student-led discussions of readings from the scientific literature. Team taught by planetary scientists from NASA Ames Research Center.

Same as: GES 121.

**GES 222. Planetary Systems: Dynamics and Origins. 3-4 Units.**

(For students with a strong background in mathematics and the physical sciences; other should register for 122.) Motions of planets, moons, and small bodies; energy transport in planetary systems; meteorites and the constraints they provide on the formation of the solar system; asteroids and Kuiper belt objects; comets; planetary rings; planet formation; and extrasolar planets. In-class presentation of student papers.

**GES 223. Planetary Systems: Atmospheres, Surfaces, and Interiors. 3 Units.**

Focus is on physical processes, such as radiation transport, atmospheric dynamics, thermal convection, and volcanism, shaping the interiors, surfaces, and atmospheres of the major planets in the solar system. How these processes manifest themselves under various conditions in the solar system. Case study of the surface and atmosphere of Mars. Application of comparative planetary science to extrasolar planets and brown dwarfs. In-class presentation of student papers.



**GES 224. Modeling Transport and Transformations in the Environment. 2-3 Units.**

An introduction to geochemical and reactive transport modeling using Geochemist's Workbench and other appropriate models. Students required to participate in a weekend-long short course at the beginning of the quarter. Throughout the quarter the students will use the principles and tools presented in the class to develop and analyze an environmental problem as part of a simulated consulting exercise. Topics covered include contaminant transport, mineral dissolution/precipitation and aquifer microbiology. Prerequisites: Either EESS 221 (CEE 260C) or EESS 220 (CEE 260A) and either GES 90, 170, or 171, or permission from instructors.

**GES 237. Surface and Near-Surface Hydrologic Response. 3 Units.**

Quantitative review of process-based hydrology and geomorphology. Introduction to finite-difference and finite-element methods of numerical analysis. Topics: biometeorology, unsaturated and saturated subsurface fluid flow, overland and open channel flow, and physically-based simulation of coupled surface and near-surface hydrologic response. Links hydrogeology, soil physics, and surface water hydrology. Same as: CEE 260B.

**GES 238. Soil Physics. 3 Units.**

Physical properties of the soil solid phase emphasizing the transport, retention, and transformation of water, heat, gases, and solutes in the unsaturated subsurface. Field experiments.

**GES 240. Geostatistics. 2-3 Units.**

Geostatistical theory and practical methodologies for quantifying and simulating spatial and spatio-temporal patterns for the Earth Sciences. Real case development of models of spatial continuity, including variograms, Boolean models and training images. Estimation versus simulation of spatial patterns. Loss functions. Estimation by kriging, co-kriging with secondary data. Dealing with data on various scales. Unconditional and conditional Boolean simulation, sequential simulation for continuous and categorical variables. Multi-variate geostatistical simulation. Probabilistic and pattern-based approaches to multiple-point simulation. Trend, secondary variable, auxiliary variable and probability-type constraints. Quality control techniques on generated models. Workflows for practical geostatistical applications in mining, petroleum, hydrogeology, remote sensing and environmental sciences. prerequisites: Energy 160/260 or basic course in data analysis/statistics  
Same as: ENERGY 240.

**GES 246. Reservoir Characterization and Flow Modeling with Outcrop Data. 3 Units.**

Project addressing a reservoir management problem by studying an outcrop analog, constructing geostatistical reservoir models, and performing flow simulation. How to use outcrop observations in quantitative geological modeling and flow simulation. Relationships between disciplines. Weekend field trip.

Same as: ENERGY 146, ENERGY 246.

**GES 249. Petroleum Geochemistry in Environmental and Earth Science. 3 Units.**

How molecular fossils in crude oils, oil spills, refinery products, and human artifacts identify their age, origin, and environment of formation. The origin and habitat of petroleum, technology for its analysis, and parameters for interpretation, including: origins of molecular fossils; function, biosynthesis, and precursors; tectonic history related to the evolution of life, mass extinctions, and molecular fossils; petroleum refinery processes and the kinds of molecular fossils that survive; environmental pollution from natural and anthropogenic sources including how to identify genetic relationships among crude oil or oil spill samples; applications of molecular fossils to archaeology; worldwide petroleum systems through geologic time.

**GES 250. Sedimentation Mechanics. 3-4 Units.**

The mechanics of sediment transport and deposition and the origins of sedimentary structures and textures as applied to interpreting ancient rock sequences. Dimensional analysis, fluid flow, drag, boundary layers, open channel flow, particle settling, erosion, sediment transport, sediment gravity flows, soft sediment deformation, and fluid escape. Field trip required.

**GES 252. Sedimentary Petrography. 4 Units.**

Siliciclastic sediments and sedimentary rocks. Research in modern sedimentary mineralogy and petrography and the relationship between the composition and texture of sediments and their provenance, tectonic settings, and diagenetic histories. Topics vary yearly. Prerequisite: 151 or equivalent.

**GES 253. Petroleum Geology and Exploration. 3 Units.**

The origin and occurrence of hydrocarbons. Topics: thermal maturation history in hydrocarbon generation, significance of sedimentary and tectonic structural setting, principles of accumulation, and exploration techniques. Prerequisites: 110, 151. Recommended: GEOPHYS 223.

**GES 255. Basin and Petroleum System Modeling. 3 Units.**

For advanced undergraduates or graduate students. Students use stratigraphy, subsurface maps, and basic well log, lithologic, paleontologic, and geochemical data to construct 1-D, 2-D, and 3-D models of petroleum systems that predict the extent of source-rock thermal maturity, petroleum migration paths, and the volumes and compositions of accumulations through time (4-D). Recent software such as PetroMod designed to reconstruct basin geohistory. Recommended: 251 or 253.

**GES 256. Quantitative Methods in Paleobiology. 3 Units.**

Introduction to statistical methods relevant to the analysis of paleobiological data. Methods include principles of inference, linear and logistic regression, principal components analysis, time-series, and re-sampling methods. Paleobiological problems include assessment of spatial and temporal patterns in biodiversity, selectivity of extinction and origination, and evolutionary trends. Readings, examples, and problems from the primary literature. Term paper. Prerequisite: Previous course in paleobiology or permission of the instructor.

**GES 257. Clastic Sequence Stratigraphy. 3 Units.**

Sequence stratigraphy facilitates integration of all sources of geologic data, including seismic, log, core, and paleontological, into a time-stratigraphic model of sediment architecture. Tools applicable to regional and field scales. Emphasis is on practical applications and integration of seismic and well data to exploration and field reservoir problems. Examples from industry data; hands-on exercises.

**GES 259. Stratigraphic Architecture. 1 Unitss.**

The stratigraphic architecture of deposits associated with a spectrum of depositional environments, using outcrop and subsurface data. Participants read and discuss selected literature.

**GES 260. Laboratory Methods in Organic Geochemistry. 2-3 Units.**

Knowledge of components in geochemical mixtures to understand geological and environmental samples. The presence and relative abundance of these compounds provides information on the biological source, depositional environment, burial history, biodegradation, and toxicity of organic materials. Laboratory methods to detect and quantify components of these mixtures. Methods for separation and analysis of organic compounds in geologic samples: extraction, liquid chromatography, absorption by zeolites, gas chromatography and gas chromatography-mass spectrometry. Student samples considered as material for analysis. Prerequisite: GES 249 or consent of instructor.

**GES 261. Physics and Chemistry of Minerals and Mineral Surfaces. 4 Units.**

The concepts of symmetry and periodicity in crystals; the physical properties of crystals and their relationship to atomic-level structure; basic structure types; crystal chemistry and bonding in solids and their relative stability; the interaction of x-rays with solids and liquids (scattering and spectroscopy); structural variations in silicate glasses and liquids; UV-visible spectroscopy and the color of minerals; review of the mineralogy, crystal chemistry, and structures of selected rock-forming silicates and oxides; mineral surface and interface geochemistry.

**GES 262. Thermodynamics and Disorder in Minerals and Melts. 3 Units.**

The thermodynamic properties of crystalline, glassy, and molten silicates and oxides in light of microscopic information about short range structure and ordering. Measurements of bulk properties such as enthalpy, density, and their pressure and temperature derivatives, and structural determination by spectroscopies such as nuclear magnetic resonance and Mössbauer. Basic formulations for configurational entropy, heats of mixing in solid solutions, activities; and the energetics of exsolution, phase transitions, and nucleation. Quantitative models of silicate melt thermodynamics are related to atomic-scale views of structure. A general view of geothermometry and geobarometry. Prerequisites: introductory mineralogy and thermodynamics.

**GES 263. Introduction to Isotope Geochemistry. 3 Units.**

Stable, cosmogenic, and radiogenic isotopes; processes that govern isotopic variations. Application of isotopes to geologic, biologic, and hydrologic questions. Major isotopic systems and their applications. Simple modeling techniques used in isotope geochemistry.

Same as: GES 163.

**GES 264. Mathematical Modeling in Biogeochemistry. 3 Units.**

The basics of translating a conceptual model into a numerical model is presented. Emphasis on building models, box modeling, methods of solving models. Lab exercises draw from examples in biogeochemistry, including modeling global biogeochemical cycles, sediment biogeochemistry, and microbial processes.

**GES 267. Solution-Mineral Equilibria: Theory. 3 Units.**

Procedures for calculating and evaluating the thermodynamic properties of reversible and irreversible reactions among rock-forming minerals and aqueous solutions in geologic systems. Emphasis is on the generation and utility of phase diagrams depicting solution-mineral interaction relevant to phase relations associated with weathering diagenetic, hydrothermal, and metamorphic processes, and the prediction of temperature, pressure, and the chemical potential of thermodynamic components compatible with observed mineralogic phase relations in geologic outcrops. Individual research topics. Prerequisite: 171.

**GES 272. Biomineralization. 3 Units.**

The functional properties of many animal and plant skeletons are dependent largely on mineralization. The relationship between mineralization processes and adaptation for all the animal phyla is reviewed. The sedimentologic contribution of mineralized skeletons, especially in carbonate reefs and pelagic sedimentation is considered. Synthesis of organic matrix and the composite nature of many animal and plant skeletons, and their development and morphogenesis are described. The mechanisms of crystal nucleation and growth are considered. The macroevolutionary history of biomineralization, and mass extinctions and the diversification of well skeletonized groups in the geologic record are considered.

**GES 273. Isotope Geochemistry Seminar. 1-3 Units.**

Current topics including new analytical techniques, advances in isotopic measurements, and new isotopic approaches and systems.

**GES 275. Electron Probe Microanalytical Techniques. 2-3 Units.**

The practical and theoretical aspects of x-ray generation and detection, and the behavior of electron beams and x-rays in solids. The basic principles needed to quantitatively analyze chemically complex geological materials. Operation of the JEOL 733 electron microprobe and associated computer software for quantitatively analyzing materials. X-ray chemical mapping. Enrollment limited to 8.

**GES 276. Earth's Weathering Engine. 3 Units.**

The complex interactions between the chemical, biological, hydrologic and tectonic process that control the chemical and isotopic flux of material to the oceans, and ultimately the long-term composition of both the atmosphere and the hydrosphere. Through a literature review and discussions students will identify key outstanding questions regarding global chemical weathering fluxes. Through data collection, data analysis, and application of appropriate modeling tools students will produce novel analyses and conclusions regarding the operation of the Earth's weathering engine. Permission of instructor required.

**GES 277. Flood Basalts and Mass Extinctions. 3 Units.**

Recent work in geochronology and paleobiology supports the temporal coincidence of the eruption of continental flood basalts with mass extinction in the marine and terrestrial realms. The mechanisms and timescale of flood basalt eruptions, their likely environmental and biological consequences, and the evidence for flood basalt eruptions as the triggers of many mass extinction events. Sources include recent primary literature.

**GES 281. Principles of  $^{40}\text{Ar}/^{39}\text{Ar}$  Thermochronometry. 3-4 Units.**

The  $^{40}\text{Ar}/^{39}\text{Ar}$  method is based upon the K-Ar decay scheme and allows high precision geochronology and thermochronology to be performed with K-bearing minerals. Provides a detailed exploration of the method including all practical considerations and laboratory procedures for standardization and instrument calibration. A laboratory component allows practical experience in making measurements and interpreting results.

**GES 282. Interpretative Methods in Detrital Geochronology. 1-5 Units.**

Over the past decade, the number of studies that make use of isotopic provenance data has sky-rocketed. This type of data is now routinely used throughout the geosciences to solve a broad range of geologic problems. This seminar examines the state-of-the-art of existing interpretative methods for detrital geo/thermochronology data in provenance studies and critically examines their strengths and weaknesses. While this course will touch upon sampling approaches analytical aspects of data collection, focus is primarily upon data interpretation.

**GES 283. Thermochronology and Crustal Evolution. 4 Units.**

Thermochronology analyzes the competition between radioactive in-growth and temperature-dependant loss of radiogenic isotopes within radioactive mineral hosts in terms of temperature-time history. Coupled with quantitative understanding of kinetic phenomena and crustal- or landscape-scale interpretational models, thermochronology provides an important source of data for the Earth Sciences, notably tectonics, geomorphology, and petrogenesis. Focus on recent developments in thermochronology, specifically analytical and interpretative innovations developed over the past decade. Integrates the latest thermochronology techniques with field work in a small-scale research project focused upon crustal evolution.

**GES 284. Field Seminar on Eastern Sierran Volcanism. 1 Unit.**

For graduate students in the earth sciences and archaeology. Four-day trip over Memorial Day weekend to study silicic and mafic volcanism in the eastern Sierra Nevada: basaltic lavas and cinder cones erupted along normal faults bounding Owens Valley, Long Valley caldera, postcaldera rhyolite lavas, hydrothermal alteration and hot springs, Holocene rhyolite lavas of the Inyo and Mono craters, subaqueous basaltic and silicic eruptions of Mono Basin, floating pumice blocks. If snow-level permits, silicic volcanism associated with the Bodie gold district. Recommended: 1 or equivalent.

**GES 285. Igneous Petrogenesis of the Continents. 2-4 Units.**

Radiogenic isotopes, stable isotopes, and trace elements applied to igneous processes; interaction of magmas with mantle and crust; convergent-margin magmatism; magmatism in extensional terrains; origins of rhyolites; residence times of magmas and magma chamber processes; granites as imperfect mirrors of their source regions; trace element modeling of igneous processes; trace element discriminant diagrams in tectonic analysis; phase equilibria of partial melting of mantle and crust; geothermometry and geobarometry. Topics emphasize student interest. Prerequisite: 180 or equivalent.

**GES 290. Departmental Seminar in Geological and Environmental Sciences. 1 Unitss.**

Current research topics. Presentations by guest speakers from Stanford and elsewhere. May be repeated for credit.

**GES 291. GES Field Trips. 1 Unitss.**

Field trips for teaching and research purposes. Trips average 5-10 days. Prerequisite: consent of instructor.

**GES 292. Directed Reading with Geological and Environmental Sciences Faculty. 1-10 Units.**

May be repeated for credit.

**GES 299. Field Research. 2-4 Units.**

Two-three week field research projects. Written report required. May be repeated three times.

**GES 310. Climate Change, Climate Variability, and Landscape Development. 1 Unitss.**

The impact of long-term climate change on erosional processes and the evolution of Cenozoic landscapes. Climate data that highlight recurring climate variability on inter-annual to decadal timescales. The behavior of climate on multi-decadal to tectonic timescales over which significant changes in topography take place. The effects of climate change and variability on landscape development, sedimentary environments, and the deposits of these events. May be repeated for credit.

**GES 311. Interpretation of Tectonically Active Landscapes. 3 Units.**

Focuses on interpreting various topographic attributes in terms of horizontal and vertical tectonic motions. Topics include identification, mapping, and dating of geomorphic markers, deducing tectonic motions from spatial changes in landscape steepness, understanding processes that give rise to different landscape elements, interrogating the role of climate and lithology in producing these landscape elements, and understanding relationships between tectonic motions, surface topography, and the spatial distribution of erosion. Consists of two one hour lectures per week and one laboratory section that help students gain proficiency in Quaternary mapping and interpretation of topographic metrics.

**GES 315. Literature of Structural Geology. 1 Unitss.**

Classic studies and current journal articles. May be repeated for credit.

**GES 325. The Evolution of Body Size. 2 Units.**

Preference to graduate students and upper-division undergraduates in GES and Biology. The influence of organism size on evolutionary and ecological patterns and processes. Focus is on integration of theoretical principles, observations of living organisms, and data from the fossil record. What are the physiological and ecological correlates of body size? Is there an optimum size? Do organisms tend to evolve to larger size? Does productivity control the size distribution of consumers? Does size affect the likelihood of extinction or speciation? How does size scale from the genome to the phenotype? How is metabolic rate involved in evolution of body size? What is the influence of geographic area on maximum body size?

Same as: BIO 325.

**GES 328. Seminar in Paleobiology. 1 Unitss.**

For graduate students. Current research topics including paleobotany, vertebrate and invertebrate evolution, paleoecology, and major events in the history of life on Earth.

**GES 336. Stanford Alpine Project Seminar. 1 Unitss.**

Seminar on the geology of the Himalaya, Tibetan plateau, and India. Weekly student presentations on continental collision tectonics, structure, petrology, geomorphology, culture, and other topics of interest. Students create a guidebook of geologic stops in advance of field trip to northwestern India in summer 2011. May be repeated for credit.

**GES 340. Seminar on the Earth's Interior. 1 Unitss.**

Seminar to review and discuss current research in mineral physics, seismology, geochemistry and geodynamics on understanding the distribution, form, and role of volatiles in Earth's mantle.

**GES 355. Advanced Stratigraphy Seminar and Field Course. 1-3 Units.**

Student-led presentations; poster-sized display on assigned topic; field trip.

**GES 381. Igneous Petrology and Petrogenesis Seminar. 1-2 Units.**

Topics vary by quarter. May be repeated for credit.

**GES 384. Volcanology Seminar. 1-2 Units.**

Specialized and advanced topics vary by offering. May be repeated for credit.

**GES 385. Practical Experience in the Geosciences. 1 Unitss.**

On-the-job training in the geosciences. May include summer internship; emphasizes training in applied aspects of the geosciences, and technical, organizational, and communication dimensions. Meets USCIS requirements for F-1 curricular practical training. (Staff).

**GES 399. Advanced Projects. 1-10 Units.**

Graduate research projects that lead to reports, papers, or other products during the quarter taken. On registration, students designate faculty member and agreed-upon units.

**GES 400. Graduate Research. 1-15 Units.**

Faculty supervision. On registration, students designate faculty member and agreed-upon units.

**GES 801. TGR Project. 0 Unit.****GES 802. TGR Dissertation. 0 Unit.**

## Geophysics Courses

**GEOPHYS 20Q. Predicting Volcanic Eruptions. 3 Units.**

Preference to sophomores. The physics and chemistry of volcanic processes and modern methods of volcano monitoring. Volcanoes as manifestations of the Earth's internal energy and hazards to society. How earth scientists better forecast eruptive activity by monitoring seismic activity, bulging of the ground surface, and the discharge of volcanic gases, and by studying deposits from past eruptions. Focus is on the interface between scientists and policy makers and the challenges of decision making with incomplete information. Field trip to Mt. St. Helens, site of the 1980 eruption.

**GEOPHYS 50N. Planetary Habitability, World View, and Sustainability. 3 Units.**

Sustainability lessons from the geological past Life on Earth has partially perished in sudden mass extinctions several time over the Earth's history. Threats include actions of our own volition, including fossil fuel burning as well as natural events, including the impact of large asteroids. The end Permian 250 million years ago and end Paleocene 55 million years ago extinctions involved natural burning of fossil fuels. The 65 million year ago end Cretaceous extinction involved the impact of and asteroid and possibly fossil fuel burning. Related sustainability topics in the popular press will be discussed as they arise. Student pairs lead discussions on topics on how humanity might avert these catastrophes. Offered occasionally. Next session - Spring 2013.

**GEOPHYS 60N. Man versus Nature: Coping with Disasters Using Space Technology. 4 Units.**

Preference to freshman. Natural hazards, earthquakes, volcanoes, floods, hurricanes, and fires, and how they affect people and society; great disasters such as asteroid impacts that periodically obliterate many species of life. Scientific issues, political and social consequences, costs of disaster mitigation, and how scientific knowledge affects policy. How spaceborne imaging technology makes it possible to respond quickly and mitigate consequences; how it is applied to natural disasters; and remote sensing data manipulation and analysis. GER:DB-EngrAppSci  
Same as: EE 60N.

**GEOPHYS 100. Directed Reading. 1-2 Units.**  
(Staff).**GEOPHYS 104. The Water Course. 3 Units.**

The pathway that water takes from rainfall to the tap using student home towns as an example. How the geological environment controls the quantity and quality of water; taste tests of water from around the world. Current U.S. and world water supply issues. Offered occasionally.  
Same as: EARTHSYS 104.

**GEOPHYS 110. Earth on the Edge: Introduction to Geophysics. 3 Units.**

Introduction to the foundations of contemporary geophysics. Topics drawn from four broad themes in: whole Earth geodynamics, geohazards, natural resources, and environment/sustainability. In each case the focus is on how the interpretation of a variety of geophysical measurements (e.g., gravity, seismology, heat flow, magnetism, electromagnetics, and geodesy) can be used to provide fundamental insight into the behavior of the Earth's complex geosystems. Prerequisite: CME 100 or MATH 51, or co-registration in either. Offered every year, autumn quarter.

**GEOPHYS 112. Exploring Geosciences with MATLAB. 1-3 Units.**

How to use MATLAB as a tool for research and technical computing, including 2-D and 3-D visualization features, numerical capabilities, and toolboxes. Practical skills in areas such as data analysis, regressions, optimization, spectral analysis, differential equations, image analysis, computational statistics, and Monte Carlo simulations. Emphasis is on scientific and engineering applications. Offered every year, autumn quarter.

**GEOPHYS 113. Earthquakes and Volcanoes. 3 Units.**

Earthquake location, magnitude and intensity scales, seismic waves, styles of eruptions and volcanic hazards, tsunami waves, types and global distribution of volcanoes, volcano forecasting. Plate tectonics as a framework for understanding earthquake and volcanic processes. Forecasting; earthquake resistant design; building codes; and probabilistic hazard assessment. For non-majors and potential earth scientists. Offered every year, spring quarter.  
Same as: EARTHSYS 113.

**GEOPHYS 120. Ice, Water, Fire. 3-5 Units.**

Introductory application of continuum mechanics to ice sheets and glaciers, water waves and tsunamis, and volcanoes. Emphasis on physical processes and mathematical description using balance of mass and momentum, combined with constitutive equations for fluids and solids. Designed for undergraduates with no prior geophysics background; also appropriate for beginning graduate students. Prerequisites: CME 100 or MATH 52 and PHYSICS 41 (or equivalent). Offered every year, winter quarter.  
Same as: GEOPHYS 220.

**GEOPHYS 130. Introductory Seismology. 3 Units.**

Introduction to seismology including: elasticity and the wave equation, P, S, and surface waves, dispersion, ray theory, reflection and transmission of seismic waves, seismic imaging, large-scale Earth structure, earthquake location, earthquake statistics and forecasting, magnitude scales, seismic source theory. Offered every year, Autumn quarter. (Beroza, G).

**GEOPHYS 146A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.  
Same as: EARTHSYS 146A, EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 246A.

**GEOPHYS 146B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. This course will give an overview of the structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic Circumpolar Current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A or EESS 246A, or CEE 164 or CEE 262D, or consent of instructor.  
Same as: EARTHSYS 146B, EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 246B.

**GEOPHYS 150. Geodynamics: Our Dynamic Earth. 3 Units.**

In this course we cover the dynamic forces acting upon the Earth. We will investigate how geophysical forces effect the bending of tectonic plates, the flow of heat, sea level topography, the breaking point of rocks, porous flow, and how faults store and release energy. Math 52 or CME 102, GP 107 or permission from instructor. Offered every year, spring quarter.

**GEOPHYS 160. Introduction to SES Computing. 2-3 Units.**

For beginning undergraduates and graduate students in the School of Earth Sciences. Computer concepts. What are computers and networks, and how do they work? Web page authoring. Introduction to scientific programming. Free computing tools for plotting data. Computer resources available to students in the school. An online repository of source codes useful for and developed by SES students, faculty, and staff. Specialists from around the school provide practical instruction and concrete examples of how to achieve basic computing needs. 2 units requires a class project: code development to be uploaded to the course's code repository. Offered every year, autumn quarter.  
Same as: ISESC.

**GEOPHYS 162. Laboratory Methods in Geophysics. 2-3 Units.**

Lab. Types of equipment used in experimental rock physics. Principles and measurements of geophysical properties such as porosity, permeability, acoustic wave velocity, and resistivity through lectures and laboratory experiments. Training in analytical project writing skills and understanding errors for assessing accuracy and variability of measured data. Students may investigate a scientific problem to support their own research. Offered every other year, spring quarter.

**GEOPHYS 170. Global Tectonics. 3 Units.**

The architecture of the Earth's crust; regional assembling of structural or deformational features and their relationship, origin and evolution. The plate-tectonic cycle: rifting, passive margins, sea-floor spreading, subduction zones, and collisions. Case studies.

**GEOPHYS 171. Tectonics Field Trip. 1-3 Units.**

Long weekend field trip to examine large-scale features in the crust. Destinations may include the San Andreas fault, Mendocino Triple Junction, Sierra Nevada, and western Basin and Range province.

**GEOPHYS 181. Fluids and Flow in the Earth: Computational Methods. 3 Units.**

Interdisciplinary problems involving the state and movement of fluids in crustal systems, and computational methods to model these processes. Examples of processes include: nonlinear, time-dependent flow in porous rocks; coupling in porous rocks between fluid flow, stress, deformation, and heat and chemical transport; percolation of partial melt; diagenetic processes; pressure solution and the formation of stylolites; and transient pore pressure in fault zones. MATLAB, Lattice-Boltzmann, and COMSOL Multiphysics. Term project. No experience with COMSOL Multiphysics required. Offered every other year, winter quarter. Same as: GEOPHYS 200.

**GEOPHYS 182. Reflection Seismology. 3 Units.**

The principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration. Same as: GEOPHYS 222.

**GEOPHYS 183. Reflection Seismology Interpretation. 1-4 Units.**

The structural and stratigraphic interpretation of seismic reflection data, emphasizing hydrocarbon traps in two and three dimensions on industry data, including workstation-based interpretation. Lectures only, 1 unit. Prerequisite: 222, or consent of instructor. Same as: GEOPHYS 223.

**GEOPHYS 184. Journey to the Center of the Earth. 3 Units.**

The interconnected set of dynamic systems that make up the Earth. Focus is on fundamental geophysical observations of the Earth and the laboratory experiments to understand and interpret them. What earthquakes, volcanoes, gravity, magnetic fields, and rocks reveal about the Earth's formation and evolution. Offered every other year, winter quarter. Same as: GEOPHYS 274, GES 107, GES 207.

**GEOPHYS 185. Rock Physics for Reservoir Characterization. 3 Units.**

How to integrate well log and laboratory data to determine and theoretically generalize rock physics transforms between sediment wave properties (acoustic and elastic impedance), bulk properties (porosity, lithology, texture, permeability), and pore fluid conditions (pore fluid and pore pressure). These transforms are used in seismic interpretation for reservoir properties, and seismic forward modeling in what-if scenarios. Offered every other year, spring quarter. Same as: GEOPHYS 260.

**GEOPHYS 186. Tectonophysics. 3 Units.**

The physics of faulting and plate tectonics. Topics: plate driving forces, lithospheric rheology, crustal faulting, and the state of stress in the lithosphere. Exercises: lithospheric temperature and strength profiles, calculation of seismic strain from summation of earthquake moment tensors, slip on faults in 3D, and stress triggering and inversion of stress from earthquake focal mechanisms. Offered every other year, winter quarter.

Same as: GEOPHYS 290.

**GEOPHYS 187. Environmental Soundings Image Estimation. 3 Units.**

Imaging principles exemplified by means of imaging geophysical data of various uncomplicated types (bathymetry, altimetry, velocity, reflectivity). Adjoints, back projection, conjugate-gradient inversion, preconditioning, multidimensional autoregression and spectral factorization, the helical coordinate, and object-based programming. Common recurring issues such as limited aperture, missing data, signal/noise segregation, and nonstationary spectra. See <http://sep.stanford.edu/sep/prof/>. Offered every year, autumn quarter.

Same as: GEOPHYS 211.

**GEOPHYS 190. Near-Surface Geophysics. 3 Units.**

Introduction to the integration of geophysical field measurements and laboratory measurements for imaging and characterizing the top 100 meters of Earth. Examples will focus on applications related to water resource management. The link between the measured geophysical properties of rocks, soils, and sediments, and their material properties. Forward modeling and inversion of geophysical data sets. Each week includes two hours of lectures; plus one two-hour lab that involves acquisition of field or lab data, or computer modeling/analysis of data. Pre-requisite: CME 100 or Math 51, or co-registration in either. Offered every year, spring quarter.

**GEOPHYS 196. Undergraduate Research in Geophysics. 1-10 Units.**

Field-, lab-, or computer-based. Faculty supervision. Written reports.

**GEOPHYS 197. Senior Thesis in Geophysics. 3-5 Units.**

For seniors writing a thesis based on Geophysics research in 196 or as a summer research fellow.

**GEOPHYS 198. Honors Program. 1-3 Units.**

Experimental, observational, or theoretical honors project and thesis in geophysics under supervision of a faculty member. Students who elect to do an honors thesis should begin planning it no later than Winter Quarter of the junior year. Prerequisites: department approval.

**GEOPHYS 199. Senior Seminar: Issues in Earth Sciences. 3 Units.**

Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review. Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review. Enroll in GES 150.

Same as: GES 150,.

**GEOPHYS 199. Senior Seminar: Issues in Earth Sciences. 3 Units.**

Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review. Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review. Enroll in GES 150.

Same as: GES 150,.

**GEOPHYS 200. Fluids and Flow in the Earth: Computational Methods. 3 Units.**

Interdisciplinary problems involving the state and movement of fluids in crustal systems, and computational methods to model these processes. Examples of processes include: nonlinear, time-dependent flow in porous rocks; coupling in porous rocks between fluid flow, stress, deformation, and heat and chemical transport; percolation of partial melt; diagenetic processes; pressure solution and the formation of stylolites; and transient pore pressure in fault zones. MATLAB, Lattice-Boltzmann, and COMSOL Multiphysics. Term project. No experience with COMSOL Multiphysics required. Offered every other year, winter quarter.  
Same as: GEOPHYS 181.

**GEOPHYS 201. Frontiers of Geophysical Research at Stanford: Faculty Lectures. 1 Unitss.**

Required for new students entering the department. Second-year and other graduate students may attend either for credit or as auditors. Department faculty and senior research staff introduce the frontiers of research problems and methods being employed or developed in the department and unique to department faculty and students: what the current research is, why the research is important, what methodologies and technologies are being used, and what the potential impact of the results might be. Offered every year, autumn quarter.

**GEOPHYS 202. Reservoir Geomechanics. 3 Units.**

Basic principles of rock mechanics and the state of stress and pore pressure in sedimentary basins related to exploitation of hydrocarbon and geothermal reservoirs. Mechanisms of hydrocarbon migration, exploitation of fractured reservoirs, reservoir compaction and subsidence, hydraulic fracturing, utilization of directional and horizontal drilling to optimize well stability. Offered every other year, winter quarter.

**GEOPHYS 204. Spectral Finite Element Method (SPECFEM) Seismograms. 3 Units.**

This is a short course intended for graduate students, but senior level undergraduate students are welcome. The course will cover spectral finite element methods for generating synthetic seismograms. The course will emphasize application over theory, such that students will be able to generate synthetic seismograms by the end of the course. We will employ the SPECFEM code suite on the Center for Computational Earth and Environmental Science (CEES) cluster to generate synthetic seismograms. Bring your laptop to class! Pre-requisite: A working knowledge of differential equations, matrix algebra, unix/linux, and earthquake seismology.

**GEOPHYS 210. Basic Earth Imaging. 3-4 Units.**

Echo seismogram recording geometry, head waves, moveout, velocity estimation, making images of complex shaped reflectors, migration by Fourier and integral methods. Anti-aliasing. Dip moveout. Computer labs. See <http://sep.stanford.edu/sep/prof/>. Offered every year, autumn quarter.

**GEOPHYS 211. Environmental Soundings Image Estimation. 3 Units.**

Imaging principles exemplified by means of imaging geophysical data of various uncomplicated types (bathymetry, altimetry, velocity, reflectivity). Adjoints, back projection, conjugate-gradient inversion, preconditioning, multidimensional autoregression and spectral factorization, the helical coordinate, and object-based programming. Common recurring issues such as limited aperture, missing data, signal/noise segregation, and nonstationary spectra. See <http://sep.stanford.edu/sep/prof/>. Offered every year, autumn quarter.  
Same as: GEOPHYS 187.

**GEOPHYS 220. Ice, Water, Fire. 3-5 Units.**

Introductory application of continuum mechanics to ice sheets and glaciers, water waves and tsunamis, and volcanoes. Emphasis on physical processes and mathematical description using balance of mass and momentum, combined with constitutive equations for fluids and solids. Designed for undergraduates with no prior geophysics background; also appropriate for beginning graduate students. Prerequisites: CME 100 or MATH 52 and PHYSICS 41 (or equivalent). Offered every year, winter quarter.  
Same as: GEOPHYS 120.

**GEOPHYS 222. Reflection Seismology. 3 Units.**

The principles of seismic reflection profiling, focusing on methods of seismic data acquisition and seismic data processing for hydrocarbon exploration.  
Same as: GEOPHYS 182.

**GEOPHYS 224. Seismic Reflection Processing. 2 Units.**

Workshop in computer processing of seismic reflection data. Students individually process a commercial seismic reflection profile from field tapes to migrated stack, using interactive software on a workstation. Prerequisite: consent of instructor.

**GEOPHYS 240. Borehole Seismic Modeling and Imaging. 3 Units.**

Seismic imaging between boreholes for applications to subsurface characterization, reservoir imaging, and reservoir monitoring. Topics include data acquisition, data analysis, data processing and imaging. Inversion models for transmitted, reflected, and diffracted waves for imaging velocity, attenuation, and anisotropy in heterogeneous media. Use of field datasets and field applications. Prerequisites: 160 or equivalent; familiarity with Matlab or other programming language. Offered every other year, spring quarter.

**GEOPHYS 241A. Seismic Reservoir Characterization. 3-4 Units.**

(Same as GP241) Practical methods for quantitative characterization and uncertainty assessment of subsurface reservoir models integrating well-log and seismic data. Multidisciplinary combination of rock-physics, seismic attributes, sedimentological information and spatial statistical modeling techniques. Student teams build reservoir models using limited well data and seismic attributes typically available in practice, comparing alternative approaches. Software provided (SGEMS, Petrel, Matlab). Recommended: ERE240/260, or GP222/223, or GP260/262 or GES253/257; ERE246, GP112  
Same as: ENERGY 141, ENERGY 241.

**GEOPHYS 246A. Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.  
Same as: EARTHSYS 146A, EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 146A.

**GEOPHYS 246B. Atmosphere, Ocean, and Climate Dynamics: the Ocean Circulation. 3 Units.**

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the large-scale ocean circulation. This course will give an overview of the structure and dynamics of the major ocean current systems that contribute to the meridional overturning circulation, the transport of heat, salt, and biogeochemical tracers, and the regulation of climate. Topics include the tropical ocean circulation, the wind-driven gyres and western boundary currents, the thermohaline circulation, the Antarctic Circumpolar Current, water mass formation, atmosphere-ocean coupling, and climate variability. Prerequisites: EESS 146A or EESS 246A, or CEE 164 or CEE 262D, or consent of instructor. Same as: EARTHSYS 146B, EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 146B.

**GEOPHYS 251. Structural Geology and Rock Mechanics. 4 Units.**

Quantitative field and laboratory data integrated with solutions to boundary value problems of continuum mechanics to understand tectonic processes in Earth's crust that lead to the development of geological structures including folds, faults, fractures and fabrics. Topics include: techniques and tools for structural mapping; differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; traction and stress analysis, conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties; brittle deformation including fracture and faulting; model development and methodology. Data sets analyzed using MATLAB. Prerequisites: GES 1, MATH 53, MATLAB or equivalent. Same as: CEE 297R, GES 215.

**GEOPHYS 255. Report on Energy Industry Training. 1-3 Units.**

On-the-job-training for master's and doctoral degree students under the guidance of on-site supervisors. Students submit a report detailing work activities, problems, assignment, and key results. May be repeated for credit. Prerequisite: written consent of adviser.

**GEOPHYS 257. Introduction to Computational Earth Sciences. 2-4 Units.**

Techniques for mapping numerically intensive algorithms to modern high performance computers such as the Center for Computational Earth and Environmental Science's (CEES) high productivity technical computing (HPTC). Topics include: debugging, performance analysis, and concepts of parallel programming; efficient serial and parallel programs; OpenMP; and MPI. Exercises using SMP and cluster computers. See <http://pangea.stanford.edu/research/cees/>. Recommended: familiarity with MATLAB, C, or Fortran. May be repeated for credit. Offered every other year, winter quarter.

**GEOPHYS 258. Applied Optimization Laboratory (Geophys 258). 3-4 Units.**

Application of optimization and estimation methods to the analysis and modeling of large observational data sets. Laboratory exercises using inverse theory and applied linear algebra to solve problems of indirect and noisy measurements. Emphasis on practical solution of scientific and engineering problems, especially those requiring large amounts of data, on digital computers using scientific languages. Also addresses advantages of large-scale computing, including hardware architectures, input/output and data bus bandwidth, programming efficiency, parallel programming techniques. Student projects involve analyzing real data by implementing observational systems such as tomography for medical and Earth observation uses, radar and matched filtering, multispectral/multitemporal studies, or migration processing. Prerequisites: Programming with high level language. Recommended: EE261, EE263, EE178/278A, ME300 or equivalent. Same as: EE 257.

**GEOPHYS 260. Rock Physics for Reservoir Characterization. 3 Units.**

How to integrate well log and laboratory data to determine and theoretically generalize rock physics transforms between sediment wave properties (acoustic and elastic impedance), bulk properties (porosity, lithology, texture, permeability), and pore fluid conditions (pore fluid and pore pressure). These transforms are used in seismic interpretation for reservoir properties, and seismic forward modeling in what-if scenarios. Offered every other year, spring quarter. Same as: GEOPHYS 185.

**GEOPHYS 270. Electromagnetic Properties of Geological Materials. 2-3 Units.**

Laboratory observations and theoretical modeling of the electromagnetic properties and nuclear magnetic resonance response of geological material. Relationships between these properties and water-saturated materials properties such as composition, water content, surface area, and permeability. Offered occasionally.

**GEOPHYS 280. 3-D Seismic Imaging. 2-3 Units.**

The principles of imaging complex structures in the Earth subsurface using 3-D reflection seismology. Emphasis is on processing methodologies and algorithms, with examples of applications to field data. Topics: acquisition geometries of land and marine 3-D seismic surveys, time vs. depth imaging, migration by Kirchhoff methods and by wave-equation methods, migration velocity analysis, velocity model building, imaging irregularly sampled and aliased data. Computational labs involve some programming. Lab for 3 units. Offered every year, winter quarter.

**GEOPHYS 281. Geophysical Inverse Problems. 3 Units.**

Concepts of inverse theory, with application to geophysics. Inverses with discrete and continuous models, generalized matrix inverses, resolving kernels, regularization, use of prior information, singular value decomposition, nonlinear inverse problems, back-projection techniques, and linear programming. Application to seismic tomography, earthquake location, migration, and fault-slip estimation. Prerequisite: MATH 103. Offered every other year, autumn quarter.

**GEOPHYS 284. Hydrogeophysics. 3 Units.**

The use of geophysical methods for imaging and characterizing the top 100 meters of Earth for hydrogeologic applications. Includes material properties, forward modeling, data acquisition, inversion, and integration with other forms of measurement. Each week includes three hours of lectures; plus one three-hour lab that involves acquisition of data at campus or nearby sites, or computer modeling of data. Offered occasionally.

**GEOPHYS 286. Global Seismology. 3 Units.**

This course investigates how waves propagate through the whole Earth. This course examines the questions "How do body waves and surface waves behave within the Earth?" and "What does that tell us about the Earth?" The course delves into both theory and how we apply that theory to understand seismic observations. Requirements: Math 52 or CME 102, GP130 or permission from instructor.

**GEOPHYS 287. Earthquake Seismology. 3-5 Units.**

Seismic wave propagation in layered media, ray theory, Green's functions, seismic moment tensors, representation theorem, finite-source effects, kinematics and dynamics of earthquakes, and engineering aspects of seismology. Prerequisites: GEOPHYS 130 or equivalent. Offered every other year, spring quarter.

**GEOPHYS 288A. Crustal Deformation. 3-5 Units.**

Earthquake and volcanic deformation, emphasizing analytical models that can be compared to data from GPS, InSAR, and strain meters. Deformation, stress, and conservation laws. Dislocation models of strike slip and dip slip faults, in 2 and 3 dimensions. Crack models, including boundary element methods. Dislocations in layered and elastically heterogeneous earth models. Models of volcano deformation, including sills, dikes, and magma chambers. Offered every other year, autumn quarter.

**GEOPHYS 288B. Crustal Deformation. 3-5 Units.**

Earthquake and volcanic deformation, emphasizing analytical models that can be compared to data from GPS, InSAR, and strain meters. Viscoelasticity, post-seismic rebound, and viscoelastic magma chambers. Effects of surface topography and earth curvature on surface deformation. Gravity changes induced by deformation and elastogravitational coupling. Poro-elasticity, coupled fluid flow and deformation. Earthquake nucleation and rate-state friction. Models of earthquake cycle at plate boundaries. Offered every other year, winter quarter.

**GEOPHYS 290. Tectonophysics. 3 Units.**

The physics of faulting and plate tectonics. Topics: plate driving forces, lithospheric rheology, crustal faulting, and the state of stress in the lithosphere. Exercises: lithospheric temperature and strength profiles, calculation of seismic strain from summation of earthquake moment tensors, slip on faults in 3D, and stress triggering and inversion of stress from earthquake focal mechanisms. Offered every other year, winter quarter.

Same as: GEOPHYS 186.

**GEOPHYS 385A. Reflection Seismology. 1-5 Units.**

Research in reflection seismology and petroleum prospecting. May be repeated for credit.

**GEOPHYS 385B. Environmental Geophysics. 1-5 Units.**

Research on the use of geophysical methods for near-surface environmental problems. May be repeated for credit.

**GEOPHYS 385D. Theoretical Geophysics. 1-5 Units.**

Research on physics and mechanics of earthquakes, volcanoes, ice sheets, and glaciers. Emphasis is on developing theoretical understanding of processes governing natural phenomena.

**GEOPHYS 385E. Tectonics. 1-5 Units.**

Research on the origin, major structures, and tectonic processes of the Earth's crust. Emphasis is on use of deep seismic reflection and refraction data. May be repeated for credit.

**GEOPHYS 385J. Global Seismic Techniques, Theory, and Application. 1-5 Units.**

Topics chosen from surface wave dispersion measurement, 1D inversion techniques, regional tomographic inversion, receiver functions, ray theory in spherical geometry, seismic attenuation, seismic anisotropy, seismic focusing, reflected phases, stacking, and interpretations of seismic results in light of other geophysical constraints. May be repeated for credit.

**GEOPHYS 385K. Crustal Mechanics. 1-5 Units.**

Research in areas of petrophysics, seismology, in situ stress, and subjects related to characterization of the physical properties of rock in situ. May be repeated for credit.

**GEOPHYS 385L. Earthquake Seismology, Deformation, and Stress. 1-5 Units.**

Research on seismic source processes, crustal stress, and deformation associated with faulting and volcanism. May be repeated for credit.

**GEOPHYS 385S. Wave Physics. 1-5 Units.**

Theory, numerical simulation, and experiments on seismic and electromagnetic waves in complex porous media. Applications from Earth imaging and in situ characterization of Earth properties, including subsurface monitoring. Presentations by faculty, research staff, students, and visitors. May be repeated for credit.

**GEOPHYS 385V. Poroelasticity. 1-5 Units.**

Research on the mechanical properties of porous rocks: dynamic problems of seismic velocity, dispersion, and attenuation; and quasi-static problems of faulting, fluid transport, crustal deformation, and loss of porosity. Participants define, investigate, and present an original problem of their own. May be repeated for credit.

**GEOPHYS 385Z. Radio Remote Sensing. 1-5 Units.**

Research applications, especially crustal deformation measurements. Recent instrumentation and system advancements. May be repeated for credit.

**GEOPHYS 400. Research in Geophysics. 1-15 Units.****GEOPHYS 801. TGR Project. 0 Unit.****GEOPHYS 802. TGR Dissertation. 0 Unit.**

## German General Courses

### German Literature Courses

**GERMAN 80N. Modern Conservatives. 4 Units.**

How do conservatives respond to the modern world? How do they find a balance between tradition and freedom, or between stability and change? This seminar will examine selections from some conservative and some classically liberal writers that address these questions. At the center of the course are thinkers who left Germany and Austria before the Second World War: Friedrich Hayek, Leo Strauss and Hannah Arendt. We will also look at earlier European writers, such as Edmund Burke and Friedrich Nietzsche, as well as some recent American thinkers. Taught in English.

**GERMAN 116. Writing About Germany: New Topics, New Genres. 3 Units.**

For Seniors who are declared German Studies majors. How to write about various topics in German Studies for a wide public through opinion pieces or blogs. Topics based on student interests: current politics, economics, European affairs, start-ups in Germany. Intensive focus on writing. Taught in English. Meets the Writing in the Major requirement.

**GERMAN 120Q. Contemporary Politics in Germany. 3 Units.**

Examination of political debates, politicians and parties in contemporary Germany with particular attention to the debate over the future of Europe. Looking closely at political discourse, from right to left, to understand how public discussion frames policy formation. At stake is the role Germany can play in the new Europe, against the background of its economic influence and its national past. Examination and analysis of public speeches by contemporary politicians such as Chancellor Angela Merkel and examples of debate from the Bundestag. Taught in German. Prerequisites: Some familiarity with German language.

**GERMAN 121N. Memory in the Modernist Novel. 3-4 Units.**

As early as the mid-19th century, the French poet Charles Baudelaire saw a new "art of memory" as a main characteristic of modernity. An exploration of the relationship between memory and modernism through an intensive reading of three major narrative texts: Rainer Maria Rilke's "The Notebooks of Malte Laurids Brigge," James Joyce's "A Portrait of the Artist as a Young Man," and Marcel Proust's "Combray." Taught in English.

**GERMAN 123. German Culture and Film. 3-5 Units.**

This course has two primary goals. First, it is designed to provide students with a visual and linguistic foundation for discussing and writing about German film from the Weimar period to the present. To that end we will review important genres, directors, and technological developments in the history of German film. Second, using film as a lens, we will examine several key moments in German cultural history from the 1920s to the present. Certain themes will reoccur throughout the course, including gender, the city, technology, violence, and social crisis. All materials and class discussion in German. (Meets Writing-in-the-Major requirement).



**GERMAN 124. Introduction to German Poetry. 4 Units.**

Introduction to the reading and interpretation of lyrical poetry in German from the 18th century to present. Readings include poems by Goethe, Holderlin, Brentano, Eichendorff, Heine, Rilke, Trakl, Celan, Brecht. Ways of thinking about and thinking with poetry. Attention to poetic form, voice, figural language, and the interaction of sensory registers. Taught in German.

**GERMAN 128N. Medicine, Modernism, and Mysticism in Thomas Mann's the Magic Mountain. 3 Units.**

Published in 1924, *The Magic Mountain* is a novel of education, tracing the intellectual growth of a budding engineer through a maze of intellectual encounters during a seven-year sojourn in a sanatorium set high in the Swiss Alps. It engages with the key themes of modernism: the relativity of time, the impact of psychoanalysis, the power of myth, and an extended dispute between an optimistic belief in progress and a pessimistic vision of human nature. Through its detailed discussion of disease (tuberculosis), this remarkable text connects the study of medicine to the humanities. There will be an exploration of this rich and profound novel both as a document of early twentieth-century Europe and as a commentary on the possibilities of education that are urgent for liberal arts education today. Taught in English.

**GERMAN 131. Intro to 18th Century German Literature: The Age of Reason, Feeling and Revolution. 3-5 Units.**

This course provides insight into the literature and cultural history of 18th century Germany with a special emphasis on the themes of identity and romantic love in the force field of tradition and change. Taught in German.

**GERMAN 132. Intro to Nineteenth-Century German Literature. 3-5 Units.**

Literary works in their historical and cultural contexts. Romanticism, responses to the French Revolution and the Napoleonic Wars, the rise of nationalism and the unification of Germany, the tension between science and religion, nihilism, social transformation. Authors include Tieck, Kleist, Buchner, Heine, Keller, Schnitzler. Taught in German. Prerequisites: Coursework on the German 120-level or equivalent.

**GERMAN 133. Twentieth Century and Contemporary Literature and Culture. 3-5 Units.**

This course is designed to provide students with a representative overview of German literature, film and music from World War I to the early twenty-first century. It draws on major texts from many of the twentieth century's great literary and artistic movements, from Expressionism and New Objectivity, via the Gruppe 47 to pop art and postmodernism. In keeping with German Studies Department's new pilot program, this course will be taught in English and in German - particular periods or literary or cultural movements will be discussed in English, while individual text will be discussed (and read) entirely in German. German language proficiency is therefore assumed, as is some familiarity with the rough outlines of German history in the 20th century.

**GERMAN 134. Freud's Vienna. 3-5 Units.**

An exploration of the intersections between literature, art, politics, psychoanalysis, and philosophy in turn of the century Vienna. Works by Hofmannsthal, Schnitzler, Bahr, Musil, Roth, Kraus, and Freud; shorter selections from Brentano, Herzl, Kraft-Ebbing, Loos, Mach, and Wittgenstein. Readings in German; discussion in English and German. (Replaces GERMAN 133 for 2012/13).

**GERMAN 181. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English. Same as: CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENCH 181, ITALIAN 181, PHIL 81, SLAVIC 181.

**GERMAN 182. War and Warfare in Germany. 3 Units.**

Survey of Germany at war through historical, theoretical and literary accounts. War in the international system and the role of technology. Religious wars, rationalization of warfare, violence and politics, terrorism. War films, such as *All Quiet on the Western Front*. Readings by authors such as Clausewitz, Jünger, Remarque, Schimtt, and Arendt. Taught in English.

**GERMAN 184. Technology, Innovation, and the History of the Book. 3-5 Units.**

An historical perspective on the intellectual and social impact of developments in information technology will be examined. Focusing on the evolution of media from scrolls to codices to printed books we will look at the social, historical, cultural, and economic sources and ramifications of innovation in media and information technology, and explore why such innovation occurs in certain places and within certain social groups and not others. Examples draw from German cultural history, e.g. Gutenberg and the printing press, but also from the broader European history of the book. Students will have the opportunity to work with historical materials from Special Collections. Taught in English.

**GERMAN 190. German Capstone: Reading Franz Kafka. 3-5 Units.**

This class will address major works by Franz Kafka and consider Kafka as a modernist writer whose work reflects on modernity. We will also examine the role of Kafka's themes and poetics in the work of contemporary writers. (Meets Writing-in-the-Major requirement)  
Same as: COMPLIT 111, COMPLIT 311C, GERMAN 390, JEWISHST 147, JEWISHST 349.

**GERMAN 199. Individual Work. 1-12 Units.**

Repeatable for Credit. Instructor Consent Required.

**GERMAN 210. Dionysus - Mythology and Poetry of a Nietzschean Inspiration. 3-5 Units.**

The Greek god Dionysus became, like Apollo, the symbol of poetic imagination. In the modern era he substituted the Apolline tradition, while Apollo assumed the characteristics of Dionysus. We will examine this central poctological motif in texts by authors including Euripides, Keats, Nietzsche, Pound, and Eliot. Open to advanced undergraduates. Taught in English.  
Same as: COMPLIT 256A, COMPLIT 356A, GERMAN 310.

**GERMAN 220. German Literature Pre 1700: Medieval and Early Modern German Literature. 3-5 Units.**

An overview of German literature from the Middle Ages to 1700. All materials will be available in the original and in modern German translation. Discussion in English. Open to graduate students and advanced undergrads.  
Same as: GERMAN 320.

**GERMAN 221. German Literature 1700-1900: From Enlightenment to Realism. 4 Units.**

Key topics in German literary culture from the Enlightenment to the revolutions of 1848. Readings may include texts by Lessing, Hamann, Herder, Goethe, the Jena Romantics, Kleist, Büchner, Heine, Droste-Hülshoff. Taught in German; graduate-level but open to undergraduates who have done coursework on or above the 130 level.  
Same as: GERMAN 321.

**GERMAN 222. German Literature and Thought from 1900 to the Present: Wrestling with Modernity. 3-5 Units.**

Masters of German 20th and 21st Century literature and philosophy as they present aesthetic innovation and confront the challenges of modern technology, social alienation, manmade catastrophes, and imagine the future. Readings include Nietzsche, Freud, Rilke, Musil, Brecht, Kafka, Doebelin, Benjamin, Juenger, Arendt, Musil, Mann, Adorno, Celan, Grass, Bachmann, Bernhardt, Wolf, and Kluge. Taught in English.  
Same as: COMPLIT 222A, GERMAN 322.

**GERMAN 234. The Bildungsroman and Other Biographical Fictions. 3-5 Units.**

Life hermeneutics practiced in the psychological novel, Bildungsroman, and autobiography. Intersections and contrasts among these genres. The origins of the notion of progress and its fictional translations; possibilities of historical and fictional closure; and the emergence of the novel's protagonist as a disciplinary subject. Authors include Augustine, Rousseau, Goethe, Moritz, and Keller. Taught in English.  
Same as: GERMAN 334.

**GERMAN 245. German Idealist and Romantic Aesthetics. 3-5 Units.**

Focus on influential theories of aesthetic experience as an autonomous cultural domain that supplements science and morality. How the discovery of beauty and sublimity in nature led to an unprecedented celebration of art as the highest form of human activity. The problem of the relation between aesthetic experience and conceptual understanding. Readings by Kant, Schiller, Friedrich Schlegel, Schelling, Hegel, and more recent responses to their works. Taught in English.

**GERMAN 250. Humanities Education in the Changing University. 3 Units.**

Advanced study in the humanities faces changes within fields, the university and the wider culture. Considers the debate over the status of the humanities with regard to historical genealogies and current innovations. Particular attention on changes in doctoral education. Topics include: origins of the research university; disciplines and specialization; liberal education in conflict with professionalization; literature and literacy education; interdisciplinarity as a challenge to departments; education policy; digital humanities; accountability in education, assessment and student-centered pedagogies.  
Same as: COMPLIT 275, DLCL 320.

**GERMAN 254. The Rhetoric of Futurity in German Literature Around 1800. 3-5 Units.**

An examination of the transformation of the discourse concerning the future in literary and philosophical texts, especially the assertion of differences among past, present and future periods. The relationship between a historical epistemology of knowledge about the future and a rhetorical analysis of speech acts. Texts include Kant's *Anthropology*, Jean Paul's *Conjectural Biography*, Schiller's *Wallenstein*, Goethe's *Hermann und Dorothea*, Schleiermacher's *Monologues* and Schlegel's *Athenaeum Fragments*. This course will be conducted in German.

**GERMAN 282. Martin Heidegger. 3-5 Units.**

Working through the most systematically important texts by Martin Heidegger and their historical moments and challenges, starting with *Being and Time* (1927), but emphasizing his philosophical production after World War II. The philological and historical understanding of the texts function as a condition for the laying open of their systematic provocations within our own (early 21st-century) situations. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature. Taught in English.  
Same as: COMPLIT 213A, COMPLIT 313A, GERMAN 382.

**GERMAN 291A. Oedipus, Hamlet, Moses: Archetypes of the Hero. 3-5 Units.**

Texts that provided psychoanalysis with its foundational myths. Oedipus, Moses, and Hamlet as archetypes of the hero related to moments of emerging modernity: from mythos to logos, polytheism to monotheism, and action to thought. The interplay among knowledge, recognition, and desire; the role of sameness and alterity in the constitution of personal, familial, and national identities; violence and the construction of history. Readings include: Exodus, Sophocles, Euripides, Shakespeare, Freud, Cavafy; theoretical essays by Laplanche, Lacan, Certeau, Kofman, Assmann, and Cavell. Taught in English.  
Same as: GERMAN 391A.

**GERMAN 298. Writing Workshop. 1-12 Units.**

Open only to German majors and to students working on special projects, including written reports for internships. Honors students use this number for the honors essay. May be repeated for credit.

**GERMAN 310. Dionysus - Mythology and Poetry of a Nietzschean Inspiration. 3-5 Units.**

The Greek god Dionysus became, like Apollo, the symbol of poetic imagination. In the modern era he substituted the Apolline tradition, while Apollo assumed the characteristics of Dionysus. We will examine this central poctological motif in texts by authors including Euripides, Keats, Nietzsche, Pound, and Eliot. Open to advanced undergraduates. Taught in English.  
Same as: COMPLIT 256A, COMPLIT 356A, GERMAN 210.

**GERMAN 320. German Literature Pre 1700: Medieval and Early Modern German Literature. 3-5 Units.**

An overview of German literature from the Middle Ages to 1700. All materials will be available in the original and in modern German translation. Discussion in English. Open to graduate students and advanced undergrads.  
Same as: GERMAN 220.

**GERMAN 321. German Literature 1700-1900: From Enlightenment to Realism. 4 Units.**

Key topics in German literary culture from the Enlightenment to the revolutions of 1848. Readings may include texts by Lessing, Hamann, Herder, Goethe, the Jena Romantics, Kleist, Büchner, Heine, Droste-Hülshoff. Taught in German; graduate-level but open to undergraduates who have done coursework on or above the 130 level.  
Same as: GERMAN 221.

**GERMAN 322. German Literature and Thought from 1900 to the Present: Wrestling with Modernity. 3-5 Units.**

Masters of German 20th and 21st Century literature and philosophy as they present aesthetic innovation and confront the challenges of modern technology, social alienation, manmade catastrophes, and imagine the future. Readings include Nietzsche, Freud, Rilke, Musil, Brecht, Kafka, Doebelin, Benjamin, Juenger, Arendt, Musil, Mann, Adorno, Celan, Grass, Bachmann, Bernhardt, Wolf, and Kluge. Taught in English.  
Same as: COMPLIT 222A, GERMAN 222.

**GERMAN 334. The Bildungsroman and Other Biographical Fictions. 3-5 Units.**

Life hermeneutics practiced in the psychological novel, Bildungsroman, and autobiography. Intersections and contrasts among these genres. The origins of the notion of progress and its fictional translations; possibilities of historical and fictional closure; and the emergence of the novel's protagonist as a disciplinary subject. Authors include Augustine, Rousseau, Goethe, Moritz, and Keller. Taught in English.  
Same as: GERMAN 234.

**GERMAN 369. Introduction to Graduate Studies: Criticism as Profession. 5 Units.**

A number of faculty will present published work and discuss their research and composition process. We will read critical, theoretical, and literary texts that address, in different ways, "What is a World?" Taught in English.  
Same as: COMPLIT 369, DLCL 369, FRENCH 369, ITALIAN 369.

**GERMAN 382. Martin Heidegger. 3-5 Units.**

Working through the most systematically important texts by Martin Heidegger and their historical moments and challenges, starting with *Being and Time* (1927), but emphasizing his philosophical production after World War II. The philological and historical understanding of the texts function as a condition for the laying open of their systematic provocations within our own (early 21st-century) situations. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature. Taught in English.  
Same as: COMPLIT 213A, COMPLIT 313A, GERMAN 282.

**GERMAN 390. German Capstone: Reading Franz Kafka. 3-5 Units.**

This class will address major works by Franz Kafka and consider Kafka as a modernist writer whose work reflects on modernity. We will also examine the role of Kafka's themes and poetics in the work of contemporary writers. (Meets Writing-in-the-Major requirement)  
Same as: COMPLIT 111, COMPLIT 311C, GERMAN 190, JEWISHST 147, JEWISHST 349.

**GERMAN 391A. Oedipus, Hamlet, Moses: Archetypes of the Hero. 3-5 Units.**

Texts that provided psychoanalysis with its foundational myths. Oedipus, Moses, and Hamlet as archetypes of the hero related to moments of emerging modernity: from mythos to logos, polytheism to monotheism, and action to thought. The interplay among knowledge, recognition, and desire; the role of sameness and alterity in the constitution of personal, familial, and national identities; violence and the construction of history. Readings include: Exodus, Sophocles, Euripides, Shakespeare, Freud, Cavafy; theoretical essays by Laplanche, Lacan, Certeau, Kofman, Assmann, and Cavell. Taught in English.  
Same as: GERMAN 291A.

**GERMAN 398. Dissertation Prospectus Colloquium. 1-12 Units.**

Repeatable for Credit.

**GERMAN 399. Individual Work. 1-12 Units.**

Repeatable for Credit. Instructor Consent Required.

**GERMAN 802. TGR Dissertation. 0 Unit.**

## German Language Courses

**GERLANG 1. First-Year German, First Quarter. 5 Units.**

Speaking, reading, writing, and listening. Authentic materials. Interactive approach with emphasis on developing communicative expression. The cultural context in which German is spoken.

**GERLANG 2. First-Year German, Second Quarter. 5 Units.**

Continuation of GERLANG 1. Speaking, reading, writing, and listening. Authentic materials. Interactive approach with emphasis on developing communicative expression. The cultural context in which German is spoken. Prerequisite: Placement Test, GERLANG 1 or consent of instructor.

**GERLANG 3. First-Year German, Third Quarter. 5 Units.**

Continuation of GERLANG 2. Speaking, reading, writing, and listening. Authentic materials. Interactive approach with emphasis on developing communicative expression. The cultural context in which German is spoken. Fulfills the University language requirement. Prerequisite: Placement Test, GERLANG 2 or consent of instructor.

**GERLANG 5A. Intensive First-Year German, Part A. 5 Units.**

Part A and Part B equivalent of 1,2,3 combined. Only Stanford graduate students restricted to 9 units may register for 205A,B.

**GERLANG 5B. Intensive First-Year German, Part B. 5 Units.**

Continuation of 5A. Part A and Part B equivalent of 1,2,3 combined. Only Stanford graduate students restricted to 9 units may register for 205A,B. Prerequisite 5A or equivalent. Fulfill the University Foreign Language Requirement.

**GERLANG 10. Elementary German for Seniors and Graduate Students. 4 Units.**

Intensive. For students who need to acquire reading ability in German for the Ph.D. or for advanced research in their own field. 250 fulfills Ph.D. reading exam.

**GERLANG 11P. Individually Programmed Beginning German. 1-12 Units.**

For those who wish to complete more or fewer than 5 units a quarter, have scheduling conflicts, or prefer to work independently. Self-paced work with text and tapes; instructor available for consultation on a regular basis. 3-unit minimum for beginners. Conversational practice available for additional unit. May be repeated for credit.

**GERLANG 20A. Beginning German Conversation. 1 Unitss. (AU).****GERLANG 20B. Intermediate German Conversation. 1 Unitss. (AU).****GERLANG 20C. Advanced German Conversation. 1 Unitss. (AU).****GERLANG 20E. Fun Facts about Europe. 1 Unitss. (AU) (Staff).****GERLANG 20K. Küche Mitt. 1 Unitss. (AU)**

Same as: German Cooking Class.

**GERLANG 20M. Mitt Movie Series. 1 Unitss. (AU).****GERLANG 20P. Theme Projects. 1 Unitss. (AU).****GERLANG 20T. Teaching German Conversation. 1 Unitss. (AU).****GERLANG 21. Intermediate German I. 4 Units.**

Reading short stories, and review of German structure. Discussions in German, short compositions, videos. Prerequisite: Placement Test, GERLANG 3 or consent of instructor.

**GERLANG 21S. Intermediate German. 4 Units.**

Reading short stories, and review of German structure. Discussions in German, short compositions, videos. Prerequisite: one year of college German; or two years high school German or equivalent, or AP German.

**GERLANG 21W. Intermediate German I: German for Business and International Relations. 4 Units.**

Equivalent to 21, but focus is on business and the political and economic geography of Germany. CDs and videos. For students planning to do a business internship in a German-speaking country. Prerequisite: placement test, 3 or consent of instructor.

**GERLANG 22. Intermediate German II. 4 Units.**

Continuation of GERLANG 21, with greater emphasis on reading and writing skills. Literary texts of major 20th-century writers in historical context. Prerequisite: Placement Test, GERLANG 21 or consent of instructor.

**GERLANG 22W. Intermediate German II: German for Business and International Relations. 4 Units.**

Equivalent to 22, but continuation of 21W. Recommended for students planning to do a business internship in a German-speaking country. Prerequisite: placement test, 21, 21W or consent of instructor.

**GERLANG 23. One Hundred German Years. 4 Units.**

Hundert deutsche Jahre - Hones German language skills while introducing the history and culture of Germany as experienced by ordinary people over the course of the 20th century. Themes include Germans and money, foreigners, Hitler, the Wall, food, etc. Video series, parallel readings, discussion in German, writing, advanced usage. Prerequisite: Placement Test, GERLANG 22, GERLANG 22W or consent of instructor.

**GERLANG 23C. Second Year German, Third Quarter. 4 Units.**

Continuation of GERLANG 22.

**GERLANG 99. Language Specials. 1-12 Units.**

Prerequisite: consent of instructor.

**GERLANG 105. Advanced Business German. 4 Units.**

For students planning to work in a German-speaking country and for preparation of the International Business German exams. Case studies of typical business situations with accompanying videos, listening comprehension exercises, and class simulations. Business correspondence and reports in German. Prerequisite: Placement Test, GERLANG 22 or consent of instructor.

**GERLANG 110. German Newspapers. 3-4 Units.**

For intermediate and advanced students. Articles from current newspapers and magazines, reading comprehension strategies with online news updates, and vocabulary. Writing practice if desired. May be repeated once for credit.

**GERLANG 111. Television News from Germany. 3-4 Units.**

For intermediate and advanced students. Current news reports and features for listening comprehension and vocabulary. Extra listening, speaking, or writing practice for fourth unit.

**GERLANG 199. Individual Reading. 1-12 Units.**

Prerequisite: consent of instructor.

**GERLANG 205A. Intensive First-Year German for Stanford Grads. 4-5 Units.**

Same as GERLANG 5A. For Stanford graduate students only. Stanford graduate students restricted to 9 units may take 205A and B for a total of 9 units.

**GERLANG 205B. Intensive First-Year German for Stanford Grads. 4-5 Units.**

Same as GERLANG 5B. For Stanford graduate students only. Continuation of 205A. Stanford graduate students restricted to 9 units may take 205A and B for a total of 9 units.

**GERLANG 210. Elementary German for Graduate Students. 3-4 Units.**

Restricted to Stanford graduate students. Prerequisite: consent of instructor.

**GERLANG 250. Reading German. 4 Units.**

For undergraduates and graduate students with a knowledge of German who want to acquire reading proficiency. Readings from scholarly works and professional journals. Recommended for students who need to pass the Ph.D. reading exam. Prerequisite: one year of German, or 10, or equivalent.

**GERLANG 395. Graduate Studies in German. 2-5 Units.**

Prerequisite: consent of instructor.

**GERLANG 399. Independent Study. 1-6 Units.**

Prerequisite: consent of instructor.

## German Literature Courses

## Health Research Policy Courses

**HRP 89Q. Introduction to Cross Cultural Issues in Medicine. 3 Units.**

Preference to sophomores. Introduction to social factors that impact health care delivery, such as ethnicity, immigration, language barriers, and patient service expectations. Focus is on developing a framework to understand culturally unique and non-English speaking populations in the health care system.

**HRP 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**HRP 206. Meta-research: Appraising Research Findings, Bias, and Meta-analysis. 3 Units.**

Open to graduate, medical, and undergraduate students. Appraisal of the quality and credibility of research findings; evaluation of sources of bias. Meta-analysis as a quantitative (statistical) method for combining results of independent studies. Examples from medicine, epidemiology, genomics, ecology, social/behavioral sciences, education. Collaborative analyses. Project involving generation of a meta-research project or reworking and evaluation of an existing published meta-analysis. Prerequisite: knowledge of basic statistics.

Same as: MED 206, STATS 211.

**HRP 207. Introduction to Concepts and Methods in Health Services and Policy Research I. 2 Units.**

Primarily for medical students in the Health Services and Policy Research scholarly concentration. Topics include health economics, statistics, decision analysis, study design, quality measurement, cost benefit and effectiveness analysis, and evidence based guidelines.

**HRP 208. Introduction to Concepts and Methods in Health Services and Policy Research II. 2 Units.**

Primarily for medical students in the Health Services and Policy Research scholarly concentration; continuation of 207. Topics include health economics, statistics, decision analysis, study design, quality measurement, cost benefit and effectiveness analysis, and evidence based guidelines. Recommended: 207.

**HRP 209. FDA's Regulation of Health Care. 2-3 Units.**

(Same as LAW 458) Open to law and medical students; other graduate students by consent of instructor. The FDA's regulatory authority over drugs, biologics, medical devices, and dietary supplements. The nature of the pharmaceutical, biotech, medical device, and nutritional supplement industries.

**HRP 210. Health Law and Policy. 3 Units.**

(Same as LAW 313) Open to law, medicine, business, and graduate students. Focus this term is on the physician/patient relationship, medical ethics, and public health law.

**HRP 211. Law and the Biosciences: Neuroscience. 3 Units.**

(Same as LAW 368) Legal, social, and ethical issues arising from advances in neuroscience, including effects upon law and society through improvements in predicting illnesses and behaviors, reading minds through neuroimaging, understanding responsibility and consciousness, treating criminal behavior, and cognitive enhancement.

**HRP 212. Cross Cultural Medicine. 3 Units.**

Developing interviewing and behavioral skills needed to facilitate culturally relevant health care across all population groups. Discussions focus on explicit and implicit cultural influences operating in formal and informal medical contexts.

**HRP 213. Writing in the Sciences. 2-3 Units.**

Primarily for medical students in the Clinical Research Scholarly concentration; open to graduate students except Epidemiology graduate students. Development of research questions and plans for statistical analysis. Study design, sample size and power calculations, and statistical analysis of study data. Analytic methods to carry out statistical power and sample size calculations. Prerequisites: 225, and 258 or 259, or consent of instructor.

**HRP 214. Scientific Writing. 2-3 Units.**

Step-by-step through the process of writing and publishing a scientific manuscript. How to write effectively, concisely, and clearly. Preparation of an actual scientific manuscript. Students are encouraged to bring a manuscript on which they are currently working to develop and polish throughout the course.

**HRP 215. Scientific Writing for Basic and Translational Scientists. 2-3 Units.**

Teaches students in the basic sciences how to write clearly, concisely, and effectively. Focuses on the process of writing and publishing a scientific manuscript. 3 unit option requires work on a manuscript. Not intended for epidemiology graduate students.

**HRP 216. Analytical and Practical Issues in the Conduct of Clinical and Epidemiologic Research. 2-3 Units.**

Topics include: advanced aspects of study design and data analyses; development of health measurement instruments; methods of summarizing literature and quantifying effect sizes; and multivariable nature of health events in human populations. 3 units requires a term paper. Prerequisites: 225, and 258 or 261, or consent of instructor.

**HRP 220. BIOTECHNOLOGY LAW AND POLICY. 3 Units.**

(Same as LAW 440) Open to all law or medical students; other graduate students by consent of the instructor. Focuses on the biotechnology industry, with some discussion of the "med tech" or medical device industry and the pharmaceutical industry. The life cycle of a biotech firm, from a good idea to a start-up company to FDA approval and beyond. Guest speakers. In addition to a final exam, students are required to participate in a group project during the term, making law and business recommendations about a biotech firm.

**HRP 221. Law and the Biosciences: Genetics. 3 Units.**

(Same as LAW 480) Open to all law or medical students; other graduate students by consent of the instructor. Focus is on ethical, legal, and social issues arising from advances in our knowledge of human genetics. Includes forensic uses of genetics, genetic testing, widespread whole genome sequencing, the consequences of genetics for human reproduction, and the ethics of genomic biobanks for research. Research paper required.

**HRP 223. Epidemiologic Analysis: Data Management and Statistical Programming. 2-3 Units.**

The skills required for management and analysis of biomedical data. Topics include importing and exporting data from multiple database systems, visualizing and cleaning data, data management for multicenter projects, and data security. Introduction to applied statistical programming relevant to epidemiologic and clinical research. No previous programming experience required.

**HRP 225. Design and Conduct of Clinical and Epidemiologic Studies. 3-4 Units.**

Intermediate-level. The skills to design, carry out, and interpret epidemiologic studies, particularly of chronic diseases. Topics: epidemiologic concepts, sources of data, cohort studies, case-control studies, cross-sectional studies, sampling, estimating sample size, questionnaire design, and the effects of measurement error. Prerequisite: A basic/introductory course in statistics or consent of instructor.

**HRP 226. Advanced Epidemiologic and Clinical Research Methods. 3-4 Units.**

The principles of measurement, measures of effect, confounding, effect modification, and strategies for minimizing bias in clinical and epidemiologic studies. Students enrolled for 4 units complete an additional assignment or paper. Prerequisite: 225 or consent of instructor.

**HRP 228. Genetic Epidemiology. 2 Units.**

Provides framework for physicians, epidemiologists, and other scientists to interpret the literature and incorporate genetic information into human disease research. Topics include: common genetic measures, approaches to finding disease genes, study design and analysis issues, genome-wide association studies, meta-analysis of genetic studies, genetic risk prediction, and applications of new genomic technologies. Includes reading seminal papers in genetic epidemiology.

**HRP 230. Cancer Epidemiology. 2-3 Units.**

Descriptive epidemiology and sources of incidence/mortality data; the biological basis of carcinogenesis and its implications for epidemiologic research; methodological issues relevant to cancer research; causal inference; major environmental risk factors; genetic susceptibility; cancer control; examples of current research; and critique of the literature. 3 units requires paper or project. Prerequisite: 225, or consent of instructor.

**HRP 231. Epidemiology of Infectious Diseases. 3 Units.**

Principles of the transmission of the infectious agents (viruses, bacteria, rickettsiae, mycoplasma, fungi, and protozoan and helminth parasites). The role of vectors, reservoirs, and environmental factors. Pathogen and host characteristics that determine the spectrum of infection and disease. Endemicity, outbreaks, and epidemics of selected infectious diseases. Principles of control and surveillance.

**HRP 236. Epidemiology Research Seminar. 1 Unit.**

Weekly forum for ongoing epidemiologic research by faculty, staff, guests, and students, emphasizing research issues relevant to disease causation, prevention, and treatment. May be repeated for credit.

**HRP 238. Genes and Environment in Disease Causation: Implications for Medicine and Public Health. 2-3 Units.**

The historical, contemporary, and future research and practice among genetics, epidemiology, clinical medicine, and public health as a source of insight for medicine and public health. Genetic and environmental contributions to multifactorial diseases; multidisciplinary approach to enhancing detection and diagnosis. The impact of the Human Genome Project on analysis of cardiovascular and neurological diseases, and cancer. Ethical and social issues in the use of genetic information. Prerequisite: basic course in genetics; for undergraduates, Human Biology core or equivalent or consent of instructor. Same as: HUMBIO 159.

**HRP 239. Understanding Statistical Models and their Social Science Applications. 3 Units.**

Critical examination of statistical methods in social science applications, especially for cause and effect determinations. Topics: path analysis, multilevel models, matching and propensity score methods, analysis of covariance, instrumental variables, compliance, longitudinal data, mediating and moderating variables. See <http://www-stat.stanford.edu/~rag/stat209>. Prerequisite: intermediate-level statistical methods Same as: EDUC 260X, STATS 209.

**HRP 241. Measuring Global Health. 4 Units.**

Open to MD, graduate, and undergraduate students. Assessing the global burden of disease, its distribution among and within countries, its causes, and appropriate interventions requires rigorous quantitative approaches. This course develops skills in these areas by critically examining questions like: How do we know who is sick and where? How are risk factors incorporated into our projections of future disease trends? How do we combine mortality and morbidity in a meaningful way? What works for improving health efficiently? Workshops build familiarity with relevant data and their analysis. Prerequisite: coursework in statistics, biostatistics, quantitative epidemiology, econometrics, or equivalent. Same as: HUMBIO 129M, MED 231.

**HRP 251. Design and Conduct of Clinical Trials. 3 Units.**

The rationale for phases 1-3 clinical trials, the recruitment of subjects, techniques for randomization, data collection and endpoints, interim monitoring, and reporting of results. Emphasis is on the theoretical underpinnings of clinical research and the practical aspects of conducting clinical trials.

**HRP 252. Outcomes Analysis. 3 Units.**

Methods of conducting empirical studies which use large existing medical, survey, and other databases to ask both clinical and policy questions. Econometric and statistical models used to conduct medical outcomes research. How research is conducted on medical and health economics questions when a randomized trial is impossible. Problem sets emphasize hands-on data analysis and application of methods, including re-analyses of well-known studies. Prerequisites: one or more courses in probability, and statistics or biostatistics. Same as: BIOMEDIN 251.

**HRP 255. Observational Studies. 2-3 Units.**

This course will cover statistical methods for the design and analysis of observational studies. Topics for the course will include the potential outcomes framework for causal inference; randomized experiments; methods for controlling for observed confounders in observational studies; sensitivity analysis for hidden bias; instrumental variables; tests of hidden bias; coherence; and design of observational studies. Same as: STATS 355.

**HRP 256. Economics of Health and Medical Care. 5 Units.**

Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: demand for medical care and medical insurance; institutions in the health sector; economics of information applied to the market for health insurance and for health care; measurement and valuation of health; competition in health care delivery. Graduate students with research interests should take ECON 248. Prerequisites: ECON 50 and ECON 102A or Stats 116 or the equivalent. Recommended: ECON 51. Same as: BIOMEDIN 156, BIOMEDIN 256, ECON 126.

**HRP 258. Introduction to Probability and Statistics for Clinical Research. 3 Units.**

Open to medical and graduate students; required of medical students in the Clinical Research Scholarly Concentration. Tools to evaluate medical literature. Topics include random variables, expectation, variance, probability distributions, the central limit theorem, sampling theory, hypothesis testing, confidence intervals, correlation, regression, analysis of variance, and survival analysis.

**HRP 259. Introduction to Probability and Statistics for Epidemiology. 3-4 Units.**

Topics: random variables, expectation, variance, probability distributions, the central limit theorem, sampling theory, hypothesis testing, confidence intervals. Correlation, regression, analysis of variance, and nonparametric tests. Introduction to least squares and maximum likelihood estimation. Emphasis is on medical applications. Differential between 3 and 4 units is the amount of out-of-class work required.

**HRP 260A. Workshop in Biostatistics. 1-2 Units.**

Applications of statistical techniques to current problems in medical science. To receive credit for one or two units, a student must attend every workshop. To receive two units, in addition to attending every workshop, the student is required to write an acceptable one page summary of two of the workshops, with choices made by the student. Same as: STATS 260A.

**HRP 260B. Workshop in Biostatistics. 1-2 Units.**

Applications of statistical techniques to current problems in medical science. To receive credit for one or two units, a student must attend every workshop. To receive two units, in addition to attending every workshop, the student is required to write an acceptable one page summary of two of the workshops, with choices made by the student. Same as: STATS 260B.

**HRP 260C. Workshop in Biostatistics. 1-2 Units.**

Applications of statistical techniques to current problems in medical science. To receive credit for one or two units, a student must attend every workshop. To receive two units, in addition to attending every workshop, the student is required to write an acceptable one page summary of two of the workshops, with choices made by the student. Same as: STATS 260C.

**HRP 261. Intermediate Biostatistics: Analysis of Discrete Data. 3 Units.**

Methods for analyzing data from case-control and cross-sectional studies: the 2x2 table, chi-square test, Fisher's exact test, odds ratios, Mantel-Haenzel methods, stratification, tests for matched data, logistic regression, conditional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference. Same as: BIOMEDIN 233, STATS 261.

**HRP 262. Intermediate Biostatistics: Regression, Prediction, Survival Analysis. 3 Units.**

Methods for analyzing longitudinal data. Topics include Kaplan-Meier methods, Cox regression, hazard ratios, time-dependent variables, longitudinal data structures, profile plots, missing data, modeling change, MANOVA, repeated-measures ANOVA, GEE, and mixed models. Emphasis is on practical applications. Prerequisites: basic ANOVA and linear regression.  
Same as: STATS 262.

**HRP 263. Advanced Decision Science Methods and Modeling in Health. 3 Units.**

Advanced methods currently used in published model-based cost-effectiveness analyses in medicine and public health, both theory and technical applications. Topics include: Markov and microsimulation models, model calibration and evaluation, and probabilistic sensitivity analyses. Prerequisites: a course in probability, a course in statistics or biostatistics, a course on cost-effectiveness such as HRP 392, a course in economics, and familiarity with decision modeling software such as TreeAge.  
Same as: MED 263.

**HRP 268. Genetics and Reproductive Technologies. 2 Units.**

(Same as LAW 568) Examines the complex interrelationship among legal, political, ethical, and social issues shaping the intersection of genetics, reproductive technologies and reproductive rights. Issues discussed may include, but are not limited to: the commercialization and sale of reproductive materials like sperm, ovum, and surrogacy services; genetic technologies, prenatal genetic screening, and diagnostic testing of offspring; criminalization of reproductive decision-making such as sex-selection and genetic enhancement; stem cells, cloning, and abortion; DNA databanks and collection of genetic information; in vitro fertilization and other emerging reproductive technologies.

**HRP 274. Design for Service Innovation. 4 Units.**

(Same as OIT 343/01) Open to graduate students from all schools and departments. An experiential project course in which students work in multidisciplinary teams to design new services to address the needs of medically patients. Project teams partner with "safety net" hospitals and clinics to find better ways to deliver care to the low income and uninsured patients these institutions serve. Students learn proven innovation processes from experienced GSB, d. school, and SoM faculty, interface with students from across the university, and have the opportunity to see their ideas translated into improvements in the quality and efficiency of healthcare in the real world. Prerequisite: admission to the course is by application only. Applications available at <http://DesignForService.stanford.edu>. Applications must be submitted by November 16, 2011.  
Same as: BIOE 372, MED 274.

**HRP 280. Spanish for Medical Students. 2 Units.**

First quarter of three-quarter series. Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on taking the medical history. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.  
Same as: SPANLANG 121M.

**HRP 281. Spanish for Medical Students. 2 Units.**

Second quarter of three-quarter series. Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on performing a physical examination. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.  
Same as: SPANLANG 122M.

**HRP 282. Spanish for Medical Students. 2 Units.**

Third quarter of three-quarter series. Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on different specialties and medical conditions. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.  
Same as: SPANLANG 123M.

**HRP 283. Health Services Research Core Seminar. 1 Unitss.**

Presentation of research in progress and tutorials in the field of health services research.

**HRP 290. Advanced Medical Spanish Oral Communication. 2 Units.**

Enrollment limited to medical students. Designed to further develop linguistic skills, covering all medical specialties according to student needs. Sessions also include topics on patient education and diseases, such as diabetes, asthma, TB, and CVDs.

**HRP 296. Current Topics in Bioethics. 3 Units.**

(Same as LAW 596) Explores the ethical, legal, and public policy issues arising from recent advances in biomedicine and the biosciences. Approaches to bioethical reasoning including casuistry, social justice, resource allocation, and individual rights in areas such as refusal of treatment conception. Topics include: the use of forensic genetics in criminal law, neuroscience and national security, race and ethnicity in genetic research, experimentation on human subjects and prisoners, privacy of medical and genetic information in the information age, synthetic biology, and do-it-yourself medical and genetic testing. No prior knowledge in science, medicine, philosophy or related disciplines is required.

**HRP 299. Directed Reading in Health Research and Policy. 1-18 Units.**

Epidemiology, health services research, preventive medicine, medical genetics, public health, economics of medical care, occupational or environmental medicine, international health, or related fields. May be repeated for credit. Prerequisite: consent of instructor.

**HRP 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**HRP 391. Health Care Regulation, Finance and Policy. 3 Units.**

(SAME AS LAW 348, MGTECON 331) Provides the legal, institutional, and economic background necessary to understand the financing and production of health services in the U.S. Potential topics include: health reform, health insurance (Medicare and Medicaid, employer-sponsored insurance, the uninsured), medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons.  
Same as: PUBLPOL 231.

**HRP 392. Analysis of Costs, Risks, and Benefits of Health Care. 4 Units.**

(Same as MGTECON 332) For graduate students. How to do cost/benefit analysis when the output is difficult or impossible to measure. How do M.B.A. analytic tools apply in health services? Literature on the principles of cost/benefit analysis applied to health care. Critical review of actual studies. Emphasis is on the art of practical application.  
Same as: BIOMEDIN 432.

**HRP 399. Graduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**HRP 801. TGR Project. 0 Unit.****HRP 802. TGR Dissertation. 0 Unit.**

## History Courses

### **HISTORY 4N. A World History of Genocide. 3-5 Units.**

Reviews the history of genocide from ancient times until the present. Defines genocide, both in legal and historical terms, and investigates its causes, consequences, and global dimensions. Issues of prevention, punishment, and interdiction. Main periods of concern are the ancient world, Spanish colonial conquest; early modern Asia; settler genocides in America, Australia, and Africa; the Armenian genocide and the Holocaust; genocide in communist societies; and late 20th century genocide.

### **HISTORY 5C. Human Trafficking: Historical, Legal, and Medical Perspectives. 3 Units.**

(Same as History 105C. History majors and others taking 5 units, enroll in 105C.) Interdisciplinary approach to understanding the extent and complexity of the global phenomenon of human trafficking, especially for forced prostitution and labor exploitation, focusing on human rights violations and remedies. Provides a historical context for the development and spread of human trafficking. Analyzes the current international and domestic legal and policy frameworks to combat trafficking and evaluates their practical implementation. Examines the medical, psychological, and public health issues involved. Uses problem-based learning and offers an optional service-learning component.  
Same as: SOMGEN 205.

### **HISTORY 10A. Europe from Late Antiquity to 1500. 3 Units.**

(Same as History 110A. History majors and others taking 5 units, register for 110A.) Course will provide a fundamental understanding of the material civilization, political and legal institutions, and cultural imagination of the Middle Ages, when the fundamental structures of life in Europe were transformed. Students will explore the documents and cultural artifacts of medieval civilization, which remain stunning monuments of perennial importance for understanding how pre-modern human beings grappled with and overcame material hardship, organized their political and economic communities, and led their spiritual and intellectual lives.

### **HISTORY 10B. From Renaissance to Revolution: Early Modern Europe. 3 Units.**

(Same as HISTORY 110B. History majors and others taking 5 units, register for 110B.) From 1350 to 1789, Europe went from being a provincial backwater to a new global center of power. This course surveys the profound changes of the period that shape our world today: the spread of humanism and science, religious reformation, new styles of warfare, the rise of capitalism and a new global economy, the emergence of the state, and revolution which sought to overthrow established governments.

### **HISTORY 10C. Introduction to Modern Europe. 3 Units.**

(SAME as HISTORY 110C. History majors and others taking 5 units, register for 110C.) From the late 18th century to the present. How Europeans responded to rapid social changes caused by political upheaval, industrialization, and modernization. How the experience and legacy of imperialism and colonialism both influenced European society and put in motion a process of globalization that continues to shape international politics today.

### **HISTORY 10N. Thinking About War. 3 Units.**

This course examines some classic approaches to war as an intellectual problem, to how a matter of such great physical violence and passions can be subjected to understanding and used in art, philosophy, or politics. Questions will include the causes of war, its use in self-definition, the problem of civil war, war's relations to political authority, etc. Readings will include extracts from Clausewitz's *On War*, Sunzi's *The Art of War*, Herodotus's *Histories*, Thucydides's *Peloponnesian War*, and Caesar's *Gallic War*.

### **HISTORY 10SC. Biography in History, Fiction, and Elsewhere. 2 Units.**

How biographers, novelists, critics and others have written about the rhythms of life & the lives of the famous as well as the obscure - will be explored in this course. Biographical writing can be frivolous, but at its best it has the capacity to uncover so much of life's richness, complexity, and confusions. We'll study biography with the use of some of the most resonant, compelling examples of the genre. Together we'll read books about poets Sylvia Plath and Ted Hughes, Henry James's *Aspern Papers*, the brilliant novel on biographical writing, A. S. Byatt's *Possession*, and Norman Mailer on Marilyn Monroe. How one chooses one topic over another; the differences and similarities between the representation of lives in fiction and biography; the benefits and pitfalls of an intense identification with one's own subjects & these and other matters will be examined. We'll meet in San Francisco with local writers wrestling with issues of this sort, and students will be encouraged to try their hands at writing about lives based on research, personal observation, or both.

### **HISTORY 10W. Visualizing Evidence. 1 Unitss.**

Seeks to advance visual and technical literacy among humanists through direct engagement with research processes from conception to completion. Students will attend presentations of scholarly work and visualization methods, workshops on the use of visualization tools led by expert faculty and staff, and engage in hands-on application of research concepts and tools with curated primary source materials in supervised lab time. Over the course of the quarter, students will be introduced to a broad range of techniques and technologies, including GIS for geospatial analysis, Tableau for tabular data, and Gephi for network rendering and analysis.

### **HISTORY 11SC. How Is a Buddhist. 2 Units.**

Buddhism as a system of thought, a culture, a way of life, a definition of reality, a method for investigating it, and a mental, physical, and social practice. Buddhism as a total phenomenon. Readings, films, music, and art. How Buddhist practices constitute the world of the Buddhist.

### **HISTORY 11W. Service-Learning Workshop on Issues of Education Equity. 1 Unitss.**

Introduces students to a variety of issues at stake in the public education of at-risk high school youth in California. Participants will hear from some of the leading faculty in the School of Education as well as the Departments of Psychology, Sociology, and others, who will share perspectives on the problems and challenges of educating a diverse student body in the state's public school system. The service-learning component of the workshop is a mentoring project (Stanford Students for Educational Equity) with junior class history students from East Palo Alto Academy High School, a Stanford charter school.

Same as: CSRE 11W.

### **HISTORY 12N. The Early Roman Emperors: History, Biography, and Fiction. 3 Units.**

Preference to freshmen. The politics, drama, and characters of the period after the fall of the Roman Republic in 49 B.C.E. Issues of liberty and autocracy explored by Roman writers through history and biography. The nature of history writing, how expectations about literary genres shape the materials, the line between biography and fiction, and senatorial ideology of liberty. Readings include: Tacitus' *Annals*, Suetonius' *Lives of the Caesars*, and Robert Graves' *I Claudius* and episodes from the BBC series of the same title.

Same as: CLASSHIS 37N.



**HISTORY 14S. Voices from Below: Commoners in Medieval and Early Modern Europe "In Their Own Words". 5 Units.**

The most famous figures of pre-modern Europe are kings, popes, and emperors. But life was largely lived outside the castles and courts of the elite. How can historians study the perspectives of these commoners? What sources are available and how are they best used? What can we learn about the ordinary lives of peasants, artisans, and merchants in the late medieval and early modern periods? Special emphasis on literacy, class, gender, and family. Sources include autobiographies, judicial records, and more.

**HISTORY 16S. Inquisition: Faith and Identity in the Pre-Modern World. 5 Units.**

The inquisition is one of the most infamous institutions of medieval and early modern Europe. Inquisition sources offer detailed records about marginalized people of this world. This course will examine how heretics, women, and Jews formed their identities through interaction with Catholic Inquisitions in the 14th-17 centuries. Through the lens of inquisitions in Europe, the Spanish Americas, and Goa, we will grapple with violence, faith, and the implications of a morally changed historical record.

**HISTORY 17N. Intimacy, Secrets and the Past: Biography in History and Fiction. 3-4 Units.**

Biography is one of the most popular- and controversial- modes of writing about the past and perhaps its greatest draw is in its promise to reveal the otherwise sequestered details of life, its everyday secrets otherwise sequestered from view. This, of course, is also at the heart of most modern fiction, and the two modes of writing have many other similarities as well as, needless to say, differences. The rhythms of life writing in biography as well as fiction will be explored in this class, along with the difficulties (factual, ethical, and otherwise) of ferreting out the secrets of individual lives. Among the figures explored in the course will be Sigmund Freud, Sabina Spielrein, Sylvia Plath, Hannah Arendt, and Woody Allen. Same as: JEWISHST 17N.

**HISTORY 20A. The Russian Empire, 1450-1796. 3 Units.**

(Same as HISTORY 120A. History majors and others taking 5 units, register for 120A.) Fundamental building blocks of Russian civilization, treated thematically, from the tenth to the eighteenth centuries: religion, art and architecture, literature, social structures, political ideology, and political culture.

**HISTORY 20N. Russia in the Early Modern European Imagination. 4 Units.**

Preference to freshmen. The contrast between the early modern image of Europe as free, civilized, democratic, rational, and clean against the notion of New World Indians, Turks, and Chinese as savage. The more difficult, contemporary problem regarding E. Europe and Russia which seemed both European and exotic. Readings concerning E. Europe and Russia from the Renaissance to the Enlightenment; how they construct a positive image of Europe and conversely a negative stereotype of E. Europe. Prerequisite: PWR 1.

**HISTORY 22SC. A Tale of Two Cities: London and San Francisco. 2 Units.**

San Francisco and London are two of the world's best-loved and most-visited cities. They have certain things in common: both are ports, situated on the edge of continents; both are major commercial and cultural centres; and both have been shaped by immigration. Their differences are more obvious than their similarities, however, and these differences are to a large extent explained by their very different histories. London was founded by the Romans and was, for a period in its recent history, the capital of an Empire on which the sun famously never set; San Francisco did not emerge as a city until well into the 19th century and even now has something of the character of a "city state" rather than a national or state capital. Though often considered one of the most European of American cities, San Francisco is in fact laid out on the typically American grid plan; the planning of London is, by contrast, chaotic, reflecting its long evolution and the lack of any effective central planning control. The course will explain the ways in which these two fascinating cities have evolved, especially over the past 200 years. We will focus on the development of what is sometimes called the "urban landscape"-streets, public buildings, housing, open spaces, transport systems-and investigate who made the decisions that shaped the two cities as we experience them today. We will look not only at the impact of major events-the San Francisco earthquake of 1906, the bombing of London during World War II-but also at the small decisions made by property owners and developers which helped determine the character of urban neighborhoods. We will use maps and primary documents as well as published histories, and there will be two field trips to explore buildings and neighborhoods in San Francisco. Students will write two papers, each of 4-5-pages, on aspects of the history of each city. An interest in history and/urban studies is an obvious asset.

**HISTORY 23S. Onion Domes and Dirt Streets: Cities in Early Modern and Imperial Russia. 5 Units.**

What social, political, and cultural roles have cities played throughout history? Moscow and St. Petersburg will be used as a lens through which to examine these questions from the 16th through 19th centuries, focusing on issues of Russian and European interaction, identity, modernity, and attempts to control and transform city space and the residents who occupied it. Wide range of textual and visual sources, including maps, paintings, memoirs, legal codes, wills, photographs, and short stories.

**HISTORY 23SC. People, Land, and Water in the Heart of the West. 2 Units.**

Salmon River. Sun Valley. Pioneer Mountains. The names speak of powerful forces and ideas in the American West. Central Idaho - a landscape embracing snow-capped mountains, raging rivers, sagebrush deserts, farms, ranches, and resort communities - is our classroom for this field-based seminar led by David Freyberg, professor of Civil and Environmental Engineering, and David Kennedy, professor emeritus of History. This course focuses on the history and future of a broad range of natural resource management issues in the western United States. We will spend a week on campus preparing for a two-week field course in Idaho exploring working landscapes, private and public lands, water and fisheries, conservation, and the history and literature of the relationship between people and the land in the American West. After the first week spent on campus, we will drive to Idaho to begin the field portion of our seminar. In Idaho, we will spend time near Twin Falls, at Lava Lake Ranch near Craters of the Moon National Monument, in Custer County at the Upper Salmon River, and near Stanley in the Sawtooth National Forest. No prior camping experience is required, but students should be comfortable living outdoors in mobile base camps for periods of several days. Students will investigate specific issues in-depth and present their findings at the end of the course. Same as: CEE 11SC, EARTHSYS 13SC.

**HISTORY 30C. Culture and Society in Reformation England. 3 Units.**

(Same as History 130C. History majors and others taking 5 units, register for 130C.) Focuses on the appeal of both Reformed and Catholic ideas in the political and cultural contexts of early modern Europe. Topics include: the Lutheran revolt; the spread of Protestant ideas; Calvin's Geneva; the English Reformation; Tridentine reform and the Jesuits; toleration and the underground churches; wars and religious violence; and the making of European confessional identities. Sources include sermons, religious polemic, autobiographies, graphic prints, poetry, and music.

**HISTORY 30Q. English Society Through Fiction. 4 Units.**

Preference to sophomores. England from the eighteenth century to the twentieth century through the reading of seven novels ranging from Henry Fielding's *Joseph Andrews*, to Evelyn Waugh's *A Handful of Dust*. Focus is on the novels themselves and the historical context of the novels to acquire a knowledge of British history over two hundred years.

**HISTORY 32A. Enlightenment and the Arts. 3 Units.**

(Same as HISTORY 132A. History majors and others taking 5 units, enroll in 132A.) Novels, poetry, music, paintings, and architecture, and what they reveal about the society that produced them.

**HISTORY 33A. Blood and Roses: The Age of the Tudors. 3 Units.**

(Same as HISTORY 133A. History majors and others taking 5 units, register for 133A.) English society and state from the Wars of the Roses to the death of Elizabeth. Political, social, and cultural upheavals of the Tudor period and the changes wrought by the Reformation. The establishment of the Tudor monarchy; destruction of the Catholic church; rise of Puritanism; and 16th-century social and economic changes.

**HISTORY 33B. Revolutionary England: The Stuart Age. 3 Units.**

(Same as HISTORY 133B. History majors and others taking 5 units, register for 133B.) From the accession of King James I in 1603 to the death of Queen Anne in 1714: a brutal civil war, the execution of one anointed king, and the deposition of another. Topics include the causes and consequences of the English Revolution, the origins of Anglo-American democratic thought, the rise and decline of Puritanism, and the emergence of England as an economic and colonial power. (Como).

**HISTORY 36N. Gay Autobiography. 4 Units.**

Preference to freshmen. Gender, identity, and solidarity as represented in nine autobiographies: Isherwood, Ackerley, Duberman, Monette, Louganis, Barbin, Cammermeyer, Gingrich, and Lorde. To what degree do these writers view sexual orientation as a defining feature of their selves? Is there a difference between the way men and women view identity? What politics follow from these writers' experiences?.

**HISTORY 38A. Germany and the World Wars, 1870-1990. 3 Units.**

(Same as HISTORY 138A. Majors and others taking 5 units, enroll in 138A.) Germany's history from Bismarck's wars of unification through the end of the Cold War. The radicalizing relationship between international conflict, social upheaval, and state transformation with a focus on the clashes of the Second Empire, the road to WW I, interwar instability, the rise of Nazism, WW II, the Holocaust, the division of communist E. and capitalist W. Germany, and the fall of the Iron Curtain.

**HISTORY 39. Modern Britain and the British Empire. 3 Units.**

(Same as HISTORY 139. History majors and others taking 5 units, register in 139.) From American Independence to the latest war in Iraq. Topics include: the rise of the modern British state and economy; imperial expansion and contraction; the formation of class, gender, and national identities; mass culture and politics; the world wars; and contemporary racial politics. Focus is on questions of decline, the fortunes and contradictions of British liberalism in an era of imperialism, and the weight of the past in contemporary Britain.

**HISTORY 40. World History of Science. 3 Units.**

(Same as HISTORY 140. History majors and others taking 5 units, register for 140.) The earliest developments in science, the prehistoric roots of technology, the scientific revolution, and global voyaging. Theories of human origins and the oldest known tools and symbols. Achievements of the Mayans, Aztecs, and native N. Americans. Science and medicine in ancient Greece, Egypt, China, Africa, and India. Science in medieval and Renaissance Europe and the Islamic world including changing cosmologies and natural histories. Theories of scientific growth and decay; how science engages other factors such as material culture and religions.

**HISTORY 40A. The Scientific Revolution. 3 Units.**

What do people know and how do they know it? What counts as scientific knowledge? In the 16th and 17th centuries, understanding the nature of knowledge engaged the attention of individuals and institutions including Copernicus, Galileo, Descartes, Newton, the early Royal Society, and less well-known contemporaries. New meanings of observing, collecting, experimenting, and philosophizing, and political, religious, and cultural ramifications in early modern Europe.

**HISTORY 41Q. Mad Women: Women and Mental Illness in U.S. History. 3 Units.**

Explores how gender and historical context have shaped the experience and treatment of mental illness in U.S. history. Why have women been the witches and hysterics of the past, and why have there historically been more women than men among the mentally ill? Topics include the relationship between historical ideas of femininity and insanity, the ways that notions of gender influence the definition and treatment of mental disorder, and the understanding of the historically embedded nature of medical ideas, diagnoses, and treatments.

**HISTORY 42. Darwin in the History of Life. 3 Units.**

(Same as HISTORY 142. History majors and others taking 5 units, register for 142.) Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evolution, neocatastrophism, and the new technological frontier of biomimicry.

**HISTORY 44. History of Women and Gender in Science, Medicine, and Engineering. 3 Units.**

(Same as HISTORY 144. Majors and others taking 5 units, enroll in HISTORY 144.) Men's and women's roles in science, medicine, and engineering over the past 200 years with a focus on the present. What are the efforts underway globally to transform science, medicine, and engineering into fields where women can flourish? How have science and medicine studied and defined males and females? Can gender analysis spark creativity in human knowledge?.

**HISTORY 44Q. Gendered Innovations in Science, Medicine, and Engineering. 4-5 Units.**

Section 1 focuses on the history of women in science, medicine, and engineering. Section 2 looks at transforming research institutions so that both men and women can flourish. Section 3 explores how sex and gender analysis can enhance creativity. We discuss concrete examples of how taking gender into account has yielded new research results. Stanford University currently has a multiple year collaboration with the European Commission for Gendered Innovations, and this class will be part of that project. This course fulfills the second level Writing and Rhetoric Requirement (WRITE 2) and will emphasize oral and multimedia presentation.

**HISTORY 45B. Africa in the Twentieth Century. 3 Units.**

(Same as HISTORY 145B. History majors and others taking 5 units, register for 145B.) The challenges facing Africans from when the continent fell under colonial rule until independence. Case studies of colonialism and its impact on African men and women drawn from West, Central, and Southern Africa. Novels, plays, polemics, and autobiographies written by Africans.

**HISTORY 47. History of South Africa. 3 Units.**

(Same as HISTORY 147. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis.

Same as: AFRICAAM 47.

**HISTORY 48N. African History through Literature and Film. 3-4 Units.**

Literary and cinematic works as a window into the history of sub-Saharan Africa.; and the difficulty of using artistic works as historical sources, the value of art as representation and artifact of the past. Premodern traditions of political narrative; art in the era of the slave trade; the impact of colonialism on African intellectuals; the political uses of art by nationalists; and the struggle to represent rapidly changing social and culture norms.

**HISTORY 48Q. South Africa: Contested Transitions. 3 Units.**

Preference to sophomores. The inauguration of Nelson Mandela as president in May 1994 marked the end of an era and a way of life for S. Africa. The changes have been dramatic, yet the legacies of racism and inequality persist. Focus: overlapping and sharply contested transitions. Who advocates and opposes change? Why? What are their historical and social roots and strategies? How do people reconstruct their society? Historical and current sources, including films, novels, and the Internet. Same as: AFRICAAM 48Q.

**HISTORY 49C. THE SLAVE TRADE. 3 Units.**

(Same as HISTORY 149C. History majors and others taking 5 units, enroll in 149C.) Slave trades and forms of slavery in W. Africa from 1000 to 1885; impacts on lives, social organization, and political structures. Slavery in Islam, the slave market in the Mediterranean and Middle East, and the Saharan slave trade. Slavery within Africa, growth of the Atlantic trade, the Middle Passage, and war and trade that produced slaves. Impact of the Industrial Revolution and European abolition movements on the use of slaves and warfare in Africa. The relationship between slaving and the European conquest of Africa.

**HISTORY 50A. Colonial and Revolutionary America. 3 Units.**

(Same as HISTORY 150A. History majors and others taking 5 units, register for 150A.) Survey of the origins of American society and polity in the 17th and 18th centuries. Topics: the migration of Europeans and Africans and the impact on native populations; the emergence of racial slavery and of regional, provincial, Protestant cultures; and the political origins and constitutional consequences of the American Revolution.

**HISTORY 50B. 19th Century America. 3 Units.**

(Same as HISTORY 150B. History majors and others taking 5 units, register in 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture.

Same as: AFRICAAM 50B.

**HISTORY 50C. The United States in the Twentieth Century. 3 Units.**

(Same as HISTORY 150C. History majors and others taking 5 units, register for 150C.) Major political, economic, social, and diplomatic developments in the U.S. Themes: the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in society (mass immigration at the turn of the century and since 1965, the civil rights era of the 50s and 60s); the changing status of women since WW II; shifting ideological bases, institutional structures, and electoral characteristics of the political system (New Deal and post-Vietnam); determinants of foreign policy in WW I and II, and the Cold War.

**HISTORY 51K. Election 2012. 1 Unitss.**

Focuses on the November 2012 election. Serial examinations of major topics at stake: foreign policy, the economy, the Supreme Court, and campaign strategy. One session will be devoted to California. Distinguished guests will participate in sessions moderated by the instructors with participation by students. Students enrolling for credit must attend regularly and contribute to a course blog. Sign up for the waitlist through PoliSci 51K. In order for a student to be enrolled in the course via the waitlist process, the student must not exceed the maximum unit enrollment for the quarter OR have a time schedule conflict with another course on his/her study list. If the student will either exceed the maximum units or has a class time conflict, the waitlist will bypass this student for enrollment, and will enroll the next eligible student into this course.

Same as: CSRE 51K, POLISCI 51K.

**HISTORY 54N. African American Women's Lives. 3-4 Units.**

Preference to freshmen. The everyday lives of African American women in 19th- and 20th-century America in comparative context of histories of European, Hispanic, Asian, and Native American women. Primary sources including personal journals, memoirs, music, literature, and film, and historical texts. Topics include slavery and emancipation, labor and leisure, consumer culture, social activism, changing gender roles, and the politics of sexuality.

Same as: AFRICAAM 54N.

**HISTORY 59S. The Digital Historian's Toolkit: Studying the West in an Age of Big Data. 5 Units.**

How did Americans envision the geography of the American West between 1848 and 1893? This course answers this question through an introduction to the practice of digital history. Students will work in a lab setting to develop skills in archival digitization, Geographic Information Systems (GIS), text and data mining, and information visualization. They will use these digital methods to study the geography of travel and tourism, mining booms, race relations, urbanization, and western literature.

**HISTORY 63S. From Hysteria to Prozac: Diagnosing Bodies, Minds, and Cultures in 20th Century America. 5 Units.**

Examines 20th century America through the lens of four mental disorders: hysteria, authoritarian personality disorder, schizophrenia, and depression. Why do particular disorders increase in prevalence and popularity in different time periods? What do diagnoses reveal about broader social, economic, political, and cultural developments? Students will work with a range of primary source materials including medical, psychological, and literary texts as well as advertisements for cures, video footage of experiments on human subjects, and artwork created by patients.

**HISTORY 70. Culture, Politics, and Society in Latin America. 3 Units.**

(Same as HISTORY 170B. History majors and others taking 5 units, enroll in HISTORY 170B.) The course of Latin American history from the colonial era to the present day. Key issues such as colonialism, nationalism, democracy, and revolution will be examined critically in light of broad comparative themes in Latin American and world history. Sources include writings in the social sciences as well as primary documents, fiction, and film.

**HISTORY 79S. From Coffee to Cocaine: Commodities, Society, and Environment in Modern South America. 5 Units.**

The relationship between South Americans and their natural environments. 19th and 20th centuries. Focus on commodity production and natural resources. Topics include: coffee and water (Brazil); wool (Argentina); guano (Peru); rubber and cattle (Amazon); cocaine (Andes); salmon (Chile). What are the environmental consequences of economic cycles of boom and bust? What is the role of environment in these cycles? Is human-caused environmental change permanent? Readings include primary and secondary sources. Last two weeks are dedicated to Spatial History (GIS).

**HISTORY 81B. Formation of the Contemporary Middle East. 3 Units.**

(Same as HISTORY 181B. History majors and others taking 5 units, register for 181B.) The history of the Middle East since WW I, focusing on the eastern Arab world, Egypt, the Fertile Crescent, and the Arabian Peninsula, with attention to Turkey, Iran, and Israel.

**HISTORY 82C. The Making of the Islamic World, 600-1500. 3 Units.**

(Same as HISTORY 182C. Majors and other taking 5 units, register for 182C.) The History of Islam and Muslim peoples from 600-1500. Topics include Muhammad and his community; the early Arab conquests and empires; sectarian movements; formation of Islamic belief, thought, legal culture and religious institutions; transregional Sufi and learned networks; family and sexuality; urban, rural and nomadic life; non-Muslim communities; the development of Mediterranean and Indian Ocean trade; relations with Byzantium, the Latin West, China; the Crusades and the Mongols.

**HISTORY 82N. Modern Islamic Movements. 3 Units.**

Muslim political mobilization in local and global settings. Topics include: Pan-Islam, the Muslim Brothers, Khomeinism, Hezbollah, al-Qaeda, the Taliban, and the geopolitics of social movements.

**HISTORY 84N. The American Empire in the Middle East since the Cold War: Afghanistan, Iraq, and Israel/Palestine. 4-5 Units.**

What were the traditional objectives of U.S. policy in the Middle East since the end of WW II? What forces shaped U.S. policy towards the Middle East? Did those interests and the means employed to pursue them change substantially after the demise of the Soviet Union? What has been the impact of U.S. policy on the region itself? The three principal cases to be examined are Afghanistan, Iraq, and Israel/Palestine.

**HISTORY 87. The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan. 3 Units.**

(Same as HISTORY 187. History majors and other taking 5 units, register for 187.) Explores the contested politics of these societies in modern times. Topics include controversies surrounding the meaning of revolution, state building, war, geopolitics, Islamic law, clerical authority, gender, an Islamic economy, culture, and ethnic, national and religious identities from the 1940s to the present. Assignments will focus on primary sources (especially legal documents, poetry, novels, and memoirs) and films.

**HISTORY 91C. Early Imperial China. 3 Units.**

(Same as HISTORY 191C. History majors and others taking 5 units, register for 191C.) The first millennium of imperial China, what endured over the centuries, and the major changes that took place in the political, social, and intellectual realms. Topics include the evolving geographic and environmental background, cities, the countryside, kinship, relations with the outer world, religion, philosophy, and literature. Also examines the nature of empire as a distinctive political form.

**HISTORY 91D. China: The Northern and Southern Dynasties. 3 Units.**

(Same as HISTORY 191D. History majors and others taking 5 units, register for 191D.) Examines one of the most dynamic periods of Chinese history with the emergence of the institutional religions (Buddhism and Daoism), the development of the garden as an art form, the rise of landscape as a theme of verse and art, the invention of lyric poetry, and the real beginnings of the southward spread of Chinese civilization.

**HISTORY 92A. The Historical Roots of Modern East Asia. 4-5 Units.**

Focus is on China and Japan before and during their transition to modernity. The populous, urbanized, economically advanced, and culturally sophisticated Ming empire and Muromachi shogunate in the 16th century when Europeans first arrived. How the status quo had turned on its head by the early 20th century when European and American steamships dominated the Pacific, China was in social and political upheaval, and Japan had begun its march to empire.

Same as: HISTORY 392E.

**HISTORY 93. Late Imperial China. 3 Units.**

(Same as HISTORY 193. History majors and others taking 5 units, register for 193.) A survey of Chinese history from the 11th century to the collapse of the imperial state in 1911. Topics include absolutism, gentry society, popular culture, gender and sexuality, steppe nomads, the Jesuits in China, peasant rebellion, ethnic conflict, opium, and the impact of Western imperialism.

**HISTORY 94B. Japan in the Age of the Samurai. 3 Units.**

(Same as HISTORY 194B. History majors and others taking 5 units, register for 194B.) From the Warring States Period to the Meiji Restoration. Topics include the three great unifiers, Tokugawa hegemony, the samurai class, Neoconfucian ideologies, suppression of Christianity, structures of social and economic control, frontiers, the other and otherness, castle-town culture, peasant rebellion, black marketing, print culture, the floating world, National Studies, food culture, samurai activism, black ships, unequal treaties, anti-foreign terrorism, restorationism, millenarianism, modernization as westernization, Japan as imagined community.

**HISTORY 94S. Rebels, Boxers and Bandits: Violent Resistance in Late Imperial China. 5 Units.**

In the mid-19th century a man claiming to be Jesus Christ's younger brother led a rebellion that killed 20 million. In 1900, the Boxers United in Righteousness staged a bloody uprising. Bandits, something in Western women's clothing, raided across the country. How did these rebels, Boxers and bandits see themselves? How were they represented by others? What were their relations to the state? Do they mean anything? Are they important?.

**HISTORY 95. Modern Korean History. 3 Units.**

(Same as HISTORY 195. History majors and others taking 5 units, register for 195.) Themes include status, gender, and monarchy in the Choson dynasty; intellectual life and social transformation in the 19th century; the rise of Korean nationalism; Japan's colonial rule and Korean identities; culture, economy, and society in colonial Korea; the Korean War, and the different state building processes in North and South after the Korean War.

**HISTORY 95C. Modern Japanese History: From Samurai to Pokemon. 3 Units.**

(Same as History 195C. History majors and others taking 5 units, register for 195C.) Japan's modern transformation from the late 19th century to the present. Topics include: the Meiji revolution; industrialization and social dislocation; the rise of democracy and empire; total war and US occupation; economic miracle and malaise; Japan as soft power; and politics of memory. Readings and films focus on the lived experience of ordinary men and women across social classes and regions.

**HISTORY 96. Worlds of Gandhi. 3 Units.**

Place the paradox of Gandhi in context of global convulsions of 20th century. Gandhi lived across continents; maturing in South Africa, struggling in India, attaining celebrity in Europe. As leader of masses, his method of Satyagraha was distinctively at odds with his times. Yet, he also privileged sacrifice, dying, even euthanasia. In a world beset by fear and war, Gandhi's complex theory of nonviolence is compelling. What kind of nonviolent politics did Gandhi envision after Fascism, Auschwitz, Hiroshima, and Pakistan?.

**HISTORY 96S. City Between Empires: Nationalism, Colonialism, and Identity in Hong Kong 1841-1997. 5 Units.**

A history of Hong Kong from 1841 to the present, concentrating on the complex intersection of colonialism and nationalism as it affected the development of local identity. Will focus in particular on Hong Kong's initial development in the nineteenth century, its connection to the global Chinese diaspora, the city's experience with both British and Japanese colonialism, and how its relationship with Mainland China changed over the course of modern history. Sources include colonial records, novels, movies, artwork, photography, and maps.

**HISTORY 97S. Urbicide: Air Raids and the Destruction of Urban Space during World War II. 5 Units.**

This course explores the rhetoric and reality of air raids conducted against European and Japanese cities during World War II. Topics include the ethics of total and aerial warfare, the mobilization of state science, theories of place annihilation, the politics of memory, and the evolution of the tactics and technologies of aerial warfare from its early origins to drone warfare in the present day.

**HISTORY 98. The History of Modern China. 3 Units.**

(Same as HISTORY 198. History majors and others taking 5 units, register for 198.) Major historical transformations including the decline of the last imperial dynasty, the formation of the first Chinese republic, WW II, the rise of Communism, China under Mao, post-Mao reforms, and the Beijing Olympics of 2008.

**HISTORY 98S. Forbidden Desires in China From Daoist Devotees to Dr. Sex. 5 Units.**

In this seminar, we will use materials from literatures, theater, law, medicine, and fine art to consider sex in Chinese history, from ancient traditions to the twentieth century. How did desires shape individual lives as well as social, political, and economic patterns? When and why did certain desires become "forbidden"? By the end of the course, we will be able to thoughtfully answer these questions by critically thinking about historical sources and our own roles as creators of historical narratives.

**HISTORY 101. The Greeks. 4-5 Units.**

Greek history from the rise of the city state through Alexander the Great's conquest of Persia. Economics, society, culture, and technology. Competition and cooperation within and between states; the emergence of strong forms of citizenship along with chattel slavery and gender inequality; the origins and practices of democracy; and relations with non-Greek peoples. Focus is on ancient sources and archaeological remains. Same as: CLASSHIS 101.

**HISTORY 102. The History of the International System since 1914. 5 Units.**

After defining the characteristics of the international system at the beginning of the twentieth century, this course reviews the primary developments in its functioning in the century that followed. Topics include the major wars and peace settlements; the emergence of Nazism and Communism; the development of the Cold War and nuclear weapons; the rise of China, India, and the EU; and the impact of Islamic terrorism. The role of international institutions and international society will also be a focus as will the challenge of environment, health, poverty, and climate issues to the functioning of the system. Same as: INTNLREL 102.

**HISTORY 102A. The Romans. 3-5 Units.**

How did a tiny village create a huge empire and shape the world, and why did it fail? Roman history, imperialism, politics, social life, economic growth, and religious change. Same as: CLASSHIS 60.

**HISTORY 103D. Human Society and Environmental Change. 4 Units.**

Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A  
Same as: EARTHYSYS 112, EESS 112.

**HISTORY 103E. History of Nuclear Weapons. 5 Units.**

The development of nuclear weapons and policies. How existing nuclear powers have managed their relations with each other. How nuclear war has been avoided so far and whether it can be avoided in the future. Same as: POLISCI 116.

**HISTORY 103F. Introduction to Military History. 5 Units.**

Introduces students to the rich history of military affairs and, at the same time, examines the ways in which we think of change and continuity in military history. How did war evolve from ancient times, both in styles of warfare and perceptions of war? What is the nature of the relationship between war and society? Is there such a thing as a Western way of war? What role does technology play in transforming military affairs? What is a military revolution and can it be manufactured or induced? Chronologically following the evolution of warfare from Ancient Greece to present day so-called new wars, we will continuously investigate how the interdependencies between technological advances, social change, philosophical debates and economic pressures both shaped and were influenced by war.

**HISTORY 105. Gandhi, King, and Nonviolence. 4 Units.**

Lives, times, theory, and practice of Mohandas Gandhi and Martin Luther King, Jr.; their significance to issues of violence and nonviolence today. Same as: RELIGST 118.

**HISTORY 105C. Human Trafficking: Historical, Legal, and Medical Perspectives. 5 Units.**

(Same as HISTORY 5C. History majors and others taking 5 units, enroll in 105C.) Interdisciplinary approach to understanding the extent and complexity of the global phenomenon of human trafficking, especially for forced prostitution and labor exploitation, focusing on human rights violations and remedies. Provides a historical context for the development and spread of human trafficking. Analyzes the current international and domestic legal and policy frameworks to combat trafficking and evaluates their practical implementation. Examines the medical, psychological, and public health issues involved. Uses problem-based learning and offers an optional service-learning component.

**HISTORY 106A. Global Human Geography: Asia and Africa. 5 Units.**

Global patterns of demography, economic and social development, geopolitics, and cultural differentiation, covering E. Asia, S. Asia, S.E. Asia, Central Asia, N. Africa, and sub-Saharan Africa. Use of maps to depict geographical patterns and processes.

**HISTORY 106C. Global Historical Geography. 5 Units.**

The sweep of human history through the medium of maps. The rise, expansion, and fall of kingdoms, empires, and other states; the spread of major religions; the paths of explorers, conquerors, and diseases; and the development and intensification of trade networks. Overview of the prehistoric period and ancient times, but focus is on the modern world.

**HISTORY 107C. Social Democracy from Marx to Gross National Happiness. 5 Units.**

The history of the 'short twentieth century' is often told as the struggle between Capitalism and Communism, as if there were no further alternatives. But the search for a "Third Way" between them was a constant feature of the 20th century, with roots deep in the 19th. One such system, Social Democracy, has a strong claim to be providing its citizens with both prosperity and justice. Explores the relationship of ideas and politics and about Social Democracy considered as a "third system": a social, economic and political system in its own right and, at the same time, a radical critique of both Capitalism and Marxist Communism. Topics include: the development of Social Democratic thought, movements, tactics policies and practices to be examined through the analysis of the writings of Marx, Bernstein, the English Fabians, and the 20th century Scandinavian and German thinkers and practitioners of Social Democracy; the history and practice of political parties, labor movements, and governments; the institutionalization of Social Democracy in Britain, Western, Central and Northern Europe, and in the so-called "developing societies"; contemporary debates as "Social Europe" and "Gross National Happiness"; and the growth of a "social democratic sensibility" and culture. Several films will be screened during the course.  
Same as: JEWISHST 187C.

**HISTORY 108B. The Great Divergence: Latin American and East Asian Historical Development. 5 Units.**

Analysis, in historical perspective, of similarities and differences between development of Latin America and East Asia from early modern times to the present. Focusing primarily on Argentina, Brazil, and Mexico on one hand and China, Japan, and (South) Korea on the other, topics include impact of colonial and postcolonial relationships on development of states, markets, and classes, as well as factors such as labor, technology, culture, and natural resources that shaped them.

**HISTORY 110A. Europe from Late Antiquity to 1500. 5 Units.**

(Same as HISTORY 10A. History majors and others taking 5 units, register for 110A.) Course will provide a fundamental understanding of the material civilization, political and legal institutions, and cultural imagination of the Middle Ages, when the fundamental structures of life in Europe were transformed. Students will explore the documents and cultural artifacts of medieval civilization, which remain stunning monuments of perennial importance for understanding how pre-modern human beings grappled with and overcame material hardship, organized their political and economic communities, and led their spiritual and intellectual lives.

**HISTORY 110B. From Renaissance to Revolution: Early Modern Europe. 5 Units.**

(Same as HISTORY 10B. History majors and others taking 5 units, register for 110B.) From 1350 to 1789, Europe went from being a provincial backwater to a new global center of power. This course surveys the profound changes of the period that shape our world today: the spread of humanism and science, religious reformation, new styles of warfare, the rise of capitalism and a new global economy, the emergence of the state, and revolution which sought to overthrow established governments.

**HISTORY 110C. Introduction to Modern Europe. 5 Units.**

(SAME as HISTORY 10C. History majors and others taking 5 units, register for 110C.) From the late 18th century to the present. How Europeans responded to rapid social changes caused by political upheaval, industrialization, and modernization. How the experience and legacy of imperialism and colonialism both influenced European society and put in motion a process of globalization that continues to shape international politics today.

**HISTORY 120A. The Russian Empire, 1450-1796. 5 Units.**

(Same as HISTORY 20A. History majors and others taking 5 units, register for 120A.) Fundamental building blocks of Russian civilization, treated thematically, from the tenth to the eighteenth centuries: religion, art and architecture, literature, social structures, political ideology, and political culture.

**HISTORY 120B. The Russian Empire. 5 Units.**

From Peter the Great to the Bolsheviks. Russia as an empire; its varied regions, including the Caucasus, Central Asia, Ukraine, Poland, and the Baltics. Focus is on the politics and cultures of empire. Sources include novels, political tracts, paintings, music, and other primary sources.

**HISTORY 120C. 20th-Century Russian and Soviet History. 5 Units.**

The Soviet polity from the 1917 Revolution to its collapse in 1991. Essentials of Marxist ideology; the Russian Empire in 1917. Causation in history; interpretations of the Revolution; state building in a socialist polity; social engineering through collectivization of agriculture, force-paced industrialization, and cultural revolution; terror as concept and practice; nationality policies in a multiethnic socialist empire; the routinization, decline, and collapse of the revolutionary ethos; and the legacy of the Soviet experiment in the new Russia.

**HISTORY 130A. The Rise of Scientific Medicine in the United States, 1825-Present. 5 Units.**

Explores the history of medical institutions, ideas and practices in the United States from the early nineteenth century to the present. How are ideas of illness and health historically rooted and socially constructed? How did scientific and medical discoveries lead to the risk of scientific medicine, and how were these innovations adopted within the American cultural landscape? Topics include the transformation of therapeutics and technologies, medicine and the scientific ideal in the U.S., gender and race and medicine, the history of public health, and the professionalization and specialization of American medical practice.

**HISTORY 132. Ordinary Lives: A Social History of the Everyday in Early Modern Europe. 5 Units.**

What war meant for foot soldiers and the peasants across whose fields they marched. Ordinary people's lives in the eras of Machiavelli, Shakespeare, the Reformation, and the scientific revolution. Topics include: birth, marriage, and death; city life and peasant culture; lay encounters with religious and intellectual ideas; war and crime; and gender and sexuality.

**HISTORY 132A. Enlightenment and the Arts. 5 Units.**

(Same as HISTORY 32A. History majors and others taking 5 units enroll in 132A.) Gateway course for the History, Literature, and the Arts track of the History major. Novels, poetry, music, paintings, and architecture, and what they reveal about the society that produced them.

**HISTORY 133A. Blood and Roses: The Age of the Tudors. 5 Units.**

English society and state from the Wars of the Roses to the death of Elizabeth. Political, social, and cultural upheavals of the Tudor period and the changes wrought by the Reformation. The establishment of the Tudor monarchy; destruction of the Catholic church; rise of Puritanism; and 16th-century social and economic changes.

**HISTORY 133B. Revolutionary England: The Stuart Age. 5 Units.**

(Same as HISTORY 33B. History majors and others taking 5 units, register for 133B.) From the accession of King James I in 1603 to the death of Queen Anne in 1714: a brutal civil war, the execution of one anointed king, and the deposition of another. Topics include the causes and consequences of the English Revolution, the origins of Anglo-American democratic thought, the rise and decline of Puritanism, and the emergence of England as an economic and colonial power. (Como).

**HISTORY 134. The French Revolution and the Invention of Modern Politics. 5 Units.**

This course will focus on the invention of modern politics in the French Revolution. The goal will be to understand the structural contradictions of the French monarchy in the pre-revolutionary period, the reasons for the monarchy's failure to resolve those contradictions, and the political dynamic unleashed as they were solved by the revolutionary action of 1789. Sovereignty, democracy, rights, representation, and terror will be principal themes. Lectures will be combined with close reading and discussions of political and philosophical writings of the period.

**HISTORY 137A. Europe, 1945-2002. 5 Units.**

Europe's transformation from the end of WW II to an expanded EU. Political, cultural, economic, and social history. Topics: postwar reconstruction, Cold War, consumer versus socialist culture, collapse of Communism, postcommunist integration.

**HISTORY 138A. Germany and the World Wars, 1870-1990. 5 Units.**

(Same as HISTORY 38A. Majors and others taking 5 units, enroll in 138A.) Germany's history from Bismarck's wars of unification through the end of the Cold War. The radicalizing relationship between international conflict, social upheaval, and state transformation with a focus on the clashes of the Second Empire, the road to WW I, interwar instability, the rise of Nazism, WW II, the Holocaust, the division of communist E. and capitalist W. Germany, and the fall of the Iron Curtain.

**HISTORY 139. Modern Britain and the British Empire. 5 Units.**

(Same as HISTORY 39. History majors and others taking 5 units, register in 139.) From American Independence to the latest war in Iraq. Topics include: the rise of the modern British state and economy; imperial expansion and contraction; the formation of class, gender, and national identities; mass culture and politics; the world wars; and contemporary racial politics. Focus is on questions of decline, the fortunes and contradictions of British liberalism in an era of imperialism, and the weight of the past in contemporary Britain.

**HISTORY 140. World History of Science. 5 Units.**

(Same as HISTORY 40. History majors and others taking 5 units, register for 140.) The earliest developments in science, the prehistoric roots of technology, the scientific revolution, and global voyaging. Theories of human origins and the oldest known tools and symbols. Achievements of the Mayans, Aztecs, and native N. Americans. Science and medicine in ancient Greece, Egypt, China, Africa, and India. Science in medieval and Renaissance Europe and the Islamic world including changing cosmologies and natural histories. Theories of scientific growth and decay; how science engages other factors such as material culture and religions.

**HISTORY 140A. The Scientific Revolution. 5 Units.**

What do people know and how do they know it? What counts as scientific knowledge? In the 16th and 17th centuries, understanding the nature of knowledge engaged the attention of individuals and institutions including Copernicus, Galileo, Descartes, Newton, the early Royal Society, and less well-known contemporaries. New meanings of observing, collecting, experimenting, and philosophizing, and political, religious, and cultural ramifications in early modern Europe.

**HISTORY 142. Darwin in the History of Life. 5 Units.**

(Same as HISTORY 42. History majors and others taking 5 units, register for 142.) Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evodevo, neocatastrophism, and the new technological frontier of biomimicry.

**HISTORY 144. History of Women and Gender in Science, Medicine and Engineering. 5 Units.**

(Same as HISTORY 44. Majors and others taking 5 units, enroll in HISTORY 144.) Men's and women's roles in science, medicine, and engineering over the past 200 years with a focus on the present. What are the efforts underway globally to transform science, medicine, and engineering into fields where women can flourish? How have science and medicine studied and defined males and females? Can gender analysis spark creativity in human knowledge?.

**HISTORY 145A. Africa Until European Conquest. 5 Units.**

Episodes in African history from the earliest records up until European partition of the continent, focusing on how knowledge about the natural, social, and spiritual worlds was linked to the exercise of power. The effects of technological innovations on states and other forms of social complexity; use of religious beliefs and practices to legitimate or critique authority. The effects of slave trades and imperial conquest on these forms of authority.

**HISTORY 145B. Africa in the 20th Century. 5 Units.**

(Same as HISTORY 45B. History majors and others taking 5 units, register for 145B.) The challenges facing Africans from when the continent fell under colonial rule until independence. Case studies of colonialism and its impact on African men and women drawn from West, Central, and Southern Africa. Novels, plays, polemics, and autobiographies written by Africans.

**HISTORY 147. History of South Africa. 5 Units.**

(Same as HISTORY 47. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis.  
Same as: AFRICAAM 147.

**HISTORY 149C. The Slave Trade. 5 Units.**

(Same as HISTORY 49C. History majors and others taking 5 units, enroll in 149C.) Slave trades and forms of slavery in W. Africa from 1000 to 1885; impacts on lives, social organization, and political structures. Slavery in Islam, the slave market in the Mediterranean and Middle East, and the Saharan slave trade. Slavery within Africa, growth of the Atlantic trade, the Middle Passage, and war and trade that produced slaves. Impact of the Industrial Revolution and European abolition movements on the use of slaves and warfare in Africa. The relationship between slaving and the European conquest of Africa.

**HISTORY 150A. Colonial and Revolutionary America. 5 Units.**

(Same as HISTORY 50A. History majors and others taking 5 units, register for HISTORY 150A.) Survey of the origins of American society and polity in the 17th and 18th centuries. Topics: the migration of Europeans and Africans and the impact on native populations; the emergence of racial slavery and of regional, provincial, Protestant cultures; and the political origins and constitutional consequences of the American Revolution.  
Same as: AMSTUD 150A.

**HISTORY 150B. 19th-Century America. 5 Units.**

(Same as HISTORY 50B. History majors and others taking 5 units, register for 150B.) Territorial expansion, social change, and economic transformation. The causes and consequences of the Civil War. Topics include: urbanization and the market revolution; slavery and the Old South; sectional conflict; successes and failures of Reconstruction; and late 19th-century society and culture.  
Same as: AFRICAAM 150B, AMSTUD 150B.

**HISTORY 150C. The United States in the Twentieth Century. 5 Units.**

(Same as HISTORY 50C. History majors and others taking 5 units, register for 150C.) Major political, economic, social, and diplomatic developments in the U.S. Themes: the economic and social role of government (Progressive, New Deal, Great Society, and Reagan-Bush eras); ethnic and racial minorities in society (mass immigration at the turn of the century and since 1965, the civil rights era of the 50s and 60s); the changing status of women since WW II; shifting ideological bases, institutional structures, and electoral characteristics of the political system (New Deal and post-Vietnam); determinants of foreign policy in WW I and II, and the Cold War.

Same as: AMSTUD 150C.

**HISTORY 154D. Religion and War in America. 4 Units.**

Scholars have devoted much attention to wars in American history, but have not agreed as to whether religion was a major cause or simply a cover for political, economic, and other motives. We will compare interpretations that leave religion out, with those that take it into account. We will also look at the impact of war on the religious lives of ordinary Americans. We will examine both secondary as well as primary sources, beginning with King Philip's War in the 17th century, and ending with the "War on Terror" in the present day.

Same as: RELIGST 105.

**HISTORY 158. The United States Since 1945. 4-5 Units.**

Focus is on foreign policy and politics with less attention to social and intellectual history. Topics include nuclear weapons in WW II, the Cold War, the Korean and Vietnam wars, Eisenhower revisionism, the Bay of Pigs and Cuban missile crisis, civil rights and the black freedom struggle, the women's movement, the Great Society and backlash, welfare policy, conservatism and liberalism, the 60s anti-war movement, Watergate and the growth of executive power, Iran-Contra and Reagan revisionism, Silicon Valley, the Gulf War, the Clinton impeachment controversy, 2004 election, and 9/11 and Iraq war.

**HISTORY 158B. History of Education in the United States. 3-5 Units.**

How education came to its current forms and functions, from the colonial experience to the present. Focus is on the 19th-century invention of the common school system, 20th-century emergence of progressive education reform, and the developments since WW II. The role of gender and race, the development of the high school and university, and school organization, curriculum, and teaching.

Same as: AMSTUD 201, EDUC 201.

**HISTORY 158C. History of Higher Education in the U.S.. 3-5 Units.**

Major periods of evolution, particularly since the mid-19th century. Premise: insights into contemporary higher education can be obtained through its antecedents, particularly regarding issues of governance, mission, access, curriculum, and the changing organization of colleges and universities.

Same as: AMSTUD 165, EDUC 165, EDUC 265.

**HISTORY 161. Women in Modern America. 4-5 Units.**

The transformation from the New Woman of the 1890s to the New Woman of the 1990s; attention to immigrant, black, and white women, both historical analyses and personal accounts. Topics include: workforce participation; family and reproductive labor; educational and professional opportunities; the impact of wars, economic depression, and popular culture; and recurrent feminist movements.

Same as: AMSTUD 161, CSRE 162.

**HISTORY 163. A History of North American Wests. 5 Units.**

The history, peoples, and natural systems of a region that has never been contained within a single empire or nation state, but has been united by the movement of peoples, species, and things. Topics include smallpox, horses, gold, salmon, rivers, coal, and oil.

**HISTORY 164C. From Freedom to Freedom Now: African American History, 1865-1965. 5 Units.**

(Same as HISTORY 64C. History majors and others taking 5 units, register for 164C.) Explores the working lives, social worlds, political ideologies and cultural expressions of African Americans from emancipation to the early civil rights era. Topics include: the transition from slavery to freedom, family life, work, culture, leisure patterns, resistance, migration and social activism. Draws largely on primary sources including autobiographies, memoirs, letters, personal journals, newspaper articles, pamphlets, speeches, literature, film and music.

Same as: AMSTUD 164C.

**HISTORY 165. Mexican American History through Film. 4-5 Units.**

Focus is on the 20th century. Themes such as immigration, urbanization, ethnic identity, the role of women, and the struggle for civil rights.

**HISTORY 166. Introduction to African American History: The Modern African American Freedom Struggle. 3-5 Units.**

This course is an introduction to African-American Political movements of the period after 1930, with special emphasis on mass protest and civil rights activism as well as leaders such as W. E. B. Du Bois, Thurgood Marshall, Martin Luther King, Jr., Malcom X, Jesse Jackson, and Barack Obama.

The lectures will utilize audio-visual materials extensively, and the exams will cover these materials as well as the traditional lectures. In addition to attending lectures, students are encouraged to undertake research projects.

Same as: AFRICAAM 166, AMSTUD 166.

**HISTORY 166B. Immigration Debates in America, Past and Present. 3-5 Units.**

Examines the ways in which the immigration of people from around the world and migration within the United States shaped American nation-building and ideas about national identity in the twentieth century. Focuses on how conflicting ideas about race, gender, ethnicity, and citizenship with respect to particular groups led to policies both of exclusion and integration. Part One begins with the ways in which the American views of race and citizenship in the colonial period through the post-Reconstruction Era led to the passage of the Chinese Exclusion Act in 1882 and subsequently to broader exclusions of immigrants from other parts of Asia, Southern and Eastern Europe, and Mexico. Explores how World War II and the Cold War challenged racial ideologies and led to policies of increasing liberalization culminating in the passage of the 1965 Immigration Act, which eliminated quotas based on national origins and opened the door for new waves of immigrants, especially from Asia and Latin America. Part Two considers new immigration patterns after 1965, including those of refugees, and investigates the contemporary debate over immigration and immigration policy in the post 9/11 era as well as inequalities within the system and the impact of foreign policy on exclusions and inclusions.

Same as: CSRE 166B, HISTORY 366B.

**HISTORY 168. American History in Film: Since World War II. 3-4 Units.**

U.S. society, culture, and politics since WW II through feature films. Topics include: McCarthyism and the Cold War; ethnicity and racial identity; changing sex and gender relationships; the civil rights and anti-war movements; and mass media. Films include *The Best Years of Our Lives*, *Salt of the Earth*, *On the Waterfront*, *Raisin in the Sun*, *Medium Cool*, and *Broadcast News*.

**HISTORY 169. The Environmental History of North America. 4-5 Units.**

Concentrates on anthropogenic environmental change and its consequences for both the natural environment and human society. Human alteration of the continent began well before the arrival of Europeans, and many developments usually considered as only human history are embedded in a wider environmental history. Begins with the Columbian Exchange and the demographic disaster that followed and ends with global climate change.

Same as: EARTHSYS 145.



**HISTORY 170B. Culture, Society and Politics in Latin America. 5 Units.**

(Same as HISTORY 70. History majors and others taking 5 units, enroll in HISTORY 170B.) The course of Latin American history from the colonial era to the present day. Key issues such as colonialism, nationalism, democracy, and revolution will be examined critically in light of broad comparative themes in Latin American and world history. Sources include writings in the social sciences as well as primary documents, fiction, and film.

**HISTORY 175B. Transnational Latin American Migration to the United States. 5 Units.**

Explores the major trends in Latin American migration to the United States. Examines the impact of transnational migration on identity formation, economic relations, and policy debates in Latin America and the United States. Topics include the role of remittances, citizenship debates, struggles over immigration reform, transnational identity formation, refugee migration and Cold War politics, Latino alliances in the United States, and the effects of gender and sexuality on migratory patterns. Same as: CHILATST 175B.

**HISTORY 181B. Formation of the Contemporary Middle East. 5 Units.**

(Same as HISTORY 81B. History majors and others taking 5 units, register for 181B.) The history of the Middle East since WW I, focusing on the eastern Arab world, Egypt, the Fertile Crescent, and the Arabian Peninsula, with attention to Turkey, Iran, and Israel.

**HISTORY 182C. The Making of the Islamic World, 600-1500. 5 Units.**

(Same as HISTORY 82C. Majors and other taking 5 units, register for 182C.) The History of Islam and Muslim peoples from 600-1500. Topics include Muhammad and his community; the early Arab conquests and empires; sectarian movements; formation of Islamic belief, thought, legal culture and religious institutions; transregional Sufi and learned networks; family and sexuality; urban, rural and nomadic life; non-Muslim communities; the development of Mediterranean and Indian Ocean trade; relations with Byzantium, the Latin West, China; the Crusades and the Mongols.

**HISTORY 187. The Islamic Republics: Politics and Society in Iran, Afghanistan and Pakistan. 5 Units.**

(Same as HISTORY 87. History majors and others taking 5 units, register for 187.) Explores the contested politics of these societies in modern times. Topics include controversies surrounding the meaning of revolution, state building, war, geopolitics, Islamic law, clerical authority, gender, an Islamic economy, culture and ethnic, national and religious identities from the 1940s to the present. Assignments will focus on primary sources (especially legal documents, poetry, novels, and memoirs) and films.

**HISTORY 187D. Zionism and Its Critics. 4-5 Units.**

Zionism from its genesis in the 1880s up until the establishment of the state of Israel in May, 1948, exploring the historical, ideological and political dimensions of Zionism. Topics include: the emergence of Zionist ideology in connection to and as a response to challenges of modernity; emancipation; Haskalah (Jewish enlightenment); other national and ideological movements of the period; the ideological crystallization of the movement; and the immigration waves to Palestine. Same as: JEWISHST 187D.

**HISTORY 191C. Early Imperial China. 5 Units.**

(Same as HISTORY 91C. History majors and others taking 5 units, register for 191C.) The first millennium of imperial China, what endured over the centuries, and the major changes that took place in the political, social, and intellectual realms. Topics include the evolving geographic and environmental background, cities, the countryside, kinship, relations with the outer world, religion, philosophy, and literature. Also examines the nature of empire as a distinctive political form.

**HISTORY 191D. China: The Northern and Southern Dynasties. 5 Units.**

(Same as HISTORY 91D. History majors and others taking 5 units, register for 191D.) Examines one of the most dynamic periods of Chinese history with the emergence of the institutional religions (Buddhism and Daoism), the development of the garden as an art form, the rise of landscape as a theme of verse and art, the invention of lyric poetry, and the real beginnings of the southward spread of Chinese civilization.

**HISTORY 192. China: The Early Empires. 3-5 Units.**

How China was transformed as a consequence of its political unification by the Qin dynasty. The geographical reorganization of China in the process of unification. The changing nature of rulership, cities, rural society, military organization, kinship structure, religion, literary practice, law, and relations to the outside world. The nature of empire as a political system.

**HISTORY 193. Late Imperial China. 5 Units.**

(Same as HISTORY 93. History majors and others taking 5 units, register for 193.) A survey of Chinese history from the 11th century to the collapse of the imperial state in 1911. Topics include absolutism, gentry society, popular culture, gender and sexuality, steppe nomads, the Jesuits in China, peasant rebellion, ethnic conflict, opium, and the impact of Western imperialism.

**HISTORY 194B. Japan in the Age of the Samurai. 5 Units.**

(Same as HISTORY 94B. History majors and others taking 5 units, register for 194B.) From the Warring States Period to the Meiji Restoration. Topics include the three great unifiers, Tokugawa hegemony, the samurai class, Neoconfucian ideologies, suppression of Christianity, structures of social and economic control, frontiers, the other and otherness, castle-town culture, peasant rebellion, black marketing, print culture, the floating world, National Studies, food culture, samurai activism, black ships, unequal treaties, anti-foreign terrorism, restorationism, millenarianism, modernization as westernization, Japan as imagined community.

**HISTORY 194D. Japan and the World, 1543-1868. 4-5 Units.**

This course aims to explore world history through the early modern Japanese experience. Japan has been formed as a state through its interactions with China, Korea, Europe, Southeast Asia, and America even before the modern period. In addition to secondary sources, we survey a variety of primary sources, including Jesuit missionaries' diaries, travel accounts by European intellectuals, and world maps to shed light on international politics, religions, economy and publishing culture in the early modern world.

**HISTORY 195. Modern Korean History. 5 Units.**

(Same as HISTORY 95. History majors and others taking 5 units, register for 195.) Themes include status, gender, and monarchy in the Choson dynasty; intellectual life and social transformation in the 19th century; the rise of Korean nationalism; Japan's colonial rule and Korean identities; culture, economy, and society in colonial Korea; the Korean War, and the different state building processes in North and South after the Korean War.

**HISTORY 195C. Modern Japanese History: From Samurai to Pokemon. 5 Units.**

(Same as HISTORY 95C. History majors and others taking 5 units, register for 195C.) Japan's modern transformation from the late 19th century to the present. Topics include: the Meiji revolution; industrialization and social dislocation; the rise of democracy and empire; total war and US occupation; economic miracle and malaise; Japan as soft power; and politics of memory. Readings and films focus on the lived experience of ordinary men and women across social classes and regions.

**HISTORY 196. Worlds of Gandhi. 5 Units.**

(Same as HISTORY 96. History majors and others taking 5 units, register for 196.) Place the paradox of Gandhi in context of global convulsions of 20th century. Gandhi lived across continents; maturing in South Africa, struggling in India, attaining celebrity in Europe. As leader of masses, his method of Satyagraha was distinctively at odds with his times. Yet, he also privileged sacrifice, dying, even euthanasia. In a world beset by fear and war, Gandhi's complex theory of nonviolence is compelling. What kind of nonviolent politics did Gandhi envision after Fascism, Auschwitz, Hiroshima, and Pakistan?

**HISTORY 197. Southeast Asia: From Antiquity to the Modern Era. 5 Units.**

The history of S.E. Asia, comprising Indonesia, the Philippines, Malaysia, Singapore, Thailand, Vietnam, Burma, Cambodia, and Laos, from antiquity to the present. The spread of Indian cultural influences, the rise of indigenous states, and the emergence of globally linked trade networks. European colonization, economic transformation, the rise of nationalism, the development of the modern state, and the impact of globalization.

**HISTORY 198. The History of Modern China. 5 Units.**

(Same as HISTORY 98. History majors and others taking 5 units, register for 198.) Major historical transformations including the decline of the last imperial dynasty, the formation of the first Chinese republic, WW II, the rise of Communism, China under Mao, post-Mao reforms, and the Beijing Olympics of 2008.

**HISTORY 198G. Beijing, Shanghai, and the Structure of China. 3-5 Units.**

China's modern history through the rivalry of its two most important cities. The course begins in the nineteenth century, contrasting Beijing, the classic imperial capital and a foreign foundation paradoxically celebrated as the embodiment of "traditional" China, with Shanghai, a treaty port and demographic/economic center of China, but identified as a "foreign" city. After following the cities' history through the warlord period, the "Shanghai decade" of Nationalist rule, and the Japanese occupation, the course examines the two cities' developments under Mao and Deng. The course concludes with a look at their current relations and roles, and the transformed nature of China's cities.

**HISTORY 201. Introduction to Public History in the U.S., 19th Century to the Present. 4-5 Units.**

Gateway course for the History and Public Service interdisciplinary track. Topics include the production, presentation, and practice of public history through narratives, exhibits, web sites, and events in museums, historical sites, parks, and public service settings in nonprofit organizations, government agencies, and educational institutions. Service Learning Course (certified by Haas Center).  
Same as: HISTORY 301.

**HISTORY 201A. The Global Drug Wars. 4-5 Units.**

Explores the global story of the struggle over drugs from the nineteenth century to the present. Topics include the history of the opium wars in China, controversies over wine and tobacco in Iran, narco-trafficking and civil war in Lebanon, the Afghan 'narco-state,' Andean cocaine as a global commodity, the politics of U.S.- Mexico drug trafficking, incarceration, drugs, and race in the U.S., and the globalization of the American 'war on drugs.'  
Same as: HISTORY 301A.

**HISTORY 202. International History and International Relations Theory. 5 Units.**

The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system.  
Same as: HISTORY 306E, POLISCI 216E, POLISCI 316.

**HISTORY 202C. Heretics to Headscarves. 5 Units.**

Broad survey of religious discrimination and persecution in the Euro-American tradition, and the rise of tolerationist ideas and practices, from Augustine's rationale for punishing dissenters to the current European debates over the regulation of Islam. Topics include the Inquisition; struggles over toleration in Reformation Europe; the impact of Locke, Bayle, and Spinoza; Spanish practice in the Americas; and the American constitutional experiment in free exercise.  
Same as: JEWISHST 182C, POLISCI 224H.

**HISTORY 202E. The Great War. 4-5 Units.**

The First World War provided a prototype for a new, horrific kind of war. It catalyzed the emergence of modern means of warfare and the social mechanisms necessary to sustain the industrialized war machine. Killing millions, it became the blueprint for the total war that succeeded it. It also brought about new social and political orders, transforming the societies which it mobilized at unprecedented levels. This course will examine the military, political, economic, social and cultural aspects of the conflict. We will discuss the origins and outbreak of the war, the land, sea and air campaigns, the war's economic and social consequences, the home fronts, the war's final stages in eastern and western Europe as well as non-European fronts, and finally, the war's impact on the international system and on its belligerents' and participants' perceptions of the new reality it had created.  
Same as: HISTORY 302E.

**HISTORY 203E. Global Catholicism. 5 Units.**

Explores the rise of Catholicism as a global phenomenon, and investigates its multiple transformations as it spread to the Americas, Asia, and Africa. Topics will include the Reformation, Tridentine reform and the Jesuits, the underground churches in England and the Dutch Republic, the missions to Asia, the Spanish conquest of Latin America, conversion and indigenous religions, missionary imperialism and new religious movements in the non-European world.

**HISTORY 204E. Totalitarianism. 4-5 Units.**

Modern revolutionary and totalitarian politics. Sources include monographs on the medieval, Reformation, French Revolutionary, and Great War eras. Topics: the essence of modern ideology, the concept of the body national, state terror, charismatic leadership, gender assignments, private and public spheres, and identities.  
Same as: HISTORY 307E.

**HISTORY 204F. The Modern Tradition of Non-Violent Resistance. 5 Units.**

During the twentieth century, peasants and menial laborers who comprised the majority of humanity launched liberation movements to secure citizenship rights. Mohandas K. Gandhi, Martin Luther King, Jr., and Nelson Mandela are among the leaders whose ideas continue to influence contemporary movements for global peace with social justice in a sustainable environment.  
Same as: AFRICAAM 204F, CSRE 104F.

**HISTORY 204G. War and Society. 5 Units.**

How Western societies and cultures have responded to modern warfare. The relationship between its destructive capacity and effects on those who produce, are subject to, and must come to terms with its aftermath. Literary representations of WW I; destructive psychological effects of modern warfare including those who take pleasure in killing; changes in relations between the genders; consequences of genocidal ideology and racial prejudice; the theory of just war and its practical implementation; and how wars are commemorated.  
Same as: HISTORY 304G.

**HISTORY 205A. The History of Information. 4-5 Units.**

Examines the history of information from multiple perspectives such as the changing conceptions of facticity and evidence cross-culturally as well as a range of information technologies, from moveable type printing and telegraphy to text messaging and Twitter. Other topics include the ways in which information is shaped by the languages in which it is recorded, stored, and transmitted, and also the ways in which information infrastructures influence what is forgotten and lost.

Same as: HISTORY 305A.

**HISTORY 205C. Capitalism and Its Discontents: From Adam Smith to Adbusters. 4-5 Units.**

The intellectual and political history of capitalism and anti-capitalism. Varying historical attempts to define and describe capitalism; ethical/moral arguments for and against capitalism; alternative economic systems and political struggles. Case studies include classical political economy, early socialism, Marxism, institutional economics, anti-modernism, "Third World" radicalism, the New Left, libertarianism, evangelical capitalism, ecology, conservative anti-capitalism and the Occupy movements. Readings include Adam Smith, Karl Marx, Thorstein Veblen, Mike Davis, Adbusters magazine, and Pope Benedict XVI.

**HISTORY 205G. Creative Political Thinking: Three Cases. 4-5 Units.**

How can we account for creativity and innovation in political thinking? Are these qualities simply a product of political expediency and rhetorical urgency, or do they also depend on qualities of mind and historical contingencies that have to be studied individually? This class will explore these questions with three noteworthy cases: Niccolo Machiavelli, John Locke, and James Madison. Extensive reading in both primary writings and secondary sources.

Same as: HISTORY 305G.

**HISTORY 206. History and Geography of Contemporary Global Issues. 5 Units.**

The historical background and geographical context of contemporary global issues and events. Texts are a world atlas and regular reading of *The New York Times* and *The Economist*. Topics vary according to what is happening in the world. Student presentations.

**HISTORY 207. Biography and History. 4-5 Units.**

The relationship between biographical and historical writing, primarily in Europe and America. Problems of methodology, evidence, dispassion, and empathy. Texts: biographies, critical literature on biographical work, and novels (A. S. Byatt's *Possession*, Bernard Malamud's *Dubin's Lives*) that illuminate the intellectual underpinnings of biographical labor.

Same as: HISTORY 308.

**HISTORY 207C. The Global Early Modern. 4-5 Units.**

In what sense can we speak of "globalization" before modernity? What are the characteristics and origins of the economic system we know as "capitalism"? When and why did European economies begin to diverge from those of other Eurasian societies? With these big questions in mind, the primary focus will be on the history of Europe and European empires, but substantial readings deal with other parts of the world, particularly China and the Indian Ocean.

Same as: HISTORY 307C.

**HISTORY 208. Private Lives, Public Stories: Autobiography in Women's History. 5 Units.**

Changing contexts of women's lives and how women's actions have shaped and responded to those contexts.

**HISTORY 208A. Science and Law in History. 4-5 Units.**

How the intertwined modern fields of science and law, since the early modern period, together developed central notions of fact, evidence, experiment, demonstration, objectivity, and proof.

Same as: HISTORY 308A.

**HISTORY 208B. Women Activists' Response to War. 4-5 Units.**

Theoretical issues, historical origins, changing forms of women's activism in response to war throughout the 20th century, and contemporary cases, such as the Russian Committee of Soldiers Mothers, Bosnian Mothers of Srebrenica, Serbian Women in Black, and the American Cindy Sheehan. Focus is on the U.S. and Eastern Europe, with attention to Israel, England, and Argentina.

Same as: HISTORY 308B.

**HISTORY 208D. Pre-Modern Warfare. 3-5 Units.**

This course examines the evolving nature of warfare and its impact on society across the Eurasian continent up to the Gunpowder Revolution and rise of the nation-state. Beginning with an attempt to define war, it will trace the evolution of military technology from the Stone Age through the rise of the chariot, the sword, and the mounted rider, and examine how changing methods of conducting warfare were inextricably linked to changes in the social order and political structures.

Same as: HISTORY 308D.

**HISTORY 208S. Facing the Past: The Politics of Retrospective Justice. 5 Units.**

Forms of injustice in history including slavery, genocide, ethnic cleansing, mass rape, forced religious conversion, and torture of prisoners. Mechanisms developed over the last century to define, deter, and alleviate the effects of such offenses, including war crimes tribunals, truth commissions, national apologies, and monetary reparations. Case studies chart the international field of retrospective justice, exploring the legal, political, and moral implications of confronting traumatic pasts.

**HISTORY 209B. The Idea of Politics. 4-5 Units.**

Can we live without politics? Is politics indispensable for humanity and vice-versa? The idea of politics is that it must transform, through human action, conditions of collective life. But the 20th century produced colliding beliefs about what that life might be and what the human being itself might look like. Explore whether, after the century, we might still think of politics as an ethical idea and the "human" as foundational political category.

Keywords: Civility, Cruelty, Friendship, Empire, Democracy, Humanism, Animals.

Same as: HISTORY 309B.

**HISTORY 209C. Liberalism and Violence. 5 Units.**

Does Liberalism have a theory of violence? What does modern political thought, in privileging humanity and rights, share with "terrorists" and "rogue states"? How is liberalism transformed by the use of religion and death for political ends? We read key thinkers of modern life- Adorno, Arendt, Agamben, Benjamin, Derrida, Fanon, Foucault, Gandhi, Heidegger, and Schmitt- to interrogate the relationship between religion, sacrifice, and democracy. At the center are connections between war and modern life, and between violence and non-violence.

Same as: HISTORY 309C.

**HISTORY 209D. Postcolonialism and Universalism. 4-5 Units.**

Key texts and motifs from postcolonial theory: empire, class, exile, suffering, textuality, archive in juxtaposition to 20th-century philosophical questions about universal history and the relevance of humanist inquiry.

Same as: HISTORY 309A.

**HISTORY 209S. Research Seminar for Majors. 5 Units.**

Required of History majors. How to conduct original, historical research and analysis, including methods such as using the libraries and archives at Stanford and elsewhere, and working collaboratively to frame topics, identify sources, and develop analyses. Autumn quarter focuses on European Lit and Arts; winter quarter on U.S. History and Colonialism; spring quarter on modern Europe, ancient China and early modern Europe.

**HISTORY 213E. Spies, Fakes, and Forgers: The History of Deception, 1300-1650. 5 Units.**

The striking new naturalism that characterized the art of Leonardo da Vinci or Raphael Sanzio was only made possible by innovations like perspective that deceived the eye, making a flat surface appear three-dimensional. During the Renaissance, deceptive practices flourished in painting, politics, warfare, and social behavior. In this seminar, we discuss the role of deception, examining major proponents like Machiavelli, as well as transvestites and spies. What was the relationship between truth and deception at the dawn of the modern age?

**HISTORY 215K. The Crusades: A Cultural History. 5 Units.**

The history of the crusades from the council of Clermont in 1095 to the fall of Acre in 1291 with emphasis on the impact of the crusades on cross-cultural interaction. Topics include the coexistence of Jews, Christians, and Muslims; perceptions of the Holy Land; conversion of mosques into churches and vice versa; trade between the Levant and Europe; precious objects in church treasuries; pilgrimage literature and travel accounts; contemporary Muslim and Christian views of the crusades; the looting of Constantinople in 1204; Saladin's recapturing of Jerusalem; relics in East and West; illustrations in chronicles; fortresses and city walls.

**HISTORY 220G. Demons, Witches, and Priests: Religion and Popular Culture in Russia. 4-5 Units.**

19th and early 20th centuries. Peasants, parish priests, witches, possessed persons, cults and sects, old believers, saints, and women's religious communities. Nominally Christian, and members of the Orthodox Church, Russians embraced beliefs and customs that combined teaching from Church and folk traditions.  
Same as: HISTORY 320G.

**HISTORY 221A. Men, Women, and Power in Early Modern Russia, 1500-1800. 5 Units.**

Social values, gender relations, and social change in an era of rapid change; challenges to established norms by new constructions of deviance (witchcraft, religious reform, and revolt) and new standards of civility; encounters with non-Russians and the construction of national consciousness. Social values as political ethos: patrimonial autocracy and the reality of female rule in the late 17th and 18th century.

**HISTORY 221B. The Woman Question in Modern Russia. 5 Units.**

Russian radicals believed that the status of women provided the measure of freedom in a society and argued for the extension of rights to women as a basic principle of social progress. The social status and cultural representations of Russian women from the mid-19th century to the present. The arguments and actions of those who fought for women's emancipation in the 19th century, theories and policies of the Bolsheviks, and the reality of women's lives under them. How the status of women today reflects on the measure of freedom in post-Communist Russia.

**HISTORY 222. Honor, Law, and Modernity. 5 Units.**

How Europe evolved from medieval to modern; focus is on standards for conflict resolution emphasizing insults to honor. How attitudes towards the self and society, and the state's relationship to individuals, changed from the 16th to 18th centuries in Europe and Russia. Traditional concepts of honor and patterns of settling disputes contrasted to early modern concepts of honor, private life, civility, and crime and punishment.

**HISTORY 223. Art and Ideas in Imperial Russia. 4-5 Units.**

Poetry, novels, symphonic music, theater, opera, painting, design, and architecture: what they reveal about the politics and culture of tsarist Russia.  
Same as: HISTORY 323.

**HISTORY 224A. The Soviet Civilization. 4-5 Units.**

Socialist visions and practices of the organization of society and messianic politics; the Soviet understanding of mass violence, political and ethnic; and living space. Primary and secondary sources. Research paper or historiographical essay.  
Same as: HISTORY 424A.

**HISTORY 224C. Genocide and Humanitarian Intervention. 3 Units.**

Open to medical students, graduate students, and undergraduate students. Traces the history of genocide in the 20th century and the question of humanitarian intervention to stop it, a topic that has been especially controversial since the end of the Cold War. The pre-1990s discussion begins with the Armenian genocide during the First World War and includes the Holocaust and Cambodia under the Khmer Rouge in the 1970s. Coverage of genocide and humanitarian intervention since the 1990s includes the wars in Bosnia, Rwanda, Kosovo, the Congo and Sudan.  
Same as: HISTORY 324C, PEDS 224.

**HISTORY 227. East European Women and War in the 20th Century. 4-5 Units.**

Thematic chronological approach through conflicts in the region: the Balkan Wars, WW I, WW II, and the recent wars in the former Yugoslavia. The way women in E. Europe have been involved in and affected by these wars compared to women in W. Europe in the two world wars. Women's involvement in war as members of the military services, the backbone of underground movements, workers in war industries, mothers of soldiers, subjects and supporters of war aims and propaganda, activists in peace movements, and objects of wartime destruction, dislocation, and sexual violation.  
Same as: HISTORY 327.

**HISTORY 228. Circles of Hell: Poland in World War II. 5 Units.**

Looks at the experience and representation of Poland's wartime history from the Nazi-Soviet Pact (1939) to the aftermath of Yalta (1945). Examines Nazi and Soviet ideology and practice in Poland, as well as the ways Poles responded, resisted, and survived. Considers wartime relations among Polish citizens, particularly Poles and Jews. In this regard, interrogates the traditional self-characterization of Poles as innocent victims, looking at their relationship to the Holocaust, thus engaging in a passionate debate still raging in Polish society.  
Same as: HISTORY 328, JEWISHST 282, JEWISHST 382.

**HISTORY 230A. The Witness in Modern History: Memoir, Reportage, Image. 5 Units.**

The rise of the witness as icon and debates about its reliability as a historical source. The power of eyewitness accounts to convict accused criminals, inspire indignation about war and genocide, and attract attention to humanitarian crises. Their notorious unreliability due to exaggeration and misapprehension. Sources include reportage, photography, and documentary film. Case studies include criminal cases, war, poverty, and natural disasters.

**HISTORY 230C. Paris: Capital of the Modern World. 4-5 Units.**

This course explores how Paris, between the eighteenth and twentieth centuries, became the political, cultural, and artistic capital of the modern world. It considers how the city has both shaped and been shaped by the tumultuous events of modern history- class conflict, industrialization, imperialism, war, and occupation. It will also explore why Paris became the major world destination for intellectuals, artists and writers. Sources will include films, paintings, architecture, novels, travel journals, and memoirs.  
Same as: FRENCH 140, FRENCH 340.

**HISTORY 230D. Europe in the World, 1789-Present. 4-5 Units.**

The European conquest of parts of Africa, Asia, and the South Pacific by European merchants, missionaries, armies, and administrators had significant, and often cataclysmic, effects on indigenous political alliances, cultural practices, and belief systems. But were the effects of expansion entirely one-sided? What impact did the experiences of colonialism have on European politics, culture, and Europe's relations with the rest of the world? Explores how interaction between Europe and the rest of the world redefined the political, racial, sexual, and religious boundaries of both Europe and its colonies and gave rise to the more "globalized" society we live in today.

Same as: HISTORY 330D.

**HISTORY 230E. Republic of Letters: Knowledge and Community, 1300-1800. 4 Units.**

How did a "republic of letters" emerge in the Renaissance and undergo multiple transformations during the Reformation, Scientific Revolution, and Enlightenment? How did knowledge, communication, and community change between the age of Renaissance humanists such as Petrarch, Machiavelli, and Erasmus, the invention of printing, the political, religious and intellectual upheavals of the seventeenth century, and the trans-Atlantic, cosmopolitan world of salons, libraries, and enlightened philosophers such as Voltaire, Gibbon, and Franklin?

Same as: HISTORY 330E.

**HISTORY 230F. Self-Policing, Denunciation, and Surveillance in Modern Europe. 4-5 Units.**

How individual actions impact state machineries of power. The motives, pressures, and consequences of everyday collaboration from the French Revolution to Nazi Germany and Soviet bloc police states; popular outrage over such practices in the aftermath of these regimes. The phenomenon of anticipatory compliance, as people tended to perceive less freedom of action than actually existed, and the reciprocal intensification of real and imagined restrictions. The malleability of personal values and interests as represented in diaries, memoirs, secondary sources, and film; variety of individual and national responses.

Same as: HISTORY 330F.

**HISTORY 230K. Left, Right, and the Intellectual Life: Politics and Intellectuals in the Short Twentieth Century. 5 Units.**

The twentieth century has been called the "century of intellectuals" because of the important role that men and women of letters played in debating, creating, and legitimizing the intense ideological conflict that defined the era. Beginning with the classic debates between Sartre and Camus, which encapsulate the dilemma of political commitment felt acutely throughout the century, this course then considers intellectuals' relationships to the major ideologies of the century: from fascism and Communism to liberalism and right-wing libertarianism.

Same as: HISTORY 330K.

**HISTORY 231K. Emotion, Power, and the Making of Modern Europe. 5 Units.**

What is the relationship between emotion and politics? Can feelings be used to reshape society, or is it rather the other way around? Explores the significance of the emotions for major developments in modern European history, with a particular emphasis on politics and culture. A wide variety of courses (music, visual art, propaganda posters, fiction, etc.) will help us think about this challenging and cutting-edge approach to history. Topics include sentimentalism, the French Revolutionary Terror, romanticism, modernism and the avant garde, the First World War and mass society, the birth of modern psychology, and the emergence of charismatic dictatorships.

**HISTORY 232D. Rome: The City and the World, 1350-1750. 4-5 Units.**

What lies beyond the ruins of an ancient city? The history of Rome from the Renaissance to the age of the grand tour. Topics include: the political, diplomatic, and religious history of the papacy; society and cultural life; the everyday world of Roman citizens; the relationship between the city and the surrounding countryside; the material transformation of Rome as a city; and its meaning for foreigners.

Same as: HISTORY 332D.

**HISTORY 232E. Machiavelli. 4-5 Units.**

The name of Florentine chancellor Niccolo Machiavelli (1469-1527 CE) is synonymous with brutal cunning and bad faith in politics. But Machiavelli was much more than a political thinker. He was also a (literally) tortured poet, a writer of comedies, an historian and student of antiquity, a statesman, an idealist, a republican, a husband, a father, and a friend. The goal of this course is to understand the multifaceted Machiavelli in his historical context and through his works.

Same as: HISTORY 332E.

**HISTORY 233. Reformation, Political Culture, and the Origins of the English Civil War. 4-5 Units.**

English political and religious culture from the end of the Wars of the Roses to the Civil War of the 1640s. Themes include the growth of the size and power of the state, Reformation, creation of a Protestant regime, transformation of the political culture of the ruling elite, emergence of Puritanism, and causes of the Civil War.

Same as: HISTORY 333.

**HISTORY 233A. Age of Light or Times of Crisis? Euro Intellectual History fr Sci Rev to Romanticism. 4-5 Units.**

Over the past three centuries, European culture, society and politics have experienced a series of dramatic transformations, changes that unleashed a myriad of intellectual theories and debates. From politics and science to justice and religion, new ideas altered all fields of European thought, as intellectuals sought to understand the turmoil around them. Examines the rise of scientific thought and utopias, the emergence of new visions of politics, the differences between key Enlightenment thinkers, the development of Romanticism, Liberalism, Hegelianism, and more. Readings include Bacon, Descartes, Hobbes, Vico, Voltaire, Rousseau, Burke, Tocqueville and others.

Same as: HISTORY 333A.

**HISTORY 233C. Two British Revolutions. 4-5 Units.**

Current scholarship on Britain, 1640-1700, focusing on political and religious history. Topics include: causes and consequences of the English civil war and revolution; rise and fall of revolutionary Puritanism; the Restoration; popular politics in the late 17th century; changing contours of religious life; the crisis leading to the Glorious Revolution; and the new order that emerged after the deposing of James II.

Same as: HISTORY 333C.

**HISTORY 233E. European Intellectual History: The Age of Grand Ideologies. 4-5 Units.**

Ever since the Napoleonic Wars, European culture, society and politics have experienced a series of dramatic transformations, changes that unleashed a myriad of intellectual theories and debates. Focuses on the nineteenth century, the age of grand theories such as Liberalism, Positivism, Nationalism, Socialism, and Marxism and examines them historically. Readings include French Utopian Socialists and members of the Russian intelligentsia, J.S. Mill, Marx, Durkheim, Weber, Freud, and others.

Same as: HISTORY 333E.

**HISTORY 233F. Political Thought in Early Modern Britain. 5 Units.**

1500 to 1700. Theorists include Hobbes, Locke, Harrington, the Levellers, and lesser known writers and schools. Foundational ideas and problems underlying modern British and American political thought and life.

**HISTORY 233G. Catholic Politics in Europe, 1789-1992. 5 Units.**

What led to the creation of a specifically Catholic mass politics? How did these parties and movements interact with the Vatican and the wider Church? What accounts for political Catholicism's involvement in clerical-fascist states and its important role in shaping the EU? Sources focus on monographs. Research paper using primary sources.

**HISTORY 233K. The Invention of the Modern Republic. 4-5 Units.**

Examines the history of republican thinking in the Atlantic World from the Renaissance to the French Revolution.

Same as: HISTORY 333K.

**HISTORY 234. Enlightenment Seminar. 3-5 Units.**

The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.

Same as: DLCL 324, HISTORY 334, HISTORY 432A, HUMNTIES 324.

**HISTORY 234K. Economic Miracles? Crisis and Recovery in Modern Europe. 5 Units.**

What are economic miracles? How are such periods of expansion more significant than others? Examines the nature of economic recoveries in the context of Modern Europe, probing how they have shaped European society, politics, and culture from the late nineteenth century through today. Central themes include questions of morality and ethics, capitalism, the emergence of the social state, and national identity. Texts include Adam Smith and Max Weber as well as novels, press materials, political speeches, posters, and film and will be used as the basis for discussion on how this history can inform our understanding of the present day economic crisis and recovery.

**HISTORY 236. The Ethics of Imperialism. 5 Units.**

Can a commitment to liberty, progress, and universal rights be reconciled with imperialism? The ethical underpinnings of empire; how modern Europeans provided ethical and political justifications for colonial expansion. How European ideals were used to defend and justify inequality, violence, and genocide. The ethics of American-driven globalization and humanitarianism. Texts include primary sources, philosophical treatises, and historical studies.

**HISTORY 237B. Teaching the Unteachable: Teaching and Representing the Holocaust. 3-5 Units.**

Theodore Adorno asked whether it was possible to write poetry after Auschwitz; whatever the answer, each year witnesses exponential growth in state-sponsored mandates to teach the Holocaust. How and to what end does catastrophe become curriculum? How to assess what students learn from these efforts. The Nazis' efforts to teach for hate, and contemporary parallels. Historical and educational sources, especially films and memoirs. Same as: EDUC 253X.

**HISTORY 239D. Capital and Empire. 4-5 Units.**

Can empire be justified with balance sheets of imperial crimes and boons, a calculus of racism versus railroads? The political economy of empire through its intellectual history from Adam Smith to the present; the history of imperial corporations from the East India Company to Wal-mart; the role of consumerism; the formation of the global economy; and the relationship between empire and the theory and practice of development.

Same as: HISTORY 339D.

**HISTORY 239F. Empire and Information. 4-5 Units.**

How do states see? How do they know what they know about their subjects, citizens, economies, and geographies? How does that knowledge shape society, politics, identity, freedom, and modernity? Focus is on the British imperial state activities in S. Asia and Britain: surveillance technologies and information-gathering systems, including mapping, statistics, cultural schemata, and intelligence systems, to render geographies and social bodies legible, visible, and governable.

Same as: HISTORY 339F.

**HISTORY 239H. Colonialism and Empire in Modern Europe. 5 Units.**

To better understand the history of modern Europe within a global context, explores the following questions: What impact did more than a century of colonialism have on the social lives, cultural attitudes, political loyalties, and intellectual world views of European women and men during the nineteenth century? What accounts for the resiliency of empire during a period of rapid global change that witnessed the rise of modern democracy, economic liberalism, ethnic nationalism, and international socialism?

**HISTORY 242A. What is Life? The History of a Question. 4-5 Units.**

History of attempts to understand the nature of life and mind by comparing living creatures with artificial machines and material arrangements. Imitations of animal life and human thought and discussions of relations between creatures and contraptions from antiquity onward, with an eye toward providing historical depth to current attempts to simulate life and mind.

Same as: HISTORY 342A.

**HISTORY 243C. Colonial Science and Medicine. 4-5 Units.**

Explores the global exchange of knowledge, technologies, plants, peoples, disease, and medicines. Colonial sciences and medicines were important militarily and strategically for positioning emerging nation states in global struggles for land and resources. Considers primarily French, British, and Dutch in the West Indies, but also takes examples from Iberian, Jesuit, and other traditions in China and India. Readings treat science and medicine in relation to voyaging, colonialism, slavery, plants, and environmental exchange.

**HISTORY 243G. Tobacco and Health in World History. 4-5 Units.**

Same as: HISTORY 343G.

**HISTORY 243J. Climate Change in the West: A History of the Future. 5 Units.**

Global warming is changing the American West. But this region is no stranger to environmental change and human adaption to harsh environments. How can history create more clear thinking about the current crisis and choices for the future? The long history of climate change in the West, as well as current warming, through scientific research, historical sources, environmental histories, and visions for the future, including plans for mitigation and adaption, scientific predictions, and science fiction.

Same as: EARTHSYS 143J.

**HISTORY 243S. Human Origins: History, Evidence, and Controversy. 4-5 Units.**

Research seminar. Debates and controversies include: theories of human origins; interpretations of fossils, early art, and the oldest tools; the origin and fate of the Neanderthals; evolutionary themes in literature and film; visual rhetoric and cliché in anthropological dioramas and phyletic diagrams; the significance of hunting, gathering, and grandmothering; climatological theories and neocatastrophic geologies; molecular anthropology; the impact of racial theories on human origins discourse. Background in human evolution not required.

Same as: HISTORY 443A.

**HISTORY 244C. The History of the Body in Science, Medicine, and Culture. 4-5 Units.**

The human body as a natural and cultural object, historicized. The crosscultural history of the body from the 18th century to the present. Topics include: sciences of sex and race; medical discovery of particular body parts; human experimentation, foot binding, veiling, and other bodily coverings; thinness and obesity; notions of the body politic. Same as: HISTORY 444C.

**HISTORY 245E. Health and Society in Africa. 4-5 Units.**

The history of disease, therapeutic and diagnostic systems, and the definition of health in precolonial, colonial, and postcolonial Africa. The social and political histories of specific epidemics, including sleeping sickness, influenza, TB, mental illness, and AIDS. The colonial contexts of epidemics and the social consequences of disease. Same as: HISTORY 347E.

**HISTORY 245G. Law and Colonialism in Africa. 3-5 Units.**

Law in colonial Africa provides an opportunity to examine the meanings of social, cultural, and economic change in the anthropological, legal, and historical approaches. Court cases as a new frontier for the social history of Africa. Topics: meanings of conflicts over marriage, divorce, inheritance, property, and authority. Same as: HISTORY 348D.

**HISTORY 246C. Islam and Christianity in Africa. 4-5 Units.**

History of the 20% of the Muslims and Christians in the world who live in Africa. The role of these religions in social, cultural and political transformations. Linkages between African religions and global/transnational institutions. African contributions to theology, religious practice and religious styles. Muslim/Christian relations and relations with "traditional" African religions. Same as: HISTORY 346C.

**HISTORY 248S. African Societies and Colonial States, Part 1. 4-5 Units.**

The encounter between African societies and European colonialism in the colony or region of their choice. Approaches to the colonial state; tours of primary source collections in the Hoover Institution and Green Libraries. Students present original research findings and may continue research for a second quarter. Same as: HISTORY 448A.

**HISTORY 250A. History of California Indians. 5 Units.**

Demographic, political, and economic history of California Indians, 1700s-1950s. Processes and events leading to the destruction of California tribes, and their effects on the groups who survived. Geographic and cultural diversity. Spanish, Mexican, and Anglo-American periods. The mission system. Same as: CSRE 117S, NATIVEAM 117S.

**HISTORY 251C. The American Enlightenment. 5 Units.**

Eighteenth century America was like a laboratory for exciting new social, political, religious, scientific, and artistic theories that we collectively call "the Enlightenment." With readings in original texts and studies of material culture, examines ways in which eighteenth century Americans applied Enlightenment thinking to some of the most important problems and questions of their time. What was the best kind of government, and how could this be known? Was the new world of America fundamentally different or the same as Europe, and did animals, plants, and people improve or worsen there? What creatures (children, apes, women, slaves) were considered unreasonable in the Age of Reason, and why? What was the place of religion and passion in the Age of Reason? Same as: AMSTUD 251C.

**HISTORY 252K. America as a World Power: U.S. Foreign Relations, 1914 to Present. 5 Units.**

This course will examine the modern history of American foreign relations, from 1914 to the present. Beginning with the fateful decision to intervene in the First World War, it will examine the major crises and choices that have defined the "American Century." Our study of U.S. foreign relations will consider such key factors as geopolitics, domestic politics, bureaucracy, psychology, race, and culture. Students will be expected to undertake their own substantial examination of a critical episode in the era studied. Same as: INTNLREL 168.

**HISTORY 253K. Law and the State in Modern America: Studies of the First and Fourteenth Amendments. 4-5 Units.**

Considers how social, political, and legal historians examine the ways in which policies and judicial actions have shaped the boundaries of the U.S. citizenship in the post-Reconstruction period. Looking at a range of case studies in civil rights, labor, civil liberties, social welfare, and immigration, we will examine how the law has functioned as a policing, criminalizing, regulatory mechanism and a tool to achieve a more egalitarian, libertarian democratic order. Defines legal development broadly, considering Supreme Court decisions alongside lawyers' legal reasoning, social movements' usage of the law, and public perception of legal rights. Same as: HISTORY 353K.

**HISTORY 254. Popular Culture and American Nature. 5 Units.**

Despite John Muir, Aldo Leopold, and Rachel Carson, it is arguable that the Disney studios have more to do with molding popular attitudes toward the natural world than politicians, ecologists, and activists. Disney as the central figure in the 20th-century American creation of nature. How Disney, the products of his studio, and other primary and secondary texts see environmentalism, science, popular culture, and their interrelationships.

**HISTORY 255. Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice. 5 Units.**

The religious and political thought of Martin Luther King, Jr., using the documentary resources of the King Institute at Stanford. His social gospel Christianity and prophetic message of radical social transformation. Readings include the forthcoming *The Papers of Martin Luther King, Jr., Volume VI: Advocate of the Social Gospel*.

**HISTORY 255D. Racial Identity in the American Imagination. 4-5 Units.**

Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music. Same as: AFRICAAM 255, AMSTUD 255D, CSRE 255D, HISTORY 355D.

**HISTORY 255E. Education, Race, and Inequality in African American History, 1880-1990. 3-5 Units.**

Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis. Same as: CSRE 216X, EDUC 216X.

**HISTORY 256. U.S.-China Relations: From the Opium War to Tiananmen. 4-5 Units.**

The history of turbulent relations, military conflict, and cultural clashes between the U.S. and China, and the implications for the domestic lives of these increasingly interconnected countries. Diplomatic, political, social, cultural, and military themes from early contact to the recent past. Same as: AMSTUD 256, HISTORY 356.

**HISTORY 256G. Constructing Race and Religion in America. 4 Units.**

This seminar focuses on the interrelationships between social constructions of race, and social interpretations of religion in America. How have assumptions about race shaped religious worldviews? How have religious beliefs shaped racial attitudes? How have ideas about religion and race contributed to notions of what it means to be "American"? We will look at primary and secondary sources, and at the historical development of ideas and practices over time.

Same as: HISTORY 356G, RELIGST 246, RELIGST 346.

**HISTORY 257C. LGBT/Queer Life in the United States. 4-5 Units.**

An introductory course on LGBT social, cultural, and political history in the United States. This course explores how categories of sexuality have changed over time, with particular emphasis on the relationship among homosexuality, heterosexuality, and transgenderism. Students will analyze how the intersections of race, class, and sexuality influenced the constitution of these categories and the politics of social relations. Historical and literary sources will be used to examine changes in LGBT experiences and identities, primarily in the twentieth century.

Same as: FEMST 140D.

**HISTORY 258. Topics in the History of Sexuality: Sexual Violence. 4-5 Units.**

Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.

Same as: AMSTUD 258, CSRE 192E, FEMST 258, FEMST 358, HISTORY 358.

**HISTORY 258D. School: What Is It Good For?. 3-4 Units.**

Focus is on authors who establish claims that the purposes, functions, impacts, and social roles of schooling promote human capital, citizenship, social reproduction, values transmission, social mobility, class equality, racial equality, social stratification, disciplinary power, and the pursuit of individual interests. Historical and sociological approaches.

Same as: EDUC 207X.

**HISTORY 258E. History of School Reform: Origins, Policies, Outcomes, and Explanations. 3-5 Units.**

Required for students in the POLS M.A. program; others welcome. Focus is on 20th-century U.S. Intended and unintended patterns in school change; the paradox of reform that schools are often reforming but never seem to change much; rhetorics of reform and factors that inhibit change. Case studies emphasize the American high school.

Same as: EDUC 220D.

**HISTORY 259A. Poverty and Homelessness in America. 4-5 Units.**

Service learning. Students participate in a two quarter internship at a local shelter for homeless individuals or families. Readings include historical, social science, and social commentary literature. Service Learning Course (certified by Haas Center).

**HISTORY 260. California's Minority-Majority Cities. 4-5 Units.**

Historical development and the social, cultural, and political issues that characterize large cities and suburbs where communities of color make up majority populations. Case studies include cities in Los Angeles, Santa Clara, and Monterey counties. Comparisons to minority-majority cities elsewhere in the U.S. Service Learning Course (certified by Haas Center).

Same as: CSRE 260.

**HISTORY 260E. Environmental Policy and the City in U.S. History. 5 Units.**

Looks at the historical backgrounds of current issues in urban environmental policy, including waste, transportation, air pollution, and other major issues. Covers the period 1800 to the present. Explores the relevance of historical scholarship

Same as: URBANST 160.

**HISTORY 261. Race, Gender, and Class in Jim Crow America. 5 Units.**

How African American life and labor were redefined from 1890-1954.

Topics include family life, work, leisure patterns, transnational relations, cultural expressions emphasizing literature and music, resistance and social activism. Primary sources including visual materials, literature, and film; historical interpretations of the period.

**HISTORY 261G. Presidents and Foreign Policy in Modern History. 5 Units.**

Nothing better illustrates the evolution of the modern presidency than the arena of foreign policy. This class will examine the changing role and choices of successive presidential administrations over the past century, examining such factors as geopolitics, domestic politics, the bureaucracy, ideology, psychology, and culture. Students will be encouraged to think historically about the institution of the presidency, while examining specific case studies, from the First World War to the conflicts of the 21st century.

Same as: INTNLREL 173.

**HISTORY 262G. The Pivotal Decade in U.S. History: 1960's or 1970's?. 4-5 Units.**

Which had more lasting impact, the civil war of the 1960s or the conservative revolt of the 1970s? Should the 1970s supersede the 1960s as a pivotal moment when something happened of considerable importance to historians? Considers this debate of the decades comparatively and thematically, addressing topics including civil rights, foreign policy, electoral politics, popular culture, law, economics, labor, and social movement organizing.

Same as: HISTORY 362G.

**HISTORY 263G. History Through a Life: The Allure of American Biography. 4-5 Units.**

Considers the possibilities and limitations of exploring U.S. history through the genre of biography. Is a single life too narrow to explain why and how pivotal events in U.S. history, such as war, economic depression, social revolution, unfold? Or can one life illuminate the complexity of historical shifts? Readings will span U.S. history, exploring topics such as labor and racial civil rights, science and culture, women and sexuality, transnationalism and diplomacy, law and presidential politics. The craft of biography will be considered alongside biographical subjects.

Same as: HISTORY 363G.

**HISTORY 264G. The Social History of Mental Illness in the United States. 5 Units.**

(Formerly HPS 158.) Explores the variety of meanings of mental illness in the past, and the diagnostic, therapeutic, cultural and policy challenges historically posed by mental illness. Focus is on the U.S. but is not limited to it. How has mental illness been defined in history? How has the mind been medicalized and managed? Topics include the rise of institutions for the mentally ill, the growth of the psychiatric profession and the relationship between psychiatry, deviance and anti-psychiatry, and gender and psychiatric norms.

**HISTORY 265. Writing Asian American History. 5 Units.**

Recent scholarship in Asian American history, with attention to methodologies and sources. Topics: racial ideologies, gender, transnationalism, culture, and Asian American art history. Primary research paper.

Same as: AMSTUD 265, HISTORY 365.



**HISTORY 266C. The Cold War: An International History. 5 Units.**

Though it ended twenty years ago, we still live in a world shaped by the Cold War. Beginning with its origins in the mid-1940s, this course will trace the evolution of the global struggle, until its culmination at the end of the 1980s. Students will be asked to ponder the fundamental nature of the Cold War, what kept it alive for nearly fifty years, how it ended, and its long term legacy for the world.

Same as: INTNLREL 154.

**HISTORY 267. Religion in Twentieth Century American Life. 5 Units.**

Why is the United States such a religious country? Over 90% of Americans profess a belief in God, and more than half identify religion as "very important" to their lives. In this seminar, we will examine the durability and power of religion in modern American history, from the emergence of Christian fundamentalism to the theology of the Cold war to the conflict with radical Islam. Other topics include: the Holocaust, Civil Rights and religion, gender and sexuality.

Same as: AMSTUD 267.

**HISTORY 272A. Spanish Nationalist Discourses from Franco to Zapatero: What does 'plural Spain' mean?. 3-5 Units.**

Spanish nationalism and 'patriotic affirmation' discourses existing in contemporary Spain. Since the end of Francoism, Spanish nationalism has existed in a de-articulated and diffuse way, rather as a reaction against the challenge of stateless nationalisms than as a substantive doctrine. However, since the mid-1980s there has been a recovery of Spanish nationalist discourse, often labeled as 'Constitutional patriotism', whose main point is the insistence on History as the founding basis for the legitimation of the present Spanish polity, as well as the vindication of the 1978 Constitution as the end-point of decentralization.

Same as: ILAC 204.

**HISTORY 273. The European Expansion. 4-5 Units.**

The relationship between European monarchies and their colonial domains from the 16th-18th centuries. Reasons for expansion, methods, and results. Case studies include the Spanish, Portuguese, Dutch, French, and English domains in Africa, Asia, and the Americas. Readings include primary and secondary sources.

Same as: HISTORY 373A.

**HISTORY 275B. Governance, Resistance, and Identity in Modern Mexico. 5 Units.**

Surveys the history of governance, resistance, and identity formation in Mexico from the nineteenth century to the present. Explores Mexico's historical struggles to achieve political stability, economic prosperity, and social justice and examines how regional, class, ethnic, and gender differences have figured prominently in the shaping of Mexican affairs. Topics include Mexico's wars and their legacies, the power of the state, violence and protest, debates over the meaning of "Mexicanness," youth culture, and the politics of indigenismo.

Same as: CHILATST 275B.

**HISTORY 277D. U.S. Intervention and Regime Change in Latin America. 5 Units.**

As the drumbeats of war in the U.S. grow louder for a forcible regime change in Iran due to its alleged nuclear ambitions, many politicians, pundits and journalists have already consigned the disastrous war for regime change in neighboring Iraq in 2003 to seemingly ancient and irrelevant history. This course does the opposite and takes seriously the proverbial saying "if history is any guide..." by examining U.S. interventions in Latin America, a region where so-called preventive regime change (covert as well as overt) has been operative policy for well over a century. Investigates the rationales, motivations and strategies behind U.S.-backed or engineered regime changes in Mexico in the 1910s, Guatemala in the 1950s, Chile in the 1970s, and Nicaragua in the 1980s.

**HISTORY 279. Latin American Development: Economy and Society, 1800-2000. 4-5 Units.**

The newly independent nations of Latin America began the 19th century with economies roughly equal to, or even ahead of, the U.S. and Canada. What explains the economic gap that developed since 1900? Why are some Latin American nations rich and others poor? Marxist, dependency, neoclassical, and institutionalist interpretive frameworks. The effects of globalization on Latin American economic growth, autonomy, and potential for social justice.

Same as: HISTORY 379.

**HISTORY 281A. Twentieth-Century Iraq: A Political and Social History. 5 Units.**

The colonial experience, creation of the modern Iraqi state, and transition to military dictatorship. Political movements, religious and tribal elements, and their relation to the state. Geopolitical context.

**HISTORY 282. The United States and the Middle East since 1945. 4-5 Units.**

Since the end of WW II, U.S. interests in the Middle East have traditionally been defined as access to oil at a reasonable price, trade and markets, containing the influence of the Soviet Union, and the security of Israel. Is this the full range of U.S. interests? How has the pursuit of these interests changed over time? What forces have shaped U.S. policy? What is the impact of U.S. policy on the region itself?

Same as: HISTORY 382.

**HISTORY 282E. Jews, Christians and Muslims in the Ottoman World. 4-5 Units.**

The experiences of the Jewish, Christian and Muslim communities in the Ottoman Empire, fifteenth to twentieth centuries. How diverse social and religious communities lived together in an imperial setting, specifically the mechanisms, discourses and crises of coexistence in the Ottoman Empire. Various comparisons of the Ottoman Empire to the Habsburg, the Romanov (Russian), the Mughal, and the British empires.

Same as: HISTORY 382E.

**HISTORY 283. The New Global Economy, Oil, and Islamic Movements in the Middle East. 4-5 Units.**

The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market combined with case studies of Egypt, Iraq, and Palestine.

Same as: HISTORY 383.

**HISTORY 284. The Ottoman Empire, 1300-1923. 4-5 Units.**

This is a course on the Middle East and Southeast Europe under the Ottoman Empire. Topics include how the Ottoman enterprise was constructed in the frontier region of the Christian and Islamic worlds; the conquests and consolidation of the imperial institutions; how diverse peoples, cultures, and regions were integrated into the imperial system; the Ottoman Empire and the broader world; merchants and their markets; elite, urban, rural and nomadic lives; women, family sexuality; art, literature, and architecture; the transformation of the empire on the eve of modernity; the rise of nationalism and the Ottoman response; Ottoman disintegration and the making of the Middle East and Southeast Europe.

Same as: HISTORY 384.

**HISTORY 286C. Jews and the Russian Revolution. 5 Units.**

This course evaluates the role of Jews in Russian radicalism beginning in the 1870s and '80s and focuses on their participation in the Revolutions of 1905 and especially 1917. The connections if any, between Judaism, Messianism, and radicalism will be evaluated, as will the socio-economic and cultural lives of Jews in Russia and how these inflected political attitudes radical and conservative. The course will trace the impact of the revolution on Jewish life into the mid, and late-1920s. The belief that Jews were once responsible for the revolution emerged as one of the cardinal principles of the Russian Right, eventually also the European Right and it would be embedded in the central ideas of Nazism and these developments, too, will be examined.

Same as: HISTORY 386C, JEWISHST 286C, JEWISHST 386C.

**HISTORY 287D. Tel Aviv: Site, Symbol, City. 4-5 Units.**

Tel Aviv, the first Israeli/Hebrew city, from a cultural history perspective combining high and low cultural artifacts, examining the symbolic constructions of the city as a site of Hebrew modernism and postmodernism. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's coffee houses; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; the effects of contemporary globalization and the reconstruction of Tel Aviv as the symbolic site of Israeli post-nationalism. Sources include art, cinema, and literature, pop music and archival materials from Green Library's Eliasaf Robinson Collection.

Hebrew reading knowledge, although helpful, is not required.

Same as: HISTORY 387D, JEWISHST 287D, JEWISHST 387D.

**HISTORY 287E. Jewish Intellectuals and the Crisis of Modernity. 4-5 Units.**

Intellectual responses of Jewish political thinkers, historians and authors to the age of extremes. Readings include Theodor Adorno, Herbert Marcuse, Eric Fromm, Hannah Arendt, Leo Strauss, Karl Popper, Isaiah Berlin, Tony Judt, and George Steiner. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in postwar years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945. No prior knowledge of political science, philosophy and/or Jewish studies is required.

Same as: HISTORY 387E, JEWISHST 287E, JEWISHST 387E.

**HISTORY 288. Palestine and the Arab-Israeli Conflict. 4-5 Units.**

1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948.

(Beinin)

Same as: HISTORY 388, JEWISHST 288, JEWISHST 388.

**HISTORY 289. The Indian Ocean World: Winds, Merchants & Empires. 4-5 Units.**

Focuses on the Indian Ocean World, a critical historical arena of large-scale cultural and economic contact among societies of South Asia, the Middle East, East and Southeast Asia, and East Africa. We will explore this contact zone chronologically and thematically, examining the influence of environment, the demands of commerce, the bonds of Islam, and the political tensions of empires from medieval to modern times. We will pay particular attention to the networks and individuals that have made up the social fabric of this oceanic world: merchants, pilgrims, smugglers, and laborers. Texts will include scholarly studies as well as travel and fictional accounts.

Same as: HISTORY 389.

**HISTORY 290B. Tibet: A Place in Time. 5 Units.**

Tibet is both a real place and an imagined place. In this approach to the history of TIBET, we will explore both dimensions of this distant, elevated land. We will survey Tibet's natural setting, history, religion as well as issues surrounding Tibet's recent past and present status. We will see that Tibet has never been a remote, isolated, self-contained Shangri-la, but an important and often conflicted crossroads in the very center of Asia, nor have Tibetans been a people given exclusively to higher spirituality. In the words of a distinguished Buddhistologist and Tibetan scholar, we will not "deny Tibet its history, exclude it from a real world of which it has always been a part [or] deny Tibetans their agency in the creation of a contested quotidian reality." (Donald S. Lopez, Jr., *Prisoners of Shangri-la: Tibetan Buddhism and the West*).

**HISTORY 290E. Movies and Empire in East Asia. 5 Units.**

Cinema was invented in the 1890s and simultaneously introduced to East Asia. This colloquium explores how this new medium changed the cultural and social landscape of East Asia and how the visual power of films also affected the culture politics of empires in the region. The themes include cinema and urban spaces, cultural imperialism, film images and gender discourse, colonial modernity, Americanism and Asianism, the visual and the textual, wartime propaganda, and Hollywood movies and cold war empires.

Same as: HISTORY 390E.

**HISTORY 291A. Archaeology and Modernity in Asia: The Excavation of Ancient Civilizations in Modern Times. 4-5 Units.**

The interplay in Asia between antiquity and modernity, civilization and nation state, and national versus colonial science. The recent excavation of artifacts and places associated with Asian civilization such as the terracotta warriors in China and Angkor Wat in Cambodia. How Asian states have grappled with modernity and colonialism as they simultaneously dug up their ancient pasts.

Same as: HISTORY 391A.

**HISTORY 291B. The City in Imperial China. 3-5 Units.**

The evolution of cities in the early imperial, medieval, and early modern periods. Topics include physical structure, social order, cultural forms, economic roles, relations to rural hinterlands, and the contrast between imperial capitals and other cities. Comparative cases from European history. Readings include primary and secondary sources, and visual materials.

Same as: HISTORY 391B.

**HISTORY 291D. Colonialism and Collaboration in East Asia. 5 Units.**

The roles and problems of collaboration in the rise, sustenance, and fall of empires. Themes include conceptual definitions of collaboration and empire, collaboration of traditional elites, accommodation of religious communities, assimilation and collaboration, local intermediaries, and class and empire. Regional focus is East Asia; also cases from other colonial situations.

Same as: HISTORY 391D.

**HISTORY 291E. Maps, Borders, and Conflict in East Asia. 4-5 Units.**

The nature of borders and border conflicts in N.E. Asia from the 17th to the early 20th century. Focus is on contact zones between China, Russia, Korea, and Japan. The geopolitical imperatives that drove states to map their terrain in variable ways. Cultural, diplomatic, and imperial contexts. European pressures and contributions to E. Asian cartography; the uses of maps in surveillance, diplomacy, identity, and war. Student projects focus on a contested border zone.

Same as: HISTORY 391E.

**HISTORY 291F. Yangtze: Nature, History, and the River. 5 Units.**

Topics include the natural history, social and economic development, and cultural construction as well as the changes to the river from the huge Three Gorges Dam and the plans for massive water transfers from the Yangtze to ever-thirstier Beijing and north China.

**HISTORY 291G. Pre-Modern Chinese Warfare. 3-5 Units.**

This course examines the evolution of warfare in China, and its impact on the evolving political and social orders, from the earliest states through the Mongol conquest. It will study how changing military technology was inextricably linked to changes in the state and society. It will also look at changing Chinese attitudes towards warfare over the same period, from the celebration of heroism, through writing about warfare as an intellectual art, to the links of militarism with steppe peoples/  
Same as: HISTORY 391G.

**HISTORY 291K. Speaking Through Objects: Material Culture in Late Imperial China, 1550-1820. 5 Units.**

Material culture in late Imperial China from Mid-Ming to High Qing (1550-1820). Topics include: beliefs and values towards the material world, the social transformation and consumer society of later imperial China, and its significance in a global context, technology and craftsmanship, objects as media, feminine space, printing and publishing, collecting and connoisseurship, taste and fashion, court culture and global trade.  
Same as: HISTORY 391K.

**HISTORY 292. The Two Koreas. 4-5 Units.**

Examines major themes and scholarly works to understand the origins, outbreak, and consequences of the Korean War. One focus will be the division of Korea into ROK and DPRK and their subsequent developments. Themes include World War II in East Asia; Korean communist movements during Japanese colonial rule; the Cold War in East Asia; the roles of the US, China, and USSR in the Korean War; the ideas of key North and South Korean leaders, and the consolidation of the two Koreas after the Korean War.  
Same as: HISTORY 392.

**HISTORY 292D. Japan in Asia, Asia in Japan. 4-5 Units.**

How Japan and Asia mutually shaped each other in the late 19th and 20th centuries. Focus is on Japanese imperialism in Asia and its postwar legacies. Topics include: pan-Asianism and orientalism; colonial modernization in Korea and Taiwan; collaboration and resistance; popular imperialism in Manchuria; total war and empire; comfort women and the politics of apology; the issue of resident Koreans; and economic and cultural integration of postwar Asia.  
Same as: HISTORY 392D.

**HISTORY 292F. Traditional Korea: History and Culture. 4-5 Units.**

Korea before 1800 and how iconic features of Korean tradition were created and reinvented. Themes include Korea's ancient kingdoms, the aristocracy and military in the Koryo dynasty, the print culture and Korean alphabet, ideologies and religions, the social status system and the life of women, the kingship and court culture of the Choson dynasty, and Korea's place in premodern East Asia. The modern and contemporary debates.  
Same as: HISTORY 392F.

**HISTORY 292G. Modern Korea. 4-5 Units.**

Examines seminal works and major historical debates in the study of modern Korea. Topics include the state and society in the Choson dynasty, reform and rebellion in the nineteenth century, colonization, gender and colonial modernity, national identity and assimilation, wartime colonial Korea, decolonization and the North Korean revolution, the Korean War and its aftermath, the Pak Chung Hee regime and labor relations, and democratization.  
Same as: HISTORY 392G.

**HISTORY 293B. Homosexuality in Historical and Comparative Perspective. 4-5 Units.**

Comparative history of homoerotic desire, relations, and identity through scholarship on different historical periods and parts of the world: the classical Mediterranean, early modern European cities, late imperial and modern China, Tokugawa and modern Japan, and the U.S.  
Same as: HISTORY 393B.

**HISTORY 293D. Global Intellectual History. 4-5 Units.**

Ideas have circulated globally for millennia but relatively recently have thinkers begun to conceptualize the global. Like "humanity" and "universalism," or what Marx called "international," the "global" too has complex genealogies. It is associated, often simultaneously, with empire and freedom, war and equality, commitment and treason, piracy and justice, homelessness and cosmopolitanism. Working with key 20th century texts from Italy, Britain, India, Israel, Palestine, Germany, France, and Algeria, course explores how thinking "globally" impacts the very foundations of modern political thought.  
Same as: HISTORY 393D.

**HISTORY 295F. Race and Ethnicity in East Asia. 4-5 Units.**

Historical, cultural, political and theoretical perspectives. Commonly misunderstood as an ethnically homogeneous country, the People's Republic of China is home to 55 officially recognized minority groups, many of whom inhabit the strategic border regions of the country. How similar assumptions of ethnic and racial homogeneity in Taiwan, Japan, and Korea are being reexamined by scholars in disciplines including anthropology, history, and political science.  
Same as: ASNAMST 295F, HISTORY 395F.

**HISTORY 295J. Chinese Women's History. 5 Units.**

The lives of women in the last 1,000 years of Chinese history. Focus is on theoretical questions fundamental to women's studies. How has the category of woman been shaped by culture and history? How has gender performance interacted with bodily disciplines and constraints such as medical, reproductive, and cosmetic technologies? How relevant is the experience of Western women to women elsewhere? By what standards should liberation be defined?.

**HISTORY 296. Communism and Revolution in China. 5 Units.**

From the formation of the Chinese Communist Party (CCP) in 1921 through the 1949 founding of the People's Republic of China (PRC). Topics include: early theories of socialism in China; the relationship between Chinese communism and the Communist International and Soviet Union; agrarian reformulation of communism by Mao; the communist-nationalist civil war; the Communist Revolution of 1949; and the consolidation of communist power in the PRC.

**HISTORY 299A. Senior Research I. 1-5 Units.****HISTORY 299B. Senior Research II. 1-5 Units.****HISTORY 299C. Senior Research III. 1-5 Units.****HISTORY 299D. Tooling Up for Digital Humanities. 1 Unitss.**

What are the digital humanities? The twenty-first century presents new opportunities in the humanities, such as unprecedented access to millions upon millions of digitized sources along with powerful technological tools to study those sources. Yet it also raises new challenges, such as the responsible and effective use of technology, and defining the nature of digital scholarship and communication. This workshop offers an introduction to fundamental concepts, methods, and issues within the growing field of digital humanities, including managing your online identity, digitizing sources, managing databases, text mining, spatial analysis, visualization, and pedagogy.  
Same as: ENGLISH 299D, ENGLISH 399D, HISTORY 399D.

**HISTORY 299E. Preparing for International Field Research: Public Svc or Research, Electronic Version. 1 Unitss.**

Restricted to students studying at a Stanford Overseas Studies campus; same course content as HISTORY 299X. Problems involved in research abroad: ethical issues; safety; security and conduct; human subjects protocol. Methodologies of research: interviewing, networking, case studies, participant observation, large surveys. Prerequisite: consent of instructor.  
Same as: HISTORY 399E.

**HISTORY 299H. Junior Honors Colloquium. 1 Unitss.**

Required of junior History majors planning to write a History honors thesis during senior year. Meets twice during quarter, including the first Friday class day of the quarter.

**HISTORY 299M. Undergraduate Directed Research: Martin Luther King, Jr., Research and Education Institute. 1-4 Units.**

May be repeated for credit.

**HISTORY 299S. Undergraduate Directed Research and Writing. 1-5 Units.**

May be repeated for credit.

**HISTORY 299X. Preparing for International Field Work: Public Service or Research. 1 Unitss.**

Problems involved in research abroad: ethical issues; safety; security and conduct; human subjects protocol. Methodologies of research: interviewing, networking, case studies, participant observation, large surveys.

Same as: HISTORY 399A.

**HISTORY 301. Introduction to Public History in the U.S., 19th Century to the Present. 4-5 Units.**

Gateway course for the History and Public Service interdisciplinary track. Topics include the production, presentation, and practice of public history through narratives, exhibits, web sites, and events in museums, historical sites, parks, and public service settings in nonprofit organizations, government agencies, and educational institutions. Service Learning Course (certified by Haas Center).

Same as: HISTORY 201.

**HISTORY 301A. The Global Drug Wars. 4-5 Units.**

Explores the global story of the struggle over drugs from the nineteenth century to the present. Topics include the history of the opium wars in China, controversies over wine and tobacco in Iran, narco-trafficking and civil war in Lebanon, the Afghan 'narco-state,' Andean cocaine as a global commodity, the politics of U.S.- Mexico drug trafficking, incarceration, drugs, and race in the U.S., and the globalization of the American 'war on drugs.'

Same as: HISTORY 201A.

**HISTORY 302E. The Great War. 4-5 Units.**

The First World War provided a prototype for a new, horrific kind of war. It catalyzed the emergence of modern means of warfare and the social mechanisms necessary to sustain the industrialized war machine. Killing millions, it became the blueprint for the total war that succeeded it. It also brought about new social and political orders, transforming the societies which it mobilized at unprecedented levels. This course will examine the military, political, economic, social and cultural aspects of the conflict. We will discuss the origins and outbreak of the war, the land, sea and air campaigns, the war's economic and social consequences, the home fronts, the war's final stages in eastern and western Europe as well as non-European fronts, and finally, the war's impact on the international system and on its belligerents' and participants' perceptions of the new reality it had created.

Same as: HISTORY 202E.

**HISTORY 304. Approaches to History. 4-5 Units.**

Required of first-year History Ph.D. students.

**HISTORY 304G. War and Society. 5 Units.**

How Western societies and cultures have responded to modern warfare. The relationship between its destructive capacity and effects on those who produce, are subject to, and must come to terms with its aftermath. Literary representations of WW I; destructive psychological effects of modern warfare including those who take pleasure in killing; changes in relations between the genders; consequences of genocidal ideology and racial prejudice; the theory of just war and its practical implementation; and how wars are commemorated.

Same as: HISTORY 204G.

**HISTORY 305. Graduate Workshop in Teaching. 1 Unitss.**

Required of first-year History Ph.D. students. Perspectives on pedagogy for historians: course design, lecturing, leading discussion, evaluation of student learning, use of technology in teaching lectures and seminars. Addressing today's classroom: sexual harassment issues, integrating diversity, designing syllabi to include students with disabilities.

**HISTORY 305A. The History of Information. 4-5 Units.**

Examines the history of information from multiple perspectives such as the changing conceptions of facticity and evidence cross-culturally as well as a range of information technologies, from moveable type printing and telegraphy to text messaging and Twitter. Other topics include the ways in which information is shaped by the languages in which it is recorded, stored, and transmitted, and also the ways in which information infrastructures influence what is forgotten and lost.

Same as: HISTORY 205A.

**HISTORY 305G. Creative Political Thinking: Three Cases. 4-5 Units.**

How can we account for creativity and innovation in political thinking? Are these qualities simply a product of political expediency and rhetorical urgency, or do they also depend on qualities of mind and historical contingencies that have to be studied individually? This class will explore these questions with three noteworthy cases: Niccolo Machiavelli, John Locke, and James Madison. Extensive reading in both primary writings and secondary sources.

Same as: HISTORY 205G.

**HISTORY 306E. International History and International Relations Theory. 5 Units.**

The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system.

Same as: HISTORY 202, POLISCI 216E, POLISCI 316.

**HISTORY 306F. Identities and Identification in the Atlantic World. 4-5 Units.**

How identities and processes of identification changed in Europe, Africa, and the Americas during the early modern period and as a result of the engagement of the inhabitants of these three continents in the Atlantic world.

**HISTORY 306G. Colonial Law. 4-5 Units.**

Examines the relationship between law and colonialism in Latin America, Africa and Asia during both the early modern and the modern period. By reading some of the seminal works that have been published on this issue, we will seek to understand how law both facilitated and limited colonialism and how colonialism, in turn, had modified the legal systems that had existed previously. Attention will also be given to law as an acculturating agent and to the legal arena as a sphere for conflict resolution, negotiation, and identity formation.

**HISTORY 307A. Legal History Workshop. 4-5 Units.**

(Same as LAW 372.) Faculty and students from the Law school and the History department discuss research in the field of legal history. Guest speakers. Secondary literature relevant to the speaker's research. Undergraduates require consent of instructors.

**HISTORY 307B. Environment, Technology and Revolution in World History. 4-5 Units.**

Exploration of historiographical and interdisciplinary methodologies and approaches to intersections among environmental, technological, and revolutionary social change in diverse geographical and temporal contexts. Readings include broad theoretical and synthetic works as well as case studies of American, French, Mexican, Russian, Chinese, and Hungarian revolutions.

**HISTORY 307C. The Global Early Modern. 4-5 Units.**

In what sense can we speak of "globalization" before modernity? What are the characteristics and origins of the economic system we know as "capitalism"? When and why did European economies begin to diverge from those of other Eurasian societies? With these big questions in mind, the primary focus will be on the history of Europe and European empires, but substantial readings deal with other parts of the world, particularly China and the Indian Ocean.

Same as: HISTORY 207C.

**HISTORY 307E. Totalitarianism. 4-5 Units.**

Modern revolutionary and totalitarian politics. Sources include monographs on the medieval, Reformation, French Revolutionary, and Great War eras. Topics: the essence of modern ideology, the concept of the body national, state terror, charismatic leadership, gender assignments, private and public spheres, and identities.

Same as: HISTORY 204E.

**HISTORY 308. Biography and History. 4-5 Units.**

The relationship between biographical and historical writing, primarily in Europe and America. Problems of methodology, evidence, dispassion, and empathy. Texts: biographies, critical literature on biographical work, and novels (A. S. Byatt's *Possession*, Bernard Malamud's *Dubin's Lives*) that illuminate the intellectual underpinnings of biographical labor.

Same as: HISTORY 207.

**HISTORY 308A. Science and Law in History. 4-5 Units.**

How the intertwined modern fields of science and law, since the early modern period, together developed central notions of fact, evidence, experiment, demonstration, objectivity, and proof.

Same as: HISTORY 208A.

**HISTORY 308B. Women Activists' Response to War. 4-5 Units.**

Theoretical issues, historical origins, changing forms of women's activism in response to war throughout the 20th century, and contemporary cases, such as the Russian Committee of Soldiers Mothers, Bosnian Mothers of Srebrenica, Serbian Women in Black, and the American Cindy Sheehan. Focus is on the U.S. and Eastern Europe, with attention to Israel, England, and Argentina.

Same as: HISTORY 208B.

**HISTORY 308D. Pre-Modern Warfare. 3-5 Units.**

This course examines the evolving nature of warfare and its impact on society across the Eurasian continent up to the Gunpowder Revolution and rise of the nation-state. Beginning with an attempt to define war, it will trace the evolution of military technology from the Stone Age through the rise of the chariot, the sword, and the mounted rider, and examine how changing methods of conducting warfare were inextricably linked to changes in the social order and political structures.

Same as: HISTORY 208D.

**HISTORY 309A. Postcolonialism and Universalism. 4-5 Units.**

Key texts and motifs from postcolonial theory: empire, class, exile, suffering, textuality, archive in juxtaposition to 20th-century philosophical questions about universal history and the relevance of humanist inquiry.

Same as: HISTORY 209D.

**HISTORY 309B. The Idea of Politics. 4-5 Units.**

Can we live without politics? Is politics indispensable for humanity and vice-versa? The idea of politics is that it must transform, through human action, conditions of collective life. But the 20th century produced colliding beliefs about what that life might be and what the human being itself might look like. Explore whether, after the century, we might still think of politics as an ethical idea and the "human" as foundational political category.

Keywords: Civility, Cruelty, Friendship, Empire, Democracy, Humanism, Animals.

Same as: HISTORY 209B.

**HISTORY 309C. Liberalism and Violence. 5 Units.**

Does Liberalism have a theory of violence? What does modern political thought, in privileging humanity and rights, share with "terrorists" and "rogue states"? How is liberalism transformed by the use of religion and death for political ends? We read key thinkers of modern life- Adorno, Arendt, Agamben, Benjamin, Derrida, Fanon, Foucault, Gandhi, Heidegger, and Schmitt- to interrogate the relationship between religion, sacrifice, and democracy. At the center are connections between war and modern life, and between violence and non-violence.

Same as: HISTORY 209C.

**HISTORY 309E. History Meets Geography. 4-5 Units.**

Focus is on developing competence in GIS computer applications and applying it to historical problems. Previous experience with GIS not required. Recommended: complete the GIS tutorial in Branner Library before the course starts.

**HISTORY 309F. Historical Geography Colloquium: Maps in the Early Modern World. 4-5 Units.**

The significance of cartographic enterprise across the early modern world. Political, economic, and epistemological imperatives that drove the proliferation of nautical charts, domain surveys, city plans, atlases, and globes; the types of work such artifacts performed for their patrons, viewers, and subjects. Contributions of indigenous knowledge to imperial maps; the career of the map in commerce, surveillance, diplomacy, conquest, and indoctrination. Sources include recent research from Asia, Europe, and the Americas.

**HISTORY 309G. Paleography of Medieval and Early Modern Manuscripts. 3-5 Units.**

Introductory course in the history of writing and of the book, from the late antique period until the advent of printing. Opportunity to learn to read and interpret medieval manuscripts through hands-on examination of original materials in Special Collections of Stanford Libraries as well as through digital images. Offers critical training in the reading of manuscripts for students from departments as diverse as Classics, History, Philosophy, Religious Studies, English, and the Division of Languages Cultures and Literatures.

Same as: CLASSGEN 311, DLCL 209, ENGLISH 209, RELIGST 204.

**HISTORY 311A. Family, Gender, and Production in Ancient Rome. 4-5 Units.**

Seminar. The household as the basic unit of production in Rome in the context of family relations and ideologies of gender. Methodological challenges of doing social and economic history from literary, epigraphic, and literary texts. Demography of family and kinship in ancient Rome. Ideologies of gender and family roles and their influence on economic production. Economic theories of the family and human capital.

Same as: CLASSGEN 220.

**HISTORY 311G. Big Ancient History. 4-5 Units.**

How the shift away from thinking about European history in terms of a western civilization model toward embedding it in stories of how global history affects research and teaching on ancient Greece and Rome. Conventional, evolutionary, and global history narratives of the past 5,000 to 15,000 years and some new ideas about how Greco-Roman history might fit into different storylines.

Same as: CLASSHIS 312.

**HISTORY 313E. Power and Institutions in Medieval Europe, 1000-1400. 4-5 Units.**

Examines how historical understandings of the exercise of power in medieval Europe have changed over the 20th and 21st centuries with particular emphasis on the impact of the Annales school on traditional institutional approaches and attempts to embrace "new institutionalism." Readings will include classics in the field, such as Marc Bloch's *Societe feodale* and Georges Duby's *La Societe aux XIe and XIIe siecles dan la region macionnaise* or Pierre Toubert's *Les structures du Latium medieval*, as well as new work on "cultures of power". A portion of the colloquium will be given over to students' explorations of particular institutions central to their own research.

**HISTORY 319B. Secularity. 4-5 Units.**

Classic theories of secularity. Is a secular world possible? How does, historically seen, the notion of the secular emerge, impose itself, and get challenged? Readings include Max Weber, E. Durkheim, R.A. Markus, Carl Schmitt, and Hans Blumenberg, and studies bearing on the Middle Ages, English monastic secularization, the French Revolution, and 20th-century political religions.

**HISTORY 320G. Demons, Witches, and Priests: Religion and Popular Culture in Russia. 4-5 Units.**

19th and early 20th centuries. Peasants, parish priests, witches, possessed persons, cults and sects, old believers, saints, and women's religious communities. Nominally Christian, and members of the Orthodox Church, Russians embraced beliefs and customs that combined teaching from Church and folk traditions.  
Same as: HISTORY 220G.

**HISTORY 321A. Classics of Russian Historiography. 4-5 Units.**

Main trends of Russian intellectual history as seen through major historians' treatment of Muscovy: Romanticism, Slavophilism, Hegelianism, Populism, Social Democracy, New Idealism, and Marxism-Leninism.

**HISTORY 321B. Imperial Russian Historiography. 4-5 Units.**

**HISTORY 322. Early Modern Russia in European Context. 4-5 Units.**  
Major topics from 1450 to 1801: state-building, ideology, empire, law, economy, international trade and relations. Comparative context with Europe and Ottoman Empire.

**HISTORY 323. Art and Ideas in Imperial Russia. 4-5 Units.**

Poetry, novels, symphonic music, theater, opera, painting, design, and architecture: what they reveal about the politics and culture of tsarist Russia.  
Same as: HISTORY 223.

**HISTORY 323B. Research Methodologies in Early Modern Russian History. 4-5 Units.****HISTORY 324C. Genocide and Humanitarian Intervention. 3 Units.**

Open to medical students, graduate students, and undergraduate students. Traces the history of genocide in the 20th century and the question of humanitarian intervention to stop it, a topic that has been especially controversial since the end of the Cold War. The pre-1990s discussion begins with the Armenian genocide during the First World War and includes the Holocaust and Cambodia under the Khmer Rouge in the 1970s. Coverage of genocide and humanitarian intervention since the 1990s includes the wars in Bosnia, Rwanda, Kosovo, the Congo and Sudan.  
Same as: HISTORY 224C, PEDS 224.

**HISTORY 324F. The Caucasus and the Muslim World. 4-5 Units.**

The linkages connecting the societies of the Caucasus to Muslim communities in Iran, Russia, the Ottoman Empire and Turkey, S. Asia, and the Middle East.

**HISTORY 326C. Graduate Colloquium on Balkan History. 4-5 Units.**

Designed for History Ph.D. students to develop competence in the history and historiography of the modern Balkans, from the French Revolution to the present. Areas of study include the influence of empires on the region, the rise of nationalism and nation states, the dilemmas of independence, the emergence and decline of communism in the region, and the recurrence of war and ethnic conflict.

**HISTORY 327. East European Women and War in the 20th Century. 4-5 Units.**

Thematic chronological approach through conflicts in the region: the Balkan Wars, WW I, WW II, and the recent wars in the former Yugoslavia. The way women in E. Europe have been involved in and affected by these wars compared to women in W. Europe in the two world wars. Women's involvement in war as members of the military services, the backbone of underground movements, workers in war industries, mothers of soldiers, subjects and supporters of war aims and propaganda, activists in peace movements, and objects of wartime destruction, dislocation, and sexual violation.

Same as: HISTORY 227.

**HISTORY 328. Circles of Hell: Poland in World War II. 5 Units.**

Looks at the experience and representation of Poland's wartime history from the Nazi-Soviet Pact (1939) to the aftermath of Yalta (1945). Examines Nazi and Soviet ideology and practice in Poland, as well as the ways Poles responded, resisted, and survived. Considers wartime relations among Polish citizens, particularly Poles and Jews. In this regard, interrogates the traditional self-characterization of Poles as innocent victims, looking at their relationship to the Holocaust, thus engaging in a passionate debate still raging in Polish society.  
Same as: HISTORY 228, JEWISHST 282, JEWISHST 382.

**HISTORY 330. Core Colloquium on Early Modern Europe: Ancien Regime. 4-5 Units.**

Topics in the social, political, and religious history of Western Europe, 1550-1789, with an emphasis on France. May be repeated for credit.

**HISTORY 330A. Core Colloquium on Early Modern Europe. 4-5 Units.**

Historiographical survey from the Renaissance to the Enlightenment. Topics include Renaissance, Reformation, European expansion, state and nation building, printing, military, and scientific revolutions, origins of Enlightenment. Designed to prepare students doing either a primary or secondary graduate field in early modern European history.

**HISTORY 330D. Europe in the World, 1789-Present. 4-5 Units.**

The European conquest of parts of Africa, Asia, and the South Pacific by European merchants, missionaries, armies, and administrators had significant, and often cataclysmic, effects on indigenous political alliances, cultural practices, and belief systems. But were the effects of expansion entirely one-sided? What impact did the experiences of colonialism have on European politics, culture, and Europe's relations with the rest of the world? Explores how interaction between Europe and the rest of the world redefined the political, racial, sexual, and religious boundaries of both Europe and its colonies and gave rise to the more "globalized" society we live in today.

Same as: HISTORY 230D.

**HISTORY 330E. Republic of Letters: Knowledge and Community, 1300-1800. 4 Units.**

How did a "republic of letters" emerge in the Renaissance and undergo multiple transformations during the Reformation, Scientific Revolution, and Enlightenment? How did knowledge, communication, and community change between the age of Renaissance humanists such as Petrarch, Machiavelli, and Erasmus, the invention of printing, the political, religious and intellectual upheavals of the seventeenth century, and the trans-Atlantic, cosmopolitan world of salons, libraries, and enlightened philosophers such as Voltaire, Gibbon, and Franklin?

Same as: HISTORY 230E.

**HISTORY 330F. Self-Policing, Denunciation, and Surveillance in Modern Europe. 4-5 Units.**

How individual actions impact state machineries of power. The motives, pressures, and consequences of everyday collaboration from the French Revolution to Nazi Germany and Soviet bloc police states; popular outrage over such practices in the aftermath of these regimes. The phenomenon of anticipatory compliance, as people tended to perceive less freedom of action than actually existed, and the reciprocal intensification of real and imagined restrictions. The malleability of personal values and interests as represented in diaries, memoirs, secondary sources, and film; variety of individual and national responses.

Same as: HISTORY 230F.

**HISTORY 330K. Left, Right, and the Intellectual Life: Politics and Intellectuals in the Short Twentieth Century. 5 Units.**

The twentieth century has been called the "century of intellectuals" because of the important role that men and women of letters played in debating, creating, and legitimizing the intense ideological conflict that defined the era. Beginning with the classic debates between Sartre and Camus, which encapsulate the dilemma of political commitment felt acutely throughout the century, this course then considers intellectuals' relationships to the major ideologies of the century: from fascism and Communism to liberalism and right-wing libertarianism.

Same as: HISTORY 230K.

**HISTORY 331B. Core Colloquium on Modern Europe: The 19th Century. 4-5 Units.**

The major historical events and historiographical debates of the long 19th century from the French Revolution to WW I.

**HISTORY 331D. Core Colloquium on Modern Europe: Intellectual History. 4-5 Units.****HISTORY 332B. Heretics, Prostitutes, and Merchants: Venice and its Empire. 4-5 Units.**

Between 1200-1600, Venice created a powerful empire at the boundary between East and West that controlled much of the Mediterranean, with a merchant society that allowed social groups, religions, and ethnicities to coexist. Topics include the features of Venetian society, the relationship between center and periphery, order and disorder, orthodoxy and heresy, the role of politics, art, and culture in the Venetian Renaissance, and the empire's decline as a political power and reinvention as a tourist site and living museum.

**HISTORY 332D. Rome: The City and the World, 1350-1750. 4-5 Units.**

What lies beyond the ruins of an ancient city? The history of Rome from the Renaissance to the age of the grand tour. Topics include: the political, diplomatic, and religious history of the papacy; society and cultural life; the everyday world of Roman citizens; the relationship between the city and the surrounding countryside; the material transformation of Rome as a city; and its meaning for foreigners.

Same as: HISTORY 232D.

**HISTORY 332E. Machiavelli. 4-5 Units.**

The name of Florentine chancellor Niccolo Machiavelli (1469-1527 CE) is synonymous with brutal cunning and bad faith in politics. But Machiavelli was much more than a political thinker. He was also a (literally) tortured poet, a writer of comedies, an historian and student of antiquity, a statesman, an idealist, a republican, a husband, a father, and a friend. The goal of this course is to understand the multifaceted Machiavelli in his historical context and through his works.

Same as: HISTORY 232E.

**HISTORY 332G. When Worlds Collide: The Trial of Galileo. 4-5 Units.**

In 1633, the Italian mathematician Galileo was tried and condemned for advocating that the sun, not the earth, was the center of the cosmos. The Catholic Church did not formally admit that Galileo was right until 1992. Examines the many factors that led to the trial of Galileo and looks at multiple perspectives on this signal event in the history of science and religion. Considers the nature and definition of intellectual heresy in the sixteenth and early seventeenth centuries, and examines the writings of Galileo's infamous predecessor Giordano Bruno (burned at the stake in 1600). Looks closely at documents surrounding the trial and related literature on Renaissance and Reformation Italy in order to understand the perspectives of various participants in this famous event. Focal point of seminar involves the examination of the many different histories that can be produced from Galileo's trial. What, in the end, were the crimes of Galileo?.

**HISTORY 333. Reformation, Political Culture, and the Origins of the English Civil War. 4-5 Units.**

English political and religious culture from the end of the Wars of the Roses to the Civil War of the 1640s. Themes include the growth of the size and power of the state, Reformation, creation of a Protestant regime, transformation of the political culture of the ruling elite, emergence of Puritanism, and causes of the Civil War.

Same as: HISTORY 233.

**HISTORY 333A. Age of Light or Times of Crisis? Euro Intellectual History fr Sci Rev to Romanticism. 4-5 Units.**

Over the past three centuries, European culture, society and politics have experienced a series of dramatic transformations, changes that unleashed a myriad of intellectual theories and debates. From politics and science to justice and religion, new ideas altered all fields of European thought, as intellectuals sought to understand the turmoil around them. Examines the rise of scientific thought and utopias, the emergence of new visions of politics, the differences between key Enlightenment thinkers, the development of Romanticism, Liberalism, Hegelianism, and more. Readings include Bacon, Descartes, Hobbes, Vico, Voltaire, Rousseau, Burke, Tocqueville and others.

Same as: HISTORY 233A.

**HISTORY 333C. Two British Revolutions. 4-5 Units.**

Current scholarship on Britain, 1640-1700, focusing on political and religious history. Topics include: causes and consequences of the English civil war and revolution; rise and fall of revolutionary Puritanism; the Restoration; popular politics in the late 17th century; changing contours of religious life; the crisis leading to the Glorious Revolution; and the new order that emerged after the deposing of James II.

Same as: HISTORY 233C.

**HISTORY 333E. European Intellectual History: The Age of Grand Ideologies. 4-5 Units.**

Ever since the Napoleonic Wars, European culture, society and politics have experienced a series of dramatic transformations, changes that unleashed a myriad of intellectual theories and debates. Focuses on the nineteenth century, the age of grand theories such as Liberalism, Positivism, Nationalism, Socialism, and Marxism and examines them historically. Readings include French Utopian Socialists and members of the Russian intelligentsia, J.S. Mill, Marx, Durkheim, Weber, Freud, and others.

Same as: HISTORY 233E.

**HISTORY 333K. The Invention of the Modern Republic. 4-5 Units.**

Examines the history of republican thinking in the Atlantic World from the Renaissance to the French Revolution.

Same as: HISTORY 233K.

**HISTORY 334. Enlightenment Seminar. 3-5 Units.**

The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.

Same as: DLCL 324, HISTORY 234, HISTORY 432A, HUMNTIES 324.

**HISTORY 334F. Science, Technology, and Empire. 4-5 Units.**

How modern Europe came to be connected to the wider world through repeated cycles of expansion, circulation, and exchange from the mid-nineteenth century to the present. Using weekly themes and in-depth discussions of watershed moments, the roles played by colonialism, migration, commerce, warfare, telecommunications, and popular culture in redefining the place of Europe in a changing global landscape will be explored.

Same as: HISTORY 234F.

**HISTORY 336. Modern France. 4-5 Units.**

(Daughton).

**HISTORY 336E. Violence in History and Theory. 4-5 Units.**

Methodological challenges associated with defining and analyzing violence in late-19th- and 20th-century contexts. How people witnessed, coped with, and survived violent episodes. Cases of state violence, ethnic and religious conflict, warfare, genocide, and decolonization. The notion of everyday suffering in the contemporary world. Sources include anthropology, sociology, and history.

**HISTORY 337C. Street History: Learning the Past in School and Out. 3-5 Units.**

Interdisciplinary. Since Herodotus, history and memory have competed to shape minds: history cultivates doubt and demands interpretation; memory seeks certainty and detests that which thwarts its aims. History and memory collide in modern society, often violently. How do young people become historical amidst these forces; how do school, family, nation, and mass media contribute to the process?

Same as: EDUC 356.

**HISTORY 338A. Graduate Colloquium in Modern British History, Part I. 4-5 Units.**

Influential approaches to problems in British, European, and imperial history. The 19th-century British experience and its relationship to Europe and empire. National identity, the industrial revolution, class formation, gender, liberalism, and state building. Goal is to prepare specialists and non-specialists for oral exams.

**HISTORY 338B. Modern Britain, Part II. 4-5 Units.**

Themes include empire and racism, the crisis of liberalism, the rise of the welfare state, national identity, the experience of total war, the politics of decline, and modernity and British culture.

**HISTORY 339D. Capital and Empire. 4-5 Units.**

Can empire be justified with balance sheets of imperial crimes and boons, a calculus of racism versus railroads? The political economy of empire through its intellectual history from Adam Smith to the present; the history of imperial corporations from the East India Company to Wal-mart; the role of consumerism; the formation of the global economy; and the relationship between empire and the theory and practice of development.

Same as: HISTORY 239D.

**HISTORY 339F. Empire and Information. 4-5 Units.**

How do states see? How do they know what they know about their subjects, citizens, economies, and geographies? How does that knowledge shape society, politics, identity, freedom, and modernity? Focus is on the British imperial state activities in S. Asia and Britain: surveillance technologies and information-gathering systems, including mapping, statistics, cultural schemata, and intelligence systems, to render geographies and social bodies legible, visible, and governable.

Same as: HISTORY 239F.

**HISTORY 339H. Modern European History in a Global Age. 4-5 Units.**

How scholars can write the history of modern Europe in a way that integrates global and transnational perspectives. Discussed the methodological challenges and merits of various approaches and reviews relevant theoretical and interdisciplinary models for how this can best be done. Topics include globalization, migration, internationalism, colonialism, post-colonialism, modern warfare, and the media.

**HISTORY 342. Darwin in the History of Life. 4-5 Units.**

Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evodevo, neocatastrophism, and the new technological frontier of biomimicry. Attendance at the lectures of HISTORY 142 is required.

**HISTORY 342A. What is Life? The History of a Question. 4-5 Units.**

History of attempts to understand the nature of life and mind by comparing living creatures with artificial machines and material arrangements. Imitations of animal life and human thought and discussions of relations between creatures and contraptions from antiquity onward, with an eye toward providing historical depth to current attempts to simulate life and mind.

Same as: HISTORY 242A.

**HISTORY 343G. Tobacco and Health in World History. 4-5 Units.**

Same as: HISTORY 243G.

**HISTORY 345A. Africa in the Era of the Slave Trade. 4-5 Units.**

The slave trade, including the trans-Saharan, Indian Ocean, and trans-Atlantic trades, constituted nearly a millennium of interaction with the wider world and set in motion transformations in African societies, politics, and cultures. Topics include the debates about slavery in Africa, the impact of the slave trade on African societies, state formation, economic change, religious change, and household change in the period before the scramble for Africa in the late 19th century.

**HISTORY 345B. African Encounters with Colonialism. 4-5 Units.****HISTORY 346C. Islam and Christianity in Africa. 4-5 Units.**

History of the 20% of the Muslims and Christians in the world who live in Africa. The role of these religions in social, cultural and political transformations. Linkages between African religions and global/transnational institutions. African contributions to theology, religious practice and religious styles. Muslim/Christian relations and relations with "traditional" African religions.

Same as: HISTORY 246C.

**HISTORY 347E. Health and Society in Africa. 4-5 Units.**

The history of disease, therapeutic and diagnostic systems, and the definition of health in precolonial, colonial, and postcolonial Africa. The social and political histories of specific epidemics, including sleeping sickness, influenza, TB, mental illness, and AIDS. The colonial contexts of epidemics and the social consequences of disease.

Same as: HISTORY 245E.



**HISTORY 348D. Law and Colonialism in Africa. 3-5 Units.**

Law in colonial Africa provides an opportunity to examine the meanings of social, cultural, and economic change in the anthropological, legal, and historical approaches. Court cases as a new frontier for the social history of Africa. Topics: meanings of conflicts over marriage, divorce, inheritance, property, and authority.

Same as: HISTORY 245G.

**HISTORY 351A. Core in American History, Part I. 4-5 Units.****HISTORY 351B. Core in American History, Part II. 4-5 Units.****HISTORY 351C. Core in American History, Part III. 4-5 Units.****HISTORY 351D. Core in American History, Part IV. 4-5 Units.****HISTORY 351E. Core in American History, Part V. 4-5 Units.**

Required of all first-year United States History Ph.D. students.

**HISTORY 351F. Core in American History, Part VI. 4-5 Units.**

Required of all first-year Ph.D. students in U.S. History.

**HISTORY 352B. History of American Law. 5 Units.**

(Same as LAW 318.) Modern history of American law, legal thought, legal institutions and the legal profession. Topics include law and regulation of corporate organizations and labor relations in the age of enterprise, law of race relations in the South and North, development of classical legalism, critiques of classical legalism, modern administrative state, organized legal profession, New Deal legal thought and legislation, legal order of the 50s, expansion of enterprise liability, civil rights movements from 1940, rights revolution of the Warren Court and Great Society.

**HISTORY 353D. Approaches to American Legal History. 4-5 Units.**

(Same as LAW 651.) Legal history may once have been primarily devoted to exploring legal doctrines and key judicial opinions, and thus to be of interest mainly to legal scholars and lawyers. Now, the best writing in legal history resembles historical writing more generally, and the study of legal ideas and practices is increasingly integrated with social, intellectual, cultural, and political history. Examines recent writings in American legal history, ranging broadly across time and space to ask how the field reflects developments in historical writing more generally, and how the use of legal materials affects our understanding of major aspects of American history.

**HISTORY 353K. Law and the State in Modern America: Studies of the First and Fourteenth Amendments. 4-5 Units.**

Considers how social, political, and legal historians examine the ways in which policies and judicial actions have shaped the boundaries of the U.S. citizenship in the post-Reconstruction period. Looking at a range of case studies in civil rights, labor, civil liberties, social welfare, and immigration, we will examine how the law has functioned as a policing, criminalizing, regulatory mechanism and a tool to achieve a more egalitarian, libertarian democratic order. Defines legal development broadly, considering Supreme Court decisions alongside lawyers' legal reasoning, social movements' usage of the law, and public perception of legal rights.

Same as: HISTORY 253K.

**HISTORY 355. Decision Making in International Crises: The A-Bomb, the Korean War, and the Cuban Missile Crisis. 4-5 Units.**

For advanced undergraduates and graduate students. Primary documents and secondary literature. Topics include: the decision to use the atomic bomb on Japan, the Korean War, and the Cuban missile crisis.

Same as: HISTORY 252.

**HISTORY 355D. Racial Identity in the American Imagination. 4-5 Units.**

Major historical transformations shaping the understanding of racial identity and how it has been experienced, represented, and contested in American history. Topics include: racial passing and racial performance; migration, immigration, and racial identity in the urban context; the interplay between racial identity and American identity; the problems of class, gender, and sexuality in the construction of racial identity. Sources include historical and legal texts, memoirs, photography, literature, film, and music.

Same as: AFRICAAM 255, AMSTUD 255D, CSRE 255D, HISTORY 255D.

**HISTORY 356. U.S.-China Relations: From the Opium War to Tiananmen. 4-5 Units.**

The history of turbulent relations, military conflict, and cultural clashes between the U.S. and China, and the implications for the domestic lives of these increasingly interconnected countries. Diplomatic, political, social, cultural, and military themes from early contact to the recent past.

Same as: AMSTUD 256, HISTORY 256.

**HISTORY 356G. Constructing Race and Religion in America. 4 Units.**

This seminar focuses on the interrelationships between social constructions of race, and social interpretations of religion in America. How have assumptions about race shaped religious worldviews? How have religious beliefs shaped racial attitudes? How have ideas about religion and race contributed to notions of what it means to be "American"? We will look at primary and secondary sources, and at the historical development of ideas and practices over time.

Same as: HISTORY 256G, RELIGST 246, RELIGST 346.

**HISTORY 358. Topics in the History of Sexuality: Sexual Violence. 4-5 Units.**

Recent historical interpretations of sexual violence, with particular attention to the intersections of gender and race in the construction of rape, from early settlement through the twentieth century. Topics include the legal prosecution of rape in Early America; the racialization of rape in the U.S.; lynching and anti-lynching in the U.S.; and feminist responses to sexual violence.

Same as: AMSTUD 258, CSRE 192E, FEMST 258, FEMST 358, HISTORY 258.

**HISTORY 362G. The Pivotal Decade in U.S. History: 1960's or 1970's?. 4-5 Units.**

Which had more lasting impact, the civil war of the 1960s or the conservative revolt of the 1970s? Should the 1970s supersede the 1960s as a pivotal moment when something happened of considerable importance to historians? Considers this debate of the decades comparatively and thematically, addressing topics including civil rights, foreign policy, electoral politics, popular culture, law, economics, labor, and social movement organizing.

Same as: HISTORY 262G.

**HISTORY 363G. History Through a Life: The Allure of American Biography. 4-5 Units.**

Considers the possibilities and limitations of exploring U.S. history through the genre of biography. Is a single life too narrow to explain why and how pivotal events in U.S. history, such as war, economic depression, social revolution, unfold? Or can one life illuminate the complexity of historical shifts? Readings will span U.S. history, exploring topics such as labor and racial civil rights, science and culture, women and sexuality, transnationalism and diplomacy, law and presidential politics. The craft of biography will be considered alongside biographical subjects.

Same as: HISTORY 263G.

**HISTORY 365. Writing Asian American History. 5 Units.**

Recent scholarship in Asian American history, with attention to methodologies and sources. Topics: racial ideologies, gender, transnationalism, culture, and Asian American art history. Primary research paper.

Same as: AMSTUD 265, HISTORY 265.

**HISTORY 366B. Immigration Debates in America, Past and Present. 3-5 Units.**

Examines the ways in which the immigration of people from around the world and migration within the United States shaped American nation-building and ideas about national identity in the twentieth century. Focuses on how conflicting ideas about race, gender, ethnicity, and citizenship with respect to particular groups led to policies both of exclusion and integration. Part One begins with the ways in which the American views of race and citizenship in the colonial period through the post-Reconstruction Era led to the passage of the Chinese Exclusion Act in 1882 and subsequently to broader exclusions of immigrants from other parts of Asia, Southern and Eastern Europe, and Mexico. Explores how World War II and the Cold War challenged racial ideologies and led to policies of increasing liberalization culminating in the passage of the 1965 Immigration Act, which eliminated quotas based on national origins and opened the door for new waves of immigrants, especially from Asia and Latin America. Part Two considers new immigration patterns after 1965, including those of refugees, and investigates the contemporary debate over immigration and immigration policy in the post 9/11 era as well as inequalities within the system and the impact of foreign policy on exclusions and inclusions.

Same as: CSRE 166B, HISTORY 166B.

**HISTORY 370. Graduate Colloquium on Colonial Latin American History. 4-5 Units.**

Sixteenth to nineteenth centuries. Indigenous cultures. The arrival of Europeans and its impact on native and European societies. Culture, religion and institutions, and everyday life. The independence period and the formation of new nations.

**HISTORY 371. Graduate Colloquium: Explorations in Latin American Social History. 4-5 Units.**

How to use primary sources such as government records, estate inventories, and parish records for social history.

Same as: HISTORY 470.

**HISTORY 373A. The European Expansion. 4-5 Units.**

The relationship between European monarchies and their colonial domains from the 16th-18th centuries. Reasons for expansion, methods, and results. Case studies include the Spanish, Portuguese, Dutch, French, and English domains in Africa, Asia, and the Americas. Readings include primary and secondary sources.

Same as: HISTORY 273.

**HISTORY 375B. Borders and Borderlands in Modern Mexico. 4-5 Units.**

Surveys the history of Mexico's borders and borderlands from the nineteenth century to the present. Examines theoretical conceptualizations of the borderlands as well as the historical development of identities and geographic borders within and around Mexico. Topics include the legacies of war, map making, the construction of *lo Mexicano*, the politics of culture, and migrations to, from, and through Mexico. Analyzes the prevailing trends in Mexicanist historiography.

**HISTORY 376. Modern Brazil. 4-5 Units.**

From independence in 1822 to the present. Social and cultural history. Literary and historical sources.

Same as: HISTORY 276.

**HISTORY 378A. The Logic of Authoritarian Government, Ancient and Modern. 5 Units.**

If authoritarianism is less economically efficient than democracy, and if authoritarianism is a less stable form of political organization than democracy, then why are there more authoritarian governments than democracies? To address this paradox, focus is on theoretical and empirical literature on authoritarian governments, and related literatures on the microeconomic analysis of property rights and credible commitments.

Same as: POLISCI 346S.

**HISTORY 379. Latin American Development: Economy and Society, 1800-2000. 4-5 Units.**

The newly independent nations of Latin America began the 19th century with economies roughly equal to, or even ahead of, the U.S. and Canada. What explains the economic gap that developed since 1900? Why are some Latin American nations rich and others poor? Marxist, dependency, neoclassical, and institutionalist interpretive frameworks. The effects of globalization on Latin American economic growth, autonomy, and potential for social justice.

Same as: HISTORY 279.

**HISTORY 382. The United States and the Middle East since 1945. 4-5 Units.**

Since the end of WW II, U.S. interests in the Middle East have traditionally been defined as access to oil at a reasonable price, trade and markets, containing the influence of the Soviet Union, and the security of Israel. Is this the full range of U.S. interests? How has the pursuit of these interests changed over time? What forces have shaped U.S. policy? What is the impact of U.S. policy on the region itself?

Same as: HISTORY 282.

**HISTORY 382E. Jews, Christians and Muslims in the Ottoman World. 4-5 Units.**

The experiences of the Jewish, Christian and Muslim communities in the Ottoman Empire, fifteenth to twentieth centuries. How diverse social and religious communities lived together in an imperial setting, specifically the mechanisms, discourses and crises of coexistence in the Ottoman Empire. Various comparisons of the Ottoman Empire to the Habsburg, the Romanov (Russian), the Mughal, and the British empires.

Same as: HISTORY 282E.

**HISTORY 382G. Israel from the Margins. 4-5 Units.**

Although secular, European Jews form a minority of the population of the State of Israel, and its history is typically narrated and interpreted from that perspective. Israel looks like a rather different place if it is seen and understood from the point of view of Middle Eastern and North African Jews, including those indigenous to the country before the advent of the modern Zionist movement, orthodox and ultra-orthodox Jews, Palestinian Arabs (nearly twenty percent of Israel's population today), migrant workers (about 200,000), and women. This course does not suggest that their perspectives are necessarily more real or true, only that an understanding of Israel that does not adequately consider them is necessarily false.

Same as: HISTORY 282G.

**HISTORY 383. The New Global Economy, Oil, and Islamic Movements in the Middle East. 4-5 Units.**

The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market combined with case studies of Egypt, Iraq, and Palestine.

Same as: HISTORY 283.

**HISTORY 384. The Ottoman Empire, 1300-1923. 4-5 Units.**

This is a course on the Middle East and Southeast Europe under the Ottoman Empire. Topics include how the Ottoman enterprise was constructed in the frontier region of the Christian and Islamic worlds; the conquests and consolidation of the imperial institutions; how diverse peoples, cultures, and regions were integrated into the imperial system; the Ottoman Empire and the broader world; merchants and their markets; elite, urban, rural and nomadic lives; women, family sexuality; art, literature, and architecture; the transformation of the empire on the eve of modernity; the rise of nationalism and the Ottoman response; Ottoman disintegration and the making of the Middle East and Southeast Europe.

Same as: HISTORY 284.

**HISTORY 385A. Core in Jewish History, 17th-19th Centuries. 4-5 Units.**

Same as: JEWISHST 385A.

**HISTORY 385B. Core in Jewish History, 20th Century. 4-5 Units.**

Instructor consent required.

Same as: JEWISHST 385B.

**HISTORY 385K. History of Modern Antisemitism: Nineteenth and Twentieth Centuries. 4-5 Units.**

The articulations of anti-Jewish hatred from the advent of Jewish emancipation in Europe. The legacy of premodern Christian demonization and its modern protean transformations as they penetrated and annexed new currents of ideology, notions of identity (social, national, racial), taste, and aesthetics. A history of ideas, representations, and stereotypes, and their relation to historical experience, action, and mobilization. Europe is the focus; case studies also include the Middle East and elsewhere.

Same as: HISTORY 185K.

**HISTORY 386. Jews among Muslims. 4-5 Units.**

The history of Jewish communities in the lands of Islam and their relations with the surrounding Muslim populations from the time of Muhammad to the 20th century. Topics: the place of Jews in Muslim societies, Jewish communal life, variation in the experience of communities in different Muslim lands, the impact of the West in the Modern period, the rise of nationalisms, and the end of Jewish life in Muslim countries.

Same as: HISTORY 286.

**HISTORY 386B. The Ottoman Empire in the Age of Revolutions, 1750-1850. 4-5 Units.**

Investigates the Ottoman World (the Balkans and the Middle East under the Ottoman Empire) in the Age of Revolutions in the global context. While the Ottoman World is the primary interest, developments in Europe, India and China are also discussed in a comparative perspective. Topics include military and fiscal transformation; regionalism; urban life and formations of public spheres; political crisis, social disturbances and political violence; transformation in the ethno-religious structures, gender relations and family life; proto-nationalism in the Balkans and Egypt.

Same as: HISTORY 286B.

**HISTORY 386C. Jews and the Russian Revolution. 5 Units.**

This course evaluates the role of Jews in Russian radicalism beginning in the 1870s and '80s and focuses on their participation in the Revolutions of 1905 and especially 1917. The connections if any, between Judaism, Messianism, and radicalism will be evaluated, as will the socio-economic and cultural lives of Jews in Russia and how these inflected political attitudes radical and conservative. The course will trace the impact of the revolution on Jewish life into the mid, and late-1920s. The belief that Jews were once responsible for the revolution emerged as one of the cardinal principles of the Russian Right, eventually also the European Right and it would be embedded in the central ideas of Nazism and these developments, too, will be examined.

Same as: HISTORY 286C, JEWISHST 286C, JEWISHST 386C.

**HISTORY 387D. Tel Aviv: Site, Symbol, City. 4-5 Units.**

Tel Aviv, the first Israeli/Hebrew city, from a cultural history perspective combining high and low cultural artifacts, examining the symbolic constructions of the city as a site of Hebrew modernism and postmodernism. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's coffee houses; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; the effects of contemporary globalization and the reconstruction of Tel Aviv as the symbolic site of Israeli post-nationalism. Sources include art, cinema, and literature, pop music and archival materials from Green Library's Eliasaf Robinson Collection.

Hebrew reading knowledge, although helpful, is not required.

Same as: HISTORY 287D, JEWISHST 287D, JEWISHST 387D.

**HISTORY 387E. Jewish Intellectuals and the Crisis of Modernity. 4-5 Units.**

Intellectual responses of Jewish political thinkers, historians and authors to the age of extremes. Readings include Theodor Adorno, Herbert Marcuse, Eric Fromm, Hannah Arendt, Leo Strauss, Karl Popper, Isaiah Berlin, Tony Judt, and George Steiner. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in postwar years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945. No prior knowledge of political science, philosophy and/or Jewish studies is required.

Same as: HISTORY 287E, JEWISHST 287E, JEWISHST 387E.

**HISTORY 387K. Gentlemen and Jews: History of the Jews of England. 4-5 Units.**

Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?

Same as: HISTORY 287K, JEWISHST 287K, JEWISHST 387K.

**HISTORY 388. Palestine and the Arab-Israeli Conflict. 4-5 Units.**

1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin)

Same as: HISTORY 288, JEWISHST 288, JEWISHST 388.

**HISTORY 389. The Indian Ocean World: Winds, Merchants & Empires. 4-5 Units.**

Focuses on the Indian Ocean World, a critical historical arena of large-scale cultural and economic contact among societies of South Asia, the Middle East, East and Southeast Asia, and East Africa. We will explore this contact zone chronologically and thematically, examining the influence of environment, the demands of commerce, the bonds of Islam, and the political tensions of empires from medieval to modern times. We will pay particular attention to the networks and individuals that have made up the social fabric of this oceanic world: merchants, pilgrims, smugglers, and laborers. Texts will include scholarly studies as well as travel and fictional accounts.

Same as: HISTORY 289.

**HISTORY 390. Han Chinese and the Global White: The Production of Ethnoracial Majorities, East and West. 4-5 Units.****HISTORY 390A. Major Topics in Modern Chinese History: Qing/Republican Transition. 4-5 Units.**

Continuities and discontinuities in society, economy, politics, culture, and thought during the transition from the Qing dynasty to the republic. May be repeated for credit.

**HISTORY 390E. Movies and Empire in East Asia. 5 Units.**

Cinema was invented in the 1890s and simultaneously introduced to East Asia. This colloquium explores how this new medium changed the cultural and social landscape of East Asia and how the visual power of films also affected the culture politics of empires in the region. The themes include cinema and urban spaces, cultural imperialism, film images and gender discourse, colonial modernity, Americanism and Asianism, the visual and the textual, wartime propaganda, and Hollywood movies and cold war empires.

Same as: HISTORY 290E.

**HISTORY 391. East Asia in the Early Buddhist Age. 4-5 Units.**

Evolution of cities in imperial China through early imperial, medieval, and early modern periods. Topics include physical structure, social order, cultural forms, economic roles, relations to rural hinterlands, and the contrast between imperial capitals and other cities. Comparative examination of cases from European history.

Same as: HISTORY 191.

**HISTORY 391A. Archaeology and Modernity in Asia: The Excavation of Ancient Civilizations in Modern Times. 4-5 Units.**

The interplay in Asia between antiquity and modernity, civilization and nation state, and national versus colonial science. The recent excavation of artifacts and places associated with Asian civilization such as the terracotta warriors in China and Angkor Wat in Cambodia. How Asian states have grappled with modernity and colonialism as they simultaneously dug up their ancient pasts.

Same as: HISTORY 291A.

**HISTORY 391B. The City in Imperial China. 3-5 Units.**

The evolution of cities in the early imperial, medieval, and early modern periods. Topics include physical structure, social order, cultural forms, economic roles, relations to rural hinterlands, and the contrast between imperial capitals and other cities. Comparative cases from European history. Readings include primary and secondary sources, and visual materials.

Same as: HISTORY 291B.

**HISTORY 391C. Early Imperial China. 4-5 Units.**

The first millennium of imperial China, what endured over the centuries, and the major changes that took place in the political, social, and intellectual realms. Topics include the evolving geographic and environmental background, cities, the countryside, kinship, relations with the outer world, religion, philosophy, and literature. Also examines the nature of empire as a distinctive political form.

**HISTORY 391D. Colonialism and Collaboration in East Asia. 5 Units.**

The roles and problems of collaboration in the rise, sustenance, and fall of empires. Themes include conceptual definitions of collaboration and empire, collaboration of traditional elites, accommodation of religious communities, assimilation and collaboration, local intermediaries, and class and empire. Regional focus is East Asia; also cases from other colonial situations.

Same as: HISTORY 291D.

**HISTORY 391E. Maps, Borders, and Conflict in East Asia. 4-5 Units.**

The nature of borders and border conflicts in N.E. Asia from the 17th to the early 20th century. Focus is on contact zones between China, Russia, Korea, and Japan. The geopolitical imperatives that drove states to map their terrain in variable ways. Cultural, diplomatic, and imperial contexts. European pressures and contributions to E. Asian cartography; the uses of maps in surveillance, diplomacy, identity, and war. Student projects focus on a contested border zone.

Same as: HISTORY 291E.

**HISTORY 391G. Pre-Modern Chinese Warfare. 3-5 Units.**

This course examines the evolution of warfare in China, and its impact on the evolving political and social orders, from the earliest states through the Mongol conquest. It will study how changing military technology was inextricably linked to changes in the state and society. It will also look at changing Chinese attitudes towards warfare over the same period, from the celebration of heroism, through writing about warfare as an intellectual art, to the links of militarism with steppe peoples/

Same as: HISTORY 291G.

**HISTORY 391K. Speaking Through Objects: Material Culture in Late Imperial China, 1550-1820. 5 Units.**

Material culture in late Imperial China from Mid-Ming to High Qing (1550-1820). Topics include: beliefs and values towards the material world, the social transformation and consumer society of later imperial China, and its significance in a global context, technology and craftsmanship, objects as media, feminine space, printing and publishing, collecting and connoisseurship, taste and fashion, court culture and global trade.

Same as: HISTORY 291K.

**HISTORY 392. The Two Koreas. 4-5 Units.**

Examines major themes and scholarly works to understand the origins, outbreak, and consequences of the Korean War. One focus will be the division of Korea into ROK and DPRK and their subsequent developments. Themes include World War II in East Asia; Korean communist movements during Japanese colonial rule; the Cold War in East Asia; the roles of the US, China, and USSR in the Korean War; the ideas of key North and South Korean leaders, and the consolidation of the two Koreas after the Korean War.

Same as: HISTORY 292.

**HISTORY 392B. Law and Society in Late Imperial China. 4-5 Units.**

Connections between legal and social history. Ideology and practice, center and periphery, and state-society tensions and interactions. Readings introduce the work of major historians on concepts and problems in Ming-Qing history.

**HISTORY 392D. Japan in Asia, Asia in Japan. 4-5 Units.**

How Japan and Asia mutually shaped each other in the late 19th and 20th centuries. Focus is on Japanese imperialism in Asia and its postwar legacies. Topics include: pan-Asianism and orientalism; colonial modernization in Korea and Taiwan; collaboration and resistance; popular imperialism in Manchuria; total war and empire; comfort women and the politics of apology; the issue of resident Koreans; and economic and cultural integration of postwar Asia.

Same as: HISTORY 292D.

**HISTORY 392E. The Historical Roots of Modern East Asia. 4-5 Units.**

Focus is on China and Japan before and during their transition to modernity. The populous, urbanized, economically advanced, and culturally sophisticated Ming empire and Muromachi shogunate in the 16th century when Europeans first arrived. How the status quo had turned on its head by the early 20th century when European and American steamships dominated the Pacific, China was in social and political upheaval, and Japan had begun its march to empire.

Same as: HISTORY 92A.

**HISTORY 392F. Traditional Korea: History and Culture. 4-5 Units.**

Korea before 1800 and how iconic features of Korean tradition were created and reinvented. Themes include Korea's ancient kingdoms, the aristocracy and military in the Koryo dynasty, the print culture and Korean alphabet, ideologies and religions, the social status system and the life of women, the kingship and court culture of the Choson dynasty, and Korea's place in premodern East Asia. The modern and contemporary debates.

Same as: HISTORY 292F.

**HISTORY 392G. Modern Korea. 4-5 Units.**

Examines seminal works and major historical debates in the study of modern Korea. Topics include the state and society in the Choson dynasty, reform and rebellion in the nineteenth century, colonization, gender and colonial modernity, national identity and assimilation, wartime colonial Korea, decolonization and the North Korean revolution, the Korean War and its aftermath, the Pak Chung Hee regime and labor relations, and democratization.

Same as: HISTORY 292G.

**HISTORY 393A. State, Society, and Economy in Qing Dynasty China. 4-5 Units.**

Historical scholarship on China during the Qing period, including the gentry, civil examinations, and the debate about social mobility; merchants, cities, and the debate about civil society/public sphere; taxation, local security, and famine relief; heterodoxy, collective violence, and rebellion; and rival approaches (neo-Malthusian, neo-conservative, and neo-Marxist) to understanding the high Qing economy.

**HISTORY 393B. Homosexuality in Historical and Comparative Perspective. 4-5 Units.**

Comparative history of homoerotic desire, relations, and identity through scholarship on different historical periods and parts of the world: the classical Mediterranean, early modern European cities, late imperial and modern China, Tokugawa and modern Japan, and the U.S.

Same as: HISTORY 293B.

**HISTORY 393C. Late Imperial China. 4-5 Units.**

A survey of Chinese history from the 11th century to the collapse of the imperial state in 1911. Topics include absolutism, gentry society, popular culture, gender and sexuality, steppe nomads, the Jesuits in China, peasant rebellion, ethnic conflict, opium, and the impact of Western imperialism.

**HISTORY 393D. Global Intellectual History. 4-5 Units.**

Ideas have circulated globally for millennia but relatively recently have thinkers begun to conceptualize the global. Like "humanity" and "universalism," or what Marx called "international," the "global" too has complex genealogies. It is associated, often simultaneously, with empire and freedom, war and equality, commitment and treason, piracy and justice, homelessness and cosmopolitanism. Working with key 20th century texts from Italy, Britain, India, Israel, Palestine, Germany, France, and Algeria, course explores how thinking "globally" impacts the very foundations of modern political thought.

Same as: HISTORY 293D.

**HISTORY 395F. Race and Ethnicity in East Asia. 4-5 Units.**

Historical, cultural, political and theoretical perspectives. Commonly misunderstood as an ethnically homogeneous country, the People's Republic of China is home to 55 officially recognized minority groups, many of whom inhabit the strategic border regions of the country. How similar assumptions of ethnic and racial homogeneity in Taiwan, Japan, and Korea are being reexamined by scholars in disciplines including anthropology, history, and political science.

Same as: ASNAMST 295F, HISTORY 295F.

**HISTORY 395G. Lost in Translation: Nineteenth Century Japan. 5 Units.**

This colloquium aims to develop young scholar's sensitivity towards intended and changing nuances in core Japanese historical terminologies used in scholarly writings. To create a basic historiographical map of scholarly writings on 19th century Japanese history, we will redefine the core terminologies on Tokugawa political ideology, economics, geography, religious network, popular culture, and publishing movement through analyzing selected primary sources and secondary readings.

**HISTORY 395J. Gender and Sexuality in Chinese History. 4-5 Units.****HISTORY 396D. Modern Japan. 4-5 Units.**

Introduces students to the major historical problems and historiographic trends in the study of modern Japan from the Meiji period to the present. Themes include approaches to late Meiji culture and politics, the formation of imperial subjects and citizens, agrarian society and politics, gender in modern Japan, empire and modernity, total war and transwar state and society, U.S. occupation, and postwar Japan.

**HISTORY 399A. Preparing for International Field Work: Public Service or Research. 1 Unitss.**

Problems involved in research abroad: ethical issues; safety; security and conduct; human subjects protocol. Methodologies of research: interviewing, networking, case studies, participant observation, large surveys.

Same as: HISTORY 299X.

**HISTORY 399E. Preparing for International Field Research: Public Svc or Research, Electronic Version. 1 Unitss.**

Restricted to students studying at a Stanford Overseas Studies campus; same course content as HISTORY 299X. Problems involved in research abroad: ethical issues; safety; security and conduct; human subjects protocol. Methodologies of research: interviewing, networking, case studies, participant observation, large surveys. Prerequisite: consent of instructor.

Same as: HISTORY 299E.

**HISTORY 399W. Graduate Directed Reading. 1-10 Units.****HISTORY 401A. Spatial History: Concepts, Methods, Problems. 4-5 Units.**

Technical training in GIS, with modules taught by Stanford Spatial History Lab staff; conceptual work in the use of these techniques in spatial historical analysis. Students develop their own spatial history projects and produce beta versions of dynamic visualizations.

**HISTORY 401B. Spatial History, Part II. 4-5 Units.**

Prerequisite: 401A.

**HISTORY 406. Graduate Research Seminar on Colonial Law. 4-5 Units.**

Prerequisite: HISTORY 306G.

**HISTORY 414A. Medieval History. 4-5 Units.****HISTORY 414B. Medieval History. 4-5 Units.****HISTORY 421A. Early Modern Russia. 4-5 Units.****HISTORY 422A. Research Seminar on the History of the Russian Empire. 4-5 Units.****HISTORY 422B. Research Seminar in Imperial Russia. 4-5 Units.****HISTORY 424A. The Soviet Civilization. 4-5 Units.**

Socialist visions and practices of the organization of society and messianic politics; the Soviet understanding of mass violence, political and ethnic; and living space. Primary and secondary sources. Research paper or historiographical essay.

Same as: HISTORY 224A.

**HISTORY 424B. The Soviet Civilization, Part 2. 4-5 Units.**

Prerequisite: HISTORY 424A.

**HISTORY 424C. The End of Communism in Europe. 4-5 Units.**

Causes, course, and consequences.

**HISTORY 425A. Graduate Research Seminar: Modern Eastern Europe. 4-5 Units.****HISTORY 425B. Modern East Europe. 4-5 Units.**

Part 2 of a 2-part sequence with HISTORY 425A.

**HISTORY 430. Graduate Research Seminar: Early Modern Europe. 3-5 Units.**

Prerequisite: HISTORY 330E. Students may research any aspect of late medieval, Renaissance, and early modern history, 1300-1800. Students wishing to take this seminar must enroll in HISTORY 330E (Republic of Letters) in Winter, 2013.

**HISTORY 430A. Graduate Research Seminar: Early Modern Europe. 3-5 Units.**

Students will begin a research project on any aspect of early modern European history, 1400-1800, by taking HISTORY 430A in winter quarter as the first quarter of this two-quarter sequence. Enrollment by permission of instructor.

**HISTORY 431. Early Modern Things. 4-5 Units.**

How do objects reveal their histories? What can be learned about the past by studying things? The material culture of early modern Europe, ca 1450-1750. Recent work on the circulation, use, and consumption of things, starting with the Columbian exchange which expanded the material horizons of the early modern world in the late 15th century, exploring challenges to the meaning of things in the age of the Reformation and Scientific Revolution, and ending with the birth of consumer society in the 18th century. How did the meaning of things and people's relationships to them change over these centuries? What objects, ordinary and extraordinary, secular and sacred, natural and man-made, came to define the emerging features of the early modern world?  
Same as: HISTORY 231S.

**HISTORY 432A. Enlightenment Seminar. 3-5 Units.**

The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.  
Same as: DLCL 324, HISTORY 234, HISTORY 334, HUMNTIES 324.

**HISTORY 438. European History Workshop. 1 Unit.**

All European history graduate students in residence register for this weekly workshop, at which dissertation chapters and prospectuses, papers, and grant proposals by students and faculty are read and discussed.

**HISTORY 439A. Graduate Research Seminar: Modern Britain and the British Empire. 4-5 Units.****HISTORY 439B. Graduate Research Seminar: Modern Britain and the British Empire II. 4-5 Units.****HISTORY 443A. Human Origins: History, Evidence, and Controversy. 4-5 Units.**

Research seminar. Debates and controversies include: theories of human origins; interpretations of fossils, early art, and the oldest tools; the origin and fate of the Neanderthals; evolutionary themes in literature and film; visual rhetoric and cliché in anthropological dioramas and phyletic diagrams; the significance of hunting, gathering, and grandmothering; climatological theories and neocatastrophic geologies; molecular anthropology; the impact of racial theories on human origins discourse. Background in human evolution not required.  
Same as: HISTORY 243S.

**HISTORY 444C. The History of the Body in Science, Medicine, and Culture. 4-5 Units.**

The human body as a natural and cultural object, historicized. The crosscultural history of the body from the 18th century to the present. Topics include: sciences of sex and race; medical discovery of particular body parts; human experimentation, foot binding, veiling, and other bodily coverings; thinness and obesity; notions of the body politic.  
Same as: HISTORY 244C.

**HISTORY 445A. Research Seminar in African History. 4-5 Units.**  
Primary sources such as government records and missionary archives. Students present work in progress. Prerequisite: consent of instructor.

**HISTORY 445B. Research Seminar in African History. 4-5 Units.**  
Primary sources such as government records and missionary archives. Students present work in progress. Prerequisite: consent of instructor.

**HISTORY 448A. African Societies and Colonial States, Part 1. 4-5 Units.**

The encounter between African societies and European colonialism in the colony or region of their choice. Approaches to the colonial state; tours of primary source collections in the Hoover Institution and Green Libraries. Students present original research findings and may continue research for a second quarter.  
Same as: HISTORY 248S.

**HISTORY 448B. African Societies and Colonial States, Part 2. 4-5 Units.****HISTORY 461A. Research Seminar on the Histories of Women, the Family, and Sexuality. 4-5 Units.**

Research design, research methods, and historical writing on topics in the histories of women, the family, or sexuality in the U.S. Prepares graduate students for dissertation work. Workshop model involves exchanging preliminary prospectus, outline, writing sample, and draft for peer responses. Article-length original paper based on primary sources, to be completed by the end of Spring Quarter.

**HISTORY 461B. Research Seminar on the Histories of Women, the Family, and Sexuality, Part II. 4-5 Units.**

Prerequisite: 461A.

**HISTORY 462A. Political Economy. 4-5 Units.**

Graduate Research Seminar centered broadly on political economy, which is undergoing something of a resurgence. Political economy can cover the new cultural history of capitalism, economics and environmental change, race and gender and the economy as well as more traditional topics.

**HISTORY 462B. Political Economy. 4-5 Units.**

Pre-requisite: HISTORY 462A.

**HISTORY 464E. Research in History and Social Science Education. 3-5 Units.**

For doctoral students. Literature on historical learning and teaching and corresponding social sciences research designs, assessment, and curriculum evaluation.  
Same as: EDUC 496.

**HISTORY 470. Graduate Colloquium: Explorations in Latin American Social History. 4-5 Units.**

How to use primary sources such as government records, estate inventories, and parish records for social history.  
Same as: HISTORY 371.

**HISTORY 470A. Graduate Research Seminar: Latin American Social History. 4-5 Units.**

Students will write a seminar paper. Prerequisite: HISTORY 470.

**HISTORY 481. Research Seminar in Middle East History. 4-5 Units.**

Student-selected research topics.  
Same as: JEWISHST 287S, JEWISHST 481.

**HISTORY 481A. Research Seminar in Middle East History. 4-5 Units.**

**HISTORY 482D. Jews, Christians and Muslims in the Ottoman World Research Seminar. 4-5 Units.**

Graduate research seminar on Jews, Christians and Muslim communities in the Ottoman Empire, fifteenth to twentieth centuries. How diverse social and religious communities lived together in an imperial setting, specifically the mechanisms, discourses and crises of coexistence in the Ottoman Empire. Various comparisons of the Ottoman Empire to the Habsburg, the Romanov (Russian), the Mughal, and the British empires.

**HISTORY 486A. Graduate Research Seminar in Jewish History. 4-5 Units.**

Same as: JEWISHST 486A.

**HISTORY 486B. Graduate Research Seminar in Jewish History. 4-5 Units.**

Prerequisite: HISTORY 486A.

Same as: JEWISHST 486B.

**HISTORY 495A. Qing Legal Documents. 4-5 Units.**

How to use Qing legal documents for research. Winter: sample documents that introduce the main genres including: the Qing code and commentaries; magistrates' handbooks and published case collections; and case records from Chinese archives. Spring: class meets occasionally; students complete research papers. Prerequisite: advanced reading ability in Chinese.

**HISTORY 496A. Graduate Research Seminar in Modern Chinese History. 4-5 Units.**

First part of a two part sequence. Primary sources and research methods to be used in the study of modern Chinese history.

**HISTORY 496B. Graduate Research Seminar in Modern Chinese History. 4-5 Units.**

Second part of a two part sequence. Primary sources and research methods to be used in the study of modern Chinese history. Prerequisite: HISTORY 496A.

**HISTORY 497A. Maps and Gazetteers as Sources for East Asian History. 4-5 Units.**

For graduate students of early modern or modern East Asia. Includes weekend workshop on Chinese historical GIS with Harvard's Peter Bol. Students work with the Stanford Spatial History Lab to develop analytical techniques. Prerequisite: background in GIS.

**HISTORY 497B. Maps and Gazetteers as Sources for East Asian History, Part 2. 4-5 Units.**

Prerequisite: HISTORY 497A.

**HISTORY 498C. Japanese Imperial Archives, Part 1. 4-5 Units.**

First part of a two quarter sequence. Graduate seminar on conducting research in modern Japanese history. Focus is on Japanese imperialism and colonialism in Asia, especially Korea. Different types of archives, from national and research libraries to online databases, and methods of research including oral history. Primary sources include government publications, classified police records, and media sources.

**HISTORY 498D. Japanese Imperial Archives, Part 2. 4-5 Units.**

Second part of a two quarter sequence. Graduate seminar on conducting research in modern Japanese history. Focus is on Japanese imperialism and colonialism in Asia, especially Korea. Different types of archives, from national and research libraries to online databases, and methods of research including oral history. Primary sources include government publications, classified police records, and media sources. Prerequisite: HISTORY 498C.

**HISTORY 499X. Graduate Research. 1-10 Units.**

Units by arrangement. May be repeated for credit.

**HISTORY 802. TGR Dissertation. 0 Unit.**

Units by arrangement.

## History Philosophy of Science Courses

**HPS 60. Introduction to Philosophy of Science. 5 Units.**

20th-century views on the nature of scientific knowledge. Logical positivism and Popper; the problem of induction; Kuhn, Feyerabend, and radical philosophies of science; subsequent attempts to rebuild moderate empiricist and realist positions.

Same as: PHIL 60.

**HPS 61. Science, Religion, and the Birth of Modern Philosophy. 5 Units.**

Galileo's defense of the Copernican world-system that initiated the scientific revolution of the 17th century, led to conflict between science and religion, and influenced the development of modern philosophy. Readings focus on Galileo and Descartes.

Same as: PHIL 61.

**HPS 199. Directed Reading. 1-15 Units.**

May be repeated for credit.

**HPS 299. Graduate Individual Work. 1-15 Units.**

May be repeated for credit.

## Human Biology Courses

**HUMBIO 2A. Genetics, Evolution, and Ecology. 5 Units.**

Introduction to the principles of classical and modern genetics, evolutionary theory, and population biology. Topics: micro- and macro-evolution, population and molecular genetics, biodiversity, and ecology, emphasizing the genetics and ecology of the evolutionary process and applications to human populations.

**HUMBIO 2B. Culture, Evolution, and Society. 5 Units.**

Introduction to the evolutionary study of human diversity. Hominid evolution, the origins of social complexity, social theory, and the emergence of the modern world system, emphasizing the concept of culture and its influence on human differences.

**HUMBIO 3A. Cell and Developmental Biology. 5 Units.**

The principles of the biology of cells: principles of human developmental biology, biochemistry of energetics and metabolism, the nature of membranes and organelles, hormone action and signal transduction in normal and diseased states (diabetes, cancer, autoimmune diseases), drug discovery, immunology, and drug addiction. Prerequisite: college chemistry or completion of the HumBio chemistry lecture series during the fall quarter. Required evening midterm for 3A, Monday, 7-9:00 PM. See syllabus for date.

**HUMBIO 3B. Behavior, Health, and Development. 5 Units.**

Research and theory on human behavior, health, and life span development. How biological factors and cultural practices influence cognition, emotion, motivation, personality, and health in childhood, adolescence, and adulthood. Required evening midterm, Monday, 7-9:00 PM. See syllabus for date.

**HUMBIO 3Y. Practicum in Child Development. 1 Unit.**

Practical experience at Bing Nursery School for 3.5 hours per week. Pre- or corequisite: 3B. (AU).

**HUMBIO 4A. The Human Organism. 5 Units.**

Organ system physiology: the principles of neurobiology and endocrinology, and the functions of body organs. The mechanisms of control, regulation, and integration of organ systems function.

**HUMBIO 4B. Environmental and Health Policy Analysis. 5 Units.**

Connections among the life sciences, social sciences, public health, and public policy. The economic, social, and institutional factors that underlie environmental degradation, the incidence of disease, and inequalities in health status and access to health care. Public policies to address these problems. Topics include pollution regulation, climate change policy, biodiversity protection, health care reform, health disparities, and women's health policy.

**HUMBIO 5E. Science Education in Human Biology. 1 Unitss.**

In this seminar, students will become familiar with current research on science education. They will use this knowledge to create and analyze teaching material such as section plans, exams, and problem sets. Material produced in this course will be related to the topics covered in the core course of the Program in Human Biology. Students will experience and practice various teaching styles.

**HUMBIO 6. Human Origins. 5 Units.**

The human fossil record from the first non-human primates in the late Cretaceous or early Paleocene, 80-65 million years ago, to the anatomically modern people in the late Pleistocene, between 100,000 to 50,000 B.C.E. Emphasis is on broad evolutionary trends and the natural selective forces behind them.

Same as: ANTHRO 6, ANTHRO 206.

**HUMBIO 17SC. Darwin, Evolution, and Galapagos. 2 Units.**

The tiny remote islands of Galápagos have played a large and central role in the study of evolution. Not surprisingly, they have also been central to the study of conservation. The fascinating adaptations of organisms to the unique ecosystems of the archipelago have left them particularly vulnerable to outside introductions. Drawing on lessons learned in Galapagos from Darwin's time to the present, this seminar explores evolution, conservation, and their connection in the Galapagos. Using case-study material on finches, iguanas, tortoises, cacti, Scalesia plants, and more, we will explore current theory and debate about adaptation, sexual selection, speciation, adaptive radiation, and other topics in evolution. Similarly, we will explore the special challenges Galápagos poses today for conservation, owing to both its unusual biota and the increasing human impact on the archipelago. This course includes an intensive eleven-day expedition to Galápagos to observe firsthand the evolutionary phenomena and conservation issues discussed in class. A chartered ship will serve as our floating classroom, dormitory, and dining hall as we work our way around the archipelago to visit as many as ten islands. For this portion of the class, undergraduates will be joined by a group of Stanford alumni and friends in a format called a Stanford "Field Seminar." Because our class time on campus is limited to one week before travel, students will be required to complete all course readings over the summer. Both on campus and in South America, the course emphasizes student contributions and presentations. Students will be asked to lead discussions and carry out literature research on the evolutionary and conservation biology of particular Galápagos species. The final assignment for the seminar is to complete a seven- to ten-page paper on the evolutionary biology and conservation challenges of a particular organism or adaptation and to present the main findings of that paper in a joint seminar of undergrads and alumni as we travel in Galápagos. Note: Students will arrive on campus and will be housed at Stanford until we leave for Galápagos. Travel to Galápagos will be provided and paid by Sophomore College (except incidentals) and is made possible by the support of the Stanford Alumni Association Travel/Study Program and generous donors. Students will return to campus late afternoon or evening on Sunday, September 23, the day before the fall term begins. Same as: ANTHRO 10SC.

**HUMBIO 18SC. Conservation and Development Dilemmas in the Amazon. 2 Units.**

This course explores the human dimensions of conservation efforts under way in the Amazon Basin of South America. It has two specific goals: (1) to introduce the human ecology of Amazonia, and (2) to assess the prospects for joint efforts at biodiversity conservation and community development. We will draw on case studies to investigate such topics as the causes and consequences of deforestation, the social impact of parks and protected areas, and the potential for "Integrated Conservation and Development Projects" (ICDPs) such as extractive reserves, natural forest management, biodiversity prospecting, and community-based ecotourism. The course views Amazonia as a microcosm of the challenges facing conservation and development efforts today in the Third World. Part of the course is an intensive 11-day expedition to the Peruvian Amazon to observe firsthand the conservation and development dilemmas discussed in class. We will visit ecologies in the rainforest, walking miles of trails to learn about local flora, fauna, and conservation efforts. We will also visit Machu Picchu in the upper reaches of the rainforest. For the travel portion of the class, undergraduates will be joined by a group of Stanford alumni and friends. Student contributions and presentations are emphasized throughout the course. Students are expected to come well-prepared to each session, to lead discussions, and to carry out literature research. The final assignment is a 6 to 8 page paper on a case study of your own choosing--or an equivalent piece of a longer, collaborative paper--that offers a critical assessment of one particular conservation and/or development project in or near the region we will visit. Students will present the main findings of their papers in a joint seminar of undergraduates and alumni as we travel in the Amazon region.

Same as: ANTHRO 11SC.

**HUMBIO 21. Introduction to Brain and Behavior. 3 Units.**

Evolutionary principles to understand how the brain regulates behavior physiologically, and is also influenced by behavioral interactions. Topics include neuron structure and function, transmission of neural information, anatomy and physiology of sensory and motor systems, regulation of body states, the biological basis of learning and memory, and behavioral abnormalities.

Same as: BIO 20.

**HUMBIO 27. Traditional Chinese Medicine. 1 Unitss.**

The philosophy and history behind traditional Chinese medicine. Concepts such as Qi, Yin/Yang, meridians, Chinese organs, and the 5 elements. How these concepts are applied through techniques such as acupuncture, herbal medicine, Qi gong, and massage. How traditional Chinese medicine is understood from a scientific standpoint. Political and socioeconomic implications. Observation of an acupuncturist. Readings on the integration of Eastern and Western medicine and on traditional Chinese medicine.

**HUMBIO 79Q. Sexuality and Society. 3 Units.**

This course will explore how sexual identity, attitudes, and behaviors are shaped by the messages sent by the various agents of society such as schools, family, peers, media, and religious, medical, and political institutions. The interaction of biology, psychology, and socio-cultural factors, such as gender roles and sexual/relationship scripts will be discussed, as will the intersection of sexuality and notions of love, romance, and commitment. Critical developmental periods, such as adolescence and emerging adulthood will be examined in depth. Students will explore their own values and feelings about sexuality and come to an understanding of how their beliefs were formed. We will discuss how information about sexuality is disseminated in our society and what we can do to help ensure that such information is used in a way that promotes healthy self-conceptions, behavior, and relationships.



**HUMBIO 80N. From Farm to Fork: The Science and Practice of Growing and Cooking Food. 3 Units.**

The science and the practice of growing and preparing nourishing food. Course imparts gardening and cooking skills and explores theoretical topics including the evolution and ecology of agricultural systems; reproductive biology, chemistry, and culinary properties of plants; plant-insect interactions; and modern food systems and their health and environmental consequences. Class meetings alternate between classroom discussions and practical experiences at the Stanford Farm and the Arrillaga Dining Commons. See syllabus for details.

**HUMBIO 81Q. Introduction to Child Nutrition. 3 Units.**

This course examines contemporary child nutrition in America, from the level of the intestinal villus to the food marketing directed at children, as well as the diseases associated with inappropriate nutrition. Students will obtain an understanding of what constitutes a healthy diet for growth and how dietary needs change throughout childhood and adolescence. We will review existing community and school-based nutrition interventions as well as pertinent literature on child nutrition. Students will also gain practical experience in healthy food preparation, emphasizing a seed-to-table approach.

**HUMBIO 82A. Qualitative Research Methodology. 3 Units.**

Goal is to develop knowledge and skills for designing and conducting qualitative research studies including purposes, conceptual contexts, research questions, methods, validity issues, and interactions among these facets. Each student designs a qualitative research study.

**HUMBIO 82B. Advanced Data Analysis in Qualitative Research. 3 Units.**

For students writing up their own qualitative research. Students prepare a complete draft presenting their own qualitative research study including results, with reports drafted section by section, week by week. Class provides feedback, guidance, support.

**HUMBIO 86Q. Love as a Force for Social Justice. 3 Units.**

Preference to sophomores. Biological, psychological, religious, social and cultural perspectives on the concept of love. How love is conceptualized across cultures; love as the basis of many religions; different kinds of love; the biology of love; love in action for social justice; the languages of love including art, literature, music, and poetry. Emphasis is on blog writing, participation, and oral presentation.

**HUMBIO 87Q. Women and Aging. 5 Units.**

Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. Service Learning Course (certified by Haas Center).

Same as: MED 87Q.

**HUMBIO 91Q. Neuroethology: The Neural Control of Behavior. 3 Units.**

Preference to sophomores. Animal behavior offers insights about evolutionary adaptations. The origins of the study of animal behavior and its development to the present. Discussion of original research papers. The use and misuse of parallels between animal and human behavior. Possible field trip to observe animals in their natural habitat.

**HUMBIO 96Q. Injustice, Advocacy and Courage: The Path of Everyday Heroes. 3 Units.**

This course will study the paradigms of people of courage, action and energy who have fought against injustice by advocating for causes against great odds and at personal risk. The focus will be on everyday people who have taken action, often at great personal risk, not for ambition, but because of their convictions and steadfast commitment to their beliefs.

**HUMBIO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine. 3 Units.**

Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.

Same as: ORTHO 97Q.

**HUMBIO 99Q. Becoming a Doctor: Readings from Medical School, Medical Training, Medical Practice. 3 Units.**

Preference to sophomores. For students considering medicine as a career. Goal is to acquaint students with medical school, training in medicine and surgery, and the practice of medicine and surgery. Topics include: how to pick a medical school and a residency; how medicine affects family life, especially children; the differences between surgical and medical specialties; the advantages and disadvantages among academic/teaching, pure research, group practice, HMO, hospital staff, or private practice; malpractice concerns; and financial considerations.

**HUMBIO 111. Human Dimensions of Global Environmental Change: Resilience, Vulnerability, and Environmental Justice. 3 Units.**

The complexity of social and political issues surrounding global environmental change. Emphasis is on synergies precipitated by human-induced climatic change. Case studies and scenarios to explore the vulnerability and resilience in households, communities, regions, and nationstates most affected by extreme weather conditions. Their concerns, livelihood changes, and diverse responses of rural smallholders, indigenous communities, the state, and local and regional migrants. Central theme is environmental justice.

Same as: ANTHRO 173.

**HUMBIO 111M. Marine Resource Economics and Conservation. 5 Units.**

Economic and ecological frameworks to understand the causes of and potential solutions to marine resource degradation. Focus on conservation of marine biodiversity and ecosystem-based management. Applications include: commercial and recreational fisheries, marine reserves, and offshore energy production.

Same as: EARTHYSYS 156M, ECON 156.

**HUMBIO 112. Conservation Biology. 3-4 Units.**

Principles and application of the science of preserving biological diversity. Topics: sources of endangerment of diversity; the Endangered Species Act; conservation concepts and techniques at the population, community, and landscape levels; reserve design and management; conflict mediation. 4 units if taken with a field trip and discussion component. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: BIO 101, or BIO 43 or HUMBIO 2A with consent of instructor.

Same as: BIO 144.

**HUMBIO 113. The Biologies of Humans and Plants. 3 Units.**

The biological interdependence of humans and plants, particularly the ways in which people and plants have imposed selection pressures and ecological change on one another. Topics include evolution and basic plant structure; plant characteristics and genetic variants allowing domestication; effects of plant domestication on human biology; plants in traditional and contemporary diets; and human influences on plant biology through genetic manipulation and environmental change. Class meetings center on discussing journal articles.

**HUMBIO 116. Controlling Climate Change in the 21st Century. 3 Units.**

Climate change is a global environmental, social, cultural and economic challenge. Responding to this challenge requires a paradigm shift which will alter energy production, transport, industry, politics, development strategies, north/south equity, and individual freedom and responsibilities around the world. Given the short term planning horizon of the majority of political, economic and social institutions, the slow burn of climate change presents major policy challenges. The course is designed to clarify the primary issues embedded in these challenges.

Same as: BIO 147, BIO 247, EARTHSYS 147, EARTHSYS 247.

**HUMBIO 117H. Human Behavioral Ecology. 3-5 Units.**

Theory, method, and application in anthropology. How theory in behavioral ecology developed to understand animal behavior is applied to questions about human economic decision making in ecological and evolutionary contexts. Topics include decisions about foraging and subsistence, competition and cooperation, mating, and reproduction and parenting.

Same as: ANTHRO 161, ANTHRO 261.

**HUMBIO 118. Theory of Ecological and Environmental Anthropology. 5 Units.**

Dynamics of culturally inherited human behavior and its relationship to social and physical environments. Topics include a history of ecological approaches in anthropology, subsistence ecology, sharing, risk management, territoriality, warfare, and resource conservation and management. Case studies from Australia, Melanesia, Africa, and S. America.

Same as: ANTHRO 90C.

**HUMBIO 119. Demography: Health, Development, Environment. 3 Units.**

Demographic methods and their application to understanding and projecting changes in human infant, child, and adult mortality and health, fertility, population, sex ratios, and demographic transitions. Progress in human development, capabilities, and freedoms. Relationships between population and environment. Prerequisites: numeracy and basic statistics; Biology or Human Biology core; or consent of instructor.

Same as: BIO 102.

**HUMBIO 120. Health Care in America: An Introduction to U.S. Health Policy. 4 Units.**

Health policy and health care delivery from a historical and a current policy perspective. Introduces cost, quality, and access as measures of health system performance. Considers institutional aspects of health care reform.

**HUMBIO 120A. American Health Policy. 3 Units.**

Issues in health care reform and the policy making process, the evolution of current systems, and theories underlying efforts for change. The national search for solutions to the problems of the uninsured, and the feasibility, options, and ramifications of alternative proposals for health care reform. Student presentations. Prerequisite: Human Biology core or equivalent, Human Biology 120, or consent of instructor.

**HUMBIO 121. Critical Issues in Child Health. 4 Units.**

Integrated picture of the physical and psychosocial health factors that result in a healthy child building on principles taught in the Human Biology core. Students apply basic human physiology to the physiology of the child to develop perspective on global pediatric health challenges and how the cultural context influences and defines the child living within it.

**HUMBIO 121E. Ethnicity and Medicine. 1-3 Units.**

Weekly lecture series. Examines the linguistic, social class, and cultural factors that impact patient care. Presentations promote culturally sensitive health care services and review contemporary research issues involving minority and underserved populations. Topics include health care inequities and medical practices of African Americans, Asians, Latinos, Native Americans, immigrants, and refugees in both urban and rural settings. 1 unit requires weekly lecture attendance, completion of required readings, completion of response questions; 2 units requires weekly lecture attendance and discussion session, completion of required readings and weekly response questions; additional requirement for 3 units (HUMBIO only) is completion of a significant term paper. Only students taking the course for 3 units may request a letter grade.

Same as: FAMMED 244.

**HUMBIO 122. Beyond Health Care: Seeking Health in Society. 3 Units.**

Available evidence at the national and cross-country level linking social welfare interventions and health outcomes. If and how non-health programs and policies could have an impact on positive health outcomes. Evaluation of social programs and policies that buffer the negative health impact of economic instability and unemployment among adult workers and their children. Examination of safety nets, including public health insurance, income maintenance programs, and disability insurance. Prerequisites: HUMBIO 4B or equivalent, and background in research methods and statistics.

Same as: PEDS 222.

**HUMBIO 122M. Challenges of Human Migration: Health and Health Care of Migrants and Autochthonous Populations. 3 Units.**

An emerging area of inquiry. Topics include: global migration trends, health issues/aspects of migration, healthcare and the needs of immigrants in the US, and migrants as healthcare providers: a new area of inquiry in the US. Class is structured to include: lectures lead by the instructor and possible guest speakers; seminar, discussion and case study sessions led by students.

Same as: PEDS 212.

**HUMBIO 122S. Social Class, Race, Ethnicity, and Health. 4 Units.**

Examines health disparities in the U.S., looking at the patterns of those disparities and their root causes. Explores the intersection of lower social class and ethnic minority status in affecting health status and access to health care. Compares social and biological conceptualizations of race and ethnicity.

**HUMBIO 123. Obesity in America: Clinical and Public Health Implications. 3-4 Units.**

Interdisciplinary clinical, research, and policy approaches. The prevalence, predictors, and consequences of obesity and diabetes; biological and physiological mechanisms; clinical treatments including medications and surgery; and the relevance of behavioral, environmental, economic, and policy approaches to obesity prevention and control. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 125. Current Controversies in Women's Health. 2-3 Units.**

Interdisciplinary. Focus is on the U.S. Topics include: health research; bioethical, legal, and policy issues; scientific and cultural perspectives; social influences; environmental and lifestyle effects on health; and issues related to special populations. Guest lecturers; student debates. Prerequisite: Human Biology core or equivalent, or consent of instructor. Only students who can attend both Mon and Wed classes can register for 3 units; students who can attend only Wed, register for 2 units.

Same as: OBGYN 256.

**HUMBIO 126. Promoting Health Over the Life Course: Multidisciplinary Perspectives. 3 Units.**

Disease prevention and health promotion topics pertinent to different stages of the life span emphasizing healthy lifestyle and reducing risk factors in both individuals and communities. Focus is on scientific investigation, the application of behavioral science to risk reduction strategies, and the importance of health promotion as a social and economic imperative. Topics include: epidemiology of chronic diseases; social determinants of health, behavior change; obesity, nutrition, and stress; young adult, mid-life and aging health issues; health care delivery and public health system; workplace wellness programs; and environmental and international issues. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 127A. Community Health: Assessment and Planning I. 4 Units.**

Major determinants of health in a community. Working with community partners to identify health issues and plan programs and policies to prevent disease and promote health. Service learning component involving students in community health assessment techniques. Final grade given upon completion of HUMBIO 127B. Service Learning Course (certified by Haas Center). Prerequisite: 4B or equivalent, or consent of instructor.

**HUMBIO 127B. Community Health: Assessment and Planning II. 4 Units.**

Continuation of 127A. Service learning course with emphasis on conducting community health assessment and planning projects in collaboration with community-based organizations. Service Learning Course (certified by Haas Center). Prerequisite: 4B or equivalent, 127A, or consent of instructor.

**HUMBIO 128. Community Health Psychology. 4 Units.**

Social ecological perspective on health emphasizing how individual health behavior is shaped by social forces. Topics include: biobehavioral factors in health; health behavior change; community health promotion; and psychological aspects of illness, patient care, and chronic disease management. Prerequisites: HUMBIO 3B or PSYCH 1, or equivalent. Same as: PSYCH 101.

**HUMBIO 129. Critical Issues in International Women's Health. 4 Units.**

Women's lives, from childhood through adolescence, reproductive years, and aging. Economic, social, and human rights factors, and the importance of women's capacities to have good health and manage their lives in the face of societal pressures and obstacles. Emphasis is on life or death issues of women's health that depend on their capacity to negotiate or feel empowered, including maternal mortality, violence, HIV/AIDS, reproductive health, and sex trafficking. Organizations addressing these issues. A requirement of this class is participation in public blogs. Prerequisites: Human Biology core or equivalent or consent of instructor. Same as: FEMST 129.

**HUMBIO 129M. Measuring Global Health. 4 Units.**

Open to MD, graduate, and undergraduate students. Assessing the global burden of disease, its distribution among and within countries, its causes, and appropriate interventions requires rigorous quantitative approaches. This course develops skills in these areas by critically examining questions like: How do we know who is sick and where? How are risk factors incorporated into our projections of future disease trends? How do we combine mortality and morbidity in a meaningful way? What works for improving health efficiently? Workshops build familiarity with relevant data and their analysis. Prerequisite: coursework in statistics, biostatistics, quantitative epidemiology, econometrics, or equivalent. Same as: HRP 241, MED 231.

**HUMBIO 129S. Global Public Health. 4 Units.**

The class is an introduction to the fields of international public health and global medicine. It focuses on resource poor areas of the world and explores major global health problems and their relation to policy, economic development and human rights. The course is intended for students interested in global health, development studies, or international relations, and provides opportunities for in-depth discussion and interaction with experts in the field.

**HUMBIO 130. Human Nutrition. 4 Units.**

The study of food, and the nutrients and substances therein. Their action, interaction, and balance in relation to health and disease. Emphasis is on the biological, chemical, and physiological processes by which humans ingest, digest, absorb, transport, utilize, and excrete food. Dietary composition and individual choices are discussed in relationship to the food supply, and to population and cultural, race, ethnic, religious, and social economic diversity. The relationships between nutrition and disease; ethnic diets; vegetarianism; nutritional deficiencies; nutritional supplementation; phytochemicals. Prerequisite: Human Biology core or consent of instructor.

**HUMBIO 132. Functional Anatomy of Exercise. 4 Units.**

Interdisciplinary: physiology, pathology, and biomechanics. Anatomy of the body's major joints in the context of exercise and movement emphasizing adaptations that occur with intensity and nature of exercise, age, and disease. Students will work in cooperative groups in the Stanford Human Performance Lab to conduct projects and experiments relating to biomechanics, exercise physiology, and anatomy of the athlete. Enrollment limited to 40. Prerequisites: HumBio 139 or consent of instructor.

**HUMBIO 133. Human Physiology. 4 Units.**

The functioning of organ systems emphasizing mechanisms of control and regulation. Topics: structure and function of endocrine and central nervous systems, cardiovascular physiology, respiration, salt and water balance, exercise, and gastrointestinal physiology. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology or Human Biology core. Same as: BIO 112, BIO 212.

**HUMBIO 135. Exercise Physiology. 4 Units.**

How body systems respond to the stress of acute exercise and adapt to chronic exercise training. How the cardiovascular system adapts to optimize oxygen delivery and utilization, how muscles generate force and hypertrophy in response to training, how metabolic/biochemical pathways are regulated to support the increased energy demand of exercise. Theories on the causes of fatigue and muscle soreness, and on what limits human performance. Applied topics such as the effects of aging, gender, and environmental conditions (high altitude, heat, cold) on exercise capacity will also be discussed. Prerequisite: Human Biology core, Biology core, or equivalent, or consent of instructor.

**HUMBIO 135S. Applied Topics in Exercise Physiology and Metabolism. 3 Units.**

Focus on scientific research related to exercise physiology, sports performance, impacts of aging and environmental physiology. Discussions of controversial topics in physiology and interpretation of conflicting data. Student presentations. Summary paper. A requirement of this class is participation in public blogs. Enrollment limited to 10. If class is full, contact instructor for application. Prerequisites: HB135 or consent of instructor.

**HUMBIO 139. Sports Medicine. 4 Units.**

Sports, exercise, health, and medicine throughout the human performance continuum. Exercise as therapy; injuries and illnesses that result from sports and exercise; and the use of technology in modern sports science. Sources include physiology, nutrition, and biomechanics. Medical problems exacerbated or caused by exercise and sport; maximizing performance in elite athletes; and population-based issues such as exercise and its relationship to health, drugs in sport, and aging. Prerequisite: Biology or Human Biology core, or consent of instructor.

**HUMBIO 140. Sex and Gender Differences in Human Physiology and Disease. 2-3 Units.**

Chromosomal and hormonal influences on cells, tissues, and organs that underlie the development of reproductive organs and sexual dimorphism of the neuroendocrine system. Effects of endogenous and exogenous sex hormones and environmental factors that differ between men and women on the musculoskeletal, neurological, cardiovascular, and immunological systems over the lifecourse, from conception to puberty, through reproductive phases (including changes during the menstrual cycle up to and beyond menopause in women and with aging in men). Transgender health issues. Guest lecturers. Prerequisite: Human Biology core or equivalent, or consent of instructor  
Same as: MED 240, OBGYN 240.

**HUMBIO 142. Adolescent Development. 4 Units.**

Underlying changes and their consequences in everyday functioning. Physical, cognitive, social, and sexual development; how these changes influence the emerging sense of identity, autonomy, and intimacy. Contexts in which adolescents move such as family, friends and peers, school, and workplace. Focus is on normal development of boys and girls; attention to problem outcomes including eating disorders, depression, and teen pregnancy. Prerequisite: 3B or PSYCH 1, or consent of instructor.

**HUMBIO 142M. Special Topics in Adolescent Mental Health. 4 Units.**

Includes the study of aspects of common disorders seen in adolescent populations, such as prevalence, developmental course, gender differences, theoretical explanations, and therapeutic interventions. Topics will include mood/anxiety disorders, eating disorders, learning disabilities and ADHD, sexual risk behaviors, developmental disorders, substance abuse, and self-harm. Goals of this course include getting students to think critically about the unique mental health needs of adolescents, collaborating on devising ways to improve the way our society meets those needs, and strengthening writing and communication skills applicable to this area of inquiry.

**HUMBIO 143. Adolescent Sexuality. 4 Units.**

Developmental perspective. Issues related to scientific, historical, and cultural perceptions; social influences on sexual development; sexual risk; and the limitations and future directions of research. Sexual identity and behavior, sexually transmitted diseases including HIV, pregnancy, abortion, gay and lesbian youth, sex education and condom availability in schools, mass media, exploitative sexual activity, and difficulties and limitations in studying adolescent sexuality. Legal and policy issues, gender differences, and international and historical trends. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 144. Boys' Psychosocial Development. 3 Units.**

From early childhood through adolescence. Emphasis is on how boys' lives and experiences are embedded within their interpersonal relationships and social and cultural contexts. Interdisciplinary approach including perspectives from fields such as psychology, sociology, anthropology, family studies, and education. Prerequisite: Human Biology core, or Developmental Psychology, or consent of instructor.  
Same as: EDUC 143.

**HUMBIO 148W. Women, Fertility, and Work. 5 Units.**

How do choices relating to bearing, nursing, and raising children influence women's participation in the labor force? Cultural, demographic, and evolutionary explanations, using crosscultural case studies. Emphasis is on understanding fertility and work in light of the options available to women at particular times and places.  
Same as: ANTHRO 151, ANTHRO 251.

**HUMBIO 149. Psychological and Educational Resilience Among Children and Youth. 4 Units.**

Theoretical, methodological, and empirical issues pertaining to the psychological and educational resilience of children and adolescents. Overview of the resilience framework, including current terminology and conceptual and measurement issues. Adaptive systems that enable some children to achieve successful adaptation despite high levels of adversity exposure. How resilience can be studied across multiple levels of analysis, ranging from cell to society. Individual, family, school, and community risk and protective factors that influence children's development and adaptation. Intervention programs designed to foster resilient adaptation in disadvantaged children's populations.  
Same as: EDUC 256.

**HUMBIO 149L. Longevity. 4 Units.**

Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists.  
Same as: NENS 202, PSYCH 102.

**HUMBIO 150A. Assisted Reproductive Technologies. 1-3 Units.**

Primary and current literature in basic and clinical science aspects of assisted reproductive technologies (ART), and demonstrations of current ART techniques including in vitro fertilization and embryo culture, and micromanipulation procedures such as intracytoplasmic sperm injection and embryo biopsy and cryopreservation. Class only may be taken for 1 unit. 2 units includes papers and attendance at clinical demonstrations. 3 units includes a term paper. Recommended: DBIO 201, or consent of instructors.  
Same as: DBIO 202, OBGYN 202.

**HUMBIO 152. Viral Lifestyles. 3 Units.**

Viral lifestyle is a seminar devoted to exploring contemporary topics in microbiology with a focus on the global microbiome. The course includes lectures and will provide an opportunity for students to interact with each other, the instructor and guest lecturers to explore novel research areas in microbiology that are still being formed. The course will begin with lectures on topics such as cross-species transmission of microbes and human microbiome and will transition to presentation and discussion led by student groups. A significant percentage of class will be devoted to presentation and discussion focused on group projects.

**HUMBIO 153. Parasites and Pestilence: Infectious Public Health Challenges. 4 Units.**

Parasitic and other pestilence of public health importance. Pathogenesis, clinical syndromes, complex life cycles, and the interplay among environment, vectors, hosts, and reservoirs in historical context. Public health policy initiatives aimed at halting disease transmission. World Health Organization tropical disease targets including river blindness, sleeping sickness, leishmaniasis, schistosomiasis, mycobacterial disease (tuberculosis and leprosy), malaria, toxoplasmosis, dracunculiasis, and intestinal helminthes. Guest lecturers with expertise in disease control. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 154. Cancer Epidemiology. 4 Units.**

Epidemiological methods relevant to human research in cancer. The concepts of risk; case control, cohort, and cross-sectional studies; clinical trials; bias; confounding; interaction; screening; and causal inference. Social, political, economic, and ethical controversies surrounding cancer screening, prevention, and research. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 155B. The Vaccine Revolution. 6 Units.**

Advanced seminar. Human aspects of viral disease, focusing on recent discoveries in vaccine development and emerging infections. Journal club format: students choose articles from primary scientific literature, write formal summaries, and synthesize them into a literature review. Emphasis is on analysis, experimental design, and interpretation of data. Oral presentations. Enrollment limited to 8. Prerequisite: prior enrollment in HumBio 155H Humans and Viruses or MI 116, The Human Virosphere Same as: MI 115B.

**HUMBIO 155H. Humans and Viruses I. 6 Units.**

Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis is on host pathogen interactions and policy issues. Topics: polio and vaccination, smallpox and eradication, yellow fever and history, influenza and genomic diversity, rubella and childhood infections, adenovirus and viral morphology, ebola and emerging infection, lassa fever and immune response. Same as: MI 155H.

**HUMBIO 156. Global HIV/AIDS. 3 Units.**

Public health, policy, and research issues. Identify resources at Stanford, and from government, NGOs, and pharmaceutical, advocacy, and international organizations. Sources include biomedical, social, and behavioral sciences. Emphasis on student projects which feature methodologies in the development and design of Operational Research and Implementation Science in AIDS/TB and Malaria in response to PEPFAR and Global Fund programs. Guest lectures. Prerequisite: Human Biology core or equivalent, or consent of instructor. Same as: MED 256.

**HUMBIO 157. The Biology of Stem Cells. 3 Units.**

The role of stem cells in human development and potential for treating disease. Guest lectures by biologists, ethicists, and legal scholars. Prerequisites: 2A,B, or consent of instructor. Same as: DBIO 257.

**HUMBIO 158. The Human Genome and Disease. 3 Units.**

The variability of the human genome and the role of genomic information in research, drug discovery, and human health. Concepts and interpretations of genomic markers in medical research and real life applications. Human genomes in diverse populations. Original contributions from thought leaders in academia and industry and interaction between students and guest lecturers. Students with a major, minor or coterm in Biology: 109A/209A or 109B/209B may count toward degree program but not both. Same as: BIO 109A, BIO 209A, BIOC 109A, BIOC 209A.

**HUMBIO 158G. Genomics, Bioinformatics and Medicine. 3 Units.**

Molecular basis of inherited human disease. Diagnostics approaches: simple Mendelian diseases and complex, multifactorial diseases. Genomics: functional genomics, epigenetics, gene expression, SNPs, copy number and other structural genomic variations involved in disease. Novel therapeutic methods: stem cell therapy, gene therapy and drug developments that depend on the knowledge of genomics. Personal genomics, pharmacogenomics, clinical genomics and their role in the future of preventive medicine. Prerequisites: BIO 41 or HUMBIO 2A or consent of instructor. Those with credit in BIOC 118 not eligible to enroll. Course webpage: <http://biochem158.stanford.edu/> Same as: BIOC 158, BIOC 258, BIOMEDIN 258.

**HUMBIO 159. Genes and Environment in Disease Causation: Implications for Medicine and Public Health. 2-3 Units.**

The historical, contemporary, and future research and practice among genetics, epidemiology, clinical medicine, and public health as a source of insight for medicine and public health. Genetic and environmental contributions to multifactorial diseases; multidisciplinary approach to enhancing detection and diagnosis. The impact of the Human Genome Project on analysis of cardiovascular and neurological diseases, and cancer. Ethical and social issues in the use of genetic information. Prerequisite: basic course in genetics; for undergraduates, Human Biology core or equivalent or consent of instructor. Same as: HRP 238.

**HUMBIO 160. Human Behavioral Biology. 5 Units.**

Multidisciplinary. How to approach complex normal and abnormal behaviors through biology. How to integrate disciplines including sociobiology, ethology, neuroscience, and endocrinology to examine behaviors such as aggression, sexual behavior, language use, and mental illness. Same as: BIO 150, BIO 250.

**HUMBIO 161. The Neurobiology of Sleep. 4 Units.**

Preference to seniors and graduate students. The neurochemistry and neurophysiology of changes in brain activity and conscious awareness associated with changes in the sleep/wake state. Behavioral and neurobiological phenomena including sleep regulation, sleep homeostasis, circadian rhythms, sleep disorders, sleep function, and the molecular biology of sleep. Enrollment limited to 16. Same as: BIO 149, BIO 249.

**HUMBIO 163. Neural Systems and Behavior. 4 Units.**

The field of neuroethology and its vertebrate and invertebrate model systems. Research-oriented. Readings include reviews and original papers. How animal brains compare; how neural circuits are adapted to species-typical behavior; and how the sensory worlds of different species represent the world. Lectures and required discussions. Satisfies Central Menu Area 3 for Bio majors. Prerequisites: BIO 42, HUMBIO 4A. Same as: BIO 163, BIO 263.

**HUMBIO 164. Autism Spectrum Disorders. 3 Units.**

Abnormal social deficits, language development and repetitive behaviors, are the core symptoms of Autism Spectrum Disorders (ASD), a group of neurodevelopmental disorders that affect about 1% of all children and costs society an estimated \$35B annually. This interactive new seminar will provide an overview of our understanding of ASD, from genetics through epidemiology, biology and treatment, and the many implications for society, including the principles and problems of diagnosis, its impact upon family and lifespan, and controversies regarding its etiology, perception and care.

**HUMBIO 166. Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context. 4 Units.**

The class examines the array of forces that affect the foods human beings eat, and when, where, and how we eat them, including human labor, agriculture, environmental sustainability, politics, animal rights/welfare, ethics, policy, culture, economics, business, law, trade, and ideology, and psychology. The class addresses the impact of current policies and actions that might be taken to improve human nutrition and health; macro-scale influences on food, nutrition, and eating behavior.

**HUMBIO 167. The Art of Vision. 3 Units.**

This course concerns eyes and art. It asks how eyes are built, how they process visual information, and how they are affected by diseases that are major problems in our society. These topics are illustrated through fine art and famous artists, and we explore the implications of both normal and abnormal vision for art. There are short diversions into animal eyes and the role of vision in music, literature, and sports. This course will be taught in Florence in Autumn, 2012.

**HUMBIO 170. Justice, Policy, and Science. 5 Units.**

The role of science in civil rights, justice, policy, criminal justice, evidence, education, and disabled rights.

**HUMBIO 172B. Children, Youth, and the Law. 5 Units.**

How the legal rights of children and adolescents in America are defined, protected, and enforced through the legal process within the context of their developmental needs and competing societal interests. Topics: origins and definitions of children's rights; adoption; custody; the juvenile justice system; education; informed consent; health care; protection from harm and child welfare; due process; and privacy and freedom of expression. Interactive, using hypotheticals for discussion and analysis. A and B alternate annually; students may take one or both. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 173. Science, Innovation and the Law. 3 Units.**

The interaction of science, business and law: how scientific ideas are protected by law; the rights of those who invent, develop, and finance scientific discovery; and how ideas are commercialized and brought to market. What kinds of research, discovery, and innovation are protected; who has rights that can be protected; what kinds of rights can be protected, and the kinds of protections that apply; how inventions are commercialized; and the success and failure of businesses based on scientific discovery. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 174. Foundations of Bioethics. 3 Units.**

Classic articles, legal cases, and foundational concepts. Theoretical approaches derived from philosophy. The ethics of medicine and research on human subjects, assisted reproductive technologies, genetics, cloning, and stem cell research. Ethical issues at the end of life. Prerequisite: Human Biology core or equivalent, or consent of instructor.

**HUMBIO 175. Health Care as Seen Through Medical History, Literature, and the Arts. 3 Units.**

The differences between disease as pathology and as the patient's experience. Topics include: patient-doctor relationships; medical technology; the changing focus on illness; gender issues; love, sex, and illness; mental illness; sick children; and death and dying. Limited enrollment.

**HUMBIO 175S. Novels and Theater of Illness. 3 Units.**

Illness and disease through novels and plays by authors including Shakespeare, Miller, Sophocles, Hemingway, and Camus. How sickness involves the patient, family, community, and state. Limited enrollment.

**HUMBIO 176. Impact of Infectious Diseases on Human History. 3 Units.**

Impact of infectious diseases on human society. Some topics include: Plague of Justinian and 14th century; impact on exploration, trade and conquest; how slavery, malaria and yellow fever conspired to alter the New World; Microbes and war; diseases of poverty, tuberculosis and others; Cholera and public health; pandemic influenza; diseases of human progress. Students give a 30 minute presentation on a topic of their choosing that exemplifies an aspect of the impact of politics, societal influences, religion or other forces on infectious diseases. Same as: MED 176.

**HUMBIO 177C. Culture, Narrative, and Medicine. 5 Units.**

This course examines the ways in which medicine is practiced in diverse cultural contexts with narrative skills of recognizing, interpreting and being moved by the stories of illness. It is an examination of the human experience of illness and healing through narratives as presented in literature, film, and storytelling. We explore how cultural resources enable and empower healing and how narrative medicine can guide the practice of culturally competent medical care. Same as: ANTHRO 178A.

**HUMBIO 179S. Spirituality and Healing. 3-5 Units.**

This course considers the puzzle of symbolic healing. How have societies without the resources of modern medicine approached healing? Why do these rituals have common features around the world? We explore shamanism, spirit possession, prayer, and the role of placebos in modern biomedicine. Students will do ethnographic work and practical explorations along with more traditional scholarly approaches to learning. Same as: ANTHRO 184.

**HUMBIO 180. Human Skeletal Anatomy. 5 Units.**

Study of the human skeleton (a. k. a. human osteology), as it bears on other disciplines, including medicine, forensics, archaeology, and paleoanthropology (human evolution). Basic bone biology, anatomy, and development, emphasizing hands-on examination and identification of human skeletal parts, their implications for determining an individual's age, sex, geographic origin, and health status, and for the evolutionary history of our species. Three hours of lecture and at least three hours of supervised and independent study in the lab each week. Same as: ANTHRO 175, ANTHRO 275, BIO 174, BIO 274.

**HUMBIO 183. Astrobiology and Space Exploration. 3-4 Units.**

Evolution in the context of space and time, focusing on the emergence of life in a planetary context on Earth and possibly elsewhere. The evolution of intelligence and the search for it elsewhere. The biological, psychological, sociological, and philosophical issues of human space exploration. Integrates information from astronautics, astrophysics, biochemistry, chemistry, evolutionary biology, geology, paleontology, physiology, psychology, and sociology. Guest lectures by scientists and astronauts from NASA, SETI, Stanford, and other universities. Prerequisite: two college-level science courses such as Human Biology core, or consent of instructor.

**HUMBIO 186. Biological Clocks. 3 Units.**

The biological basis for endogenous timekeeping in organisms from flies to human beings. How biological clocks are constructed at the molecular, tissue, and behavioral levels; how these clocks interact with other physiological systems and allow animals to anticipate changes in their environment. Applications of circadian rhythm principles to treating human disorders and diseases such as cancer. Prerequisite: Biology or Human Biology core, or consent of instructor. Same as: BIO 135.

**HUMBIO 193. Research in Human Biology. 1-5 Units.**

Independent research conducted under faculty supervision, in junior or senior year, normally but not necessarily in pursuit of an honors project. May be taken for a maximum 3 quarters of credit. Prerequisite: Faculty approval; application available in student services office.

**HUMBIO 194. Honors. 1-10 Units.**

Completion of the honors project, normally taken in the student's final quarter. First component: the honors thesis, a final paper providing evidence of rigorous research, fully referenced, and written in an accepted scientific style. Second component: participation in the honors symposium, including a 10-minute oral presentation followed by a brief question and answer session. Prerequisites: 193 or 199, and acceptance into the honors program.

**HUMBIO 197. Human Biology Internship. 1-4 Units.**

Limited to and required of Human Biology majors. A supervised field, community, or lab experience of student's choosing, pre-approved by Human Biology faculty and student advisers, and initiated at least three quarters prior to graduation. Participation in a poster session on the internship experience is required during the first quarter that the student is in residence at Stanford after completion of the internship. May be repeated for credit. Prerequisite: Human Biology core.

**HUMBIO 198. Senior Tutorial in Human Biology. 1-5 Units.**

Reading for Human Biology majors in exceptional circumstances and under sponsorship of Human Biology associated faculty. Students must apply through Human Biology student services before registering. Reading list, paper, and evaluation required. May be repeated for credit.

**HUMBIO 199. Directed Reading/Special Projects. 1-4 Units.**

Human Biology majors must obtain a sponsor from the Human Biology associated faculty or the Academic Council. Non-majors and students who have not declared must obtain a sponsor only from the Human Biology associated faculty. Students must complete application in student services office.

**HUMBIO 200. Teaching of Human Biology. 1-5 Units.**

For upper division undergraduates and graduate students. Practical experience in teaching Human Biology or serving as an assistant in a lecture course. May be repeated for credit.

## Human Resource Management Courses

**HRMGT 280. Human Resource Management. 2 Units.**

Many managers and organizations now recognize that a critical source of competitive advantage often comes not from having the most ingenious product design, the best marketing strategy, or the most state-of-the-art production technology, but rather from hiring the right kind of talent. This course seeks to train students in defining the talent brand of a firm, developing role descriptions, and various approaches to hiring talent.

**HRMGT 289. Sloan: Talent Management Strategy. 4 Units.**

Everyone manages people; how can it be done better? How can it be done to facilitate your overall strategy, for your company and your career? This class covers the standard topics of people management: recruitment and selection; performance evaluation; incentives and compensation; promotions; job design; training; teamwork; and layoffs and retention. Each topic is covered through case studies and then analytical models for choosing and using best practices. The class content is aimed at managers who recognize that people management is important, but who typically want to spend less time managing people and more time doing what they really enjoy.

**HRMGT 302. Incentives and Productivity. 4 Units.**

This course is designed to teach the student how to use economics to solve practical personnel problems that affect worker productivity. Topics include: selecting the best workers to hire, training workers, turnover, setting compensation strategically, structuring salespersons' commissions, downsizing, using promotions as an incentive mechanism, and other topics. Examples and cases will be presented to demonstrate the importance of using economic techniques to structure human resources programs. The course will appeal most to the student who expects to be a general manager or who hopes to run his or her own business. Although the human resources specialist may benefit from this course, the emphasis will be on decisions that affect personnel, but are made primarily by general managers. The class format is somewhat unusual. Most classes consist of lecture with questions, but two are class workshops. The lecture will present a theoretical development of a topic. The questions discussed during the last part of the lecture period will involve practical business application of the theory presented in lecture. This course is more technical than other human resources courses, but should be accessible to anyone who has successfully completed the economics and statistics courses in the MBA core. Every student is expected to know calculus and basic probability and statistics. Although I will not emphasize the technical aspects on the final exam, the problem sets will require some knowledge of mathematics. To ease your fears, many "poets" have taken variants of this course in the past and have done well. There will be graded team problem sets, a midterm, and a final exam.

**HRMGT 512. Changing How We Manage People. 1 Unit.**

This course is designed for individuals interested in changing how people are managed-to dispel flawed assumptions about human resource strategies and develop new techniques. In the past, human resource practices rarely served as a source of innovation in organizations. Rather, when establishing guidelines, policies, and rules, most companies chose to follow the norm, which often was unsatisfying and frustrating for their employees. These same firms chose not to focus on their human resource practices as a source of competitive advantage that could be used to hire the best talent, perform at the highest level, and weather the most difficult times. More recently, new ideas about the optimal approach to managing the firm's most important asset-its human capital-have flourished. As a result, a debate has surfaced in the corporate world about the best ways to get work done-from the allocation of job tasks to the structure of financial incentives. We tackle many of these fundamental questions in this course-what is the best way to hire people, to give performance feedback, to foster collaboration-but we look at these problems through a new lens, one informed more by evidence and analysis than by tradition and intuition. This class is an exercise in collaboration: a joint effort by a practitioner and an academic who are both hopelessly optimistic about how the management of human resources can be improved. In each session, we will tackle a novel and important topic (e.g., engagement surveys?) from three distinct points of view, first describing what is currently done, then identifying alternative approaches in other firms, and finally considering what a bold and creative approach might look like. After taking this course, you will be better able to: (1) identify misconceptions that undermine the effectiveness of human resource strategies; (2) learn new insights about human motivation in the workplace and (3) design new tools that can improve the working lives of your employees. We believe this perspective will be invaluable to you throughout your career.

**HRMGT 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, MGTECON 691, MKTG 691, OB 691, OIT 691, POLECON 691, STRAMGT 691.

**HRMGT 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, MGTECON 692, MKTG 692, OB 692, OIT 692, POLECON 692, STRAMGT 692.

**HRMGT 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, MGTECON 802, MKTG 802, OB 802, OIT 802, POLECON 802, STRAMGT 802.

## Humanities Sciences Courses

**HUMSCI 201. Graduate Environment of Support. 1 Unit.**

Psychosocial, financial, and career issues in adapting graduate students to Stanford; how these issues relate to diversity, resources, policies, and procedures. Discussions among faculty, advanced graduate students, campus resource people, and the dean's office. (Thomas).

# Iberian Latin American Cultures Courses

## **ILAC 10SC. Spanish Immersion. 2 Units.**

Wouldn't it be great if you could quickly increase your Spanish proficiency through an intensive immersion experience right here at Stanford? Wouldn't you love to gain the cultural and historical knowledge necessary to begin taking literature and culture courses generally reserved for advanced students? This intensive Spanish immersion course is designed to help students who have completed a year of Spanish to move forward quickly toward greater linguistic and cultural competence. After a year of Spanish, students tend to be able to handle straightforward interactions related to basic needs and personal information, but they generally lack the ability to handle more abstract discussions or to combine short utterances into sustained presentations of their ideas. Most students likewise have little knowledge of the rich and complex history that surrounds the Spanish language or the central role that Spanish has played in the cultural and political life of California. In this course, a team of experienced instructors will help students improve their Spanish through intensive lessons that incorporate film, literature, and social issues. Through a focused discussion of the themes of immigration and democracy in Spain, Latin America, and the United States, as well as excursions and guest lectures by Stanford faculty and community leaders, this course will immerse students in Spanish and help them to gain advanced proficiency much more quickly.

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## **ILAC 110. Spanish Society in the 21st Century Throughout Film. 3-5 Units.**

Open to undergraduates with an interest in 21st Century Film and the social reality of Spain nowadays. Explores how Spain has evolved from being one of the most undeveloped European countries to become a first mover in social issues such as gay marriage or women's public role. Topics include racism, migration, the reconstruction of the past and the vision of the other. Themes are analyzed through movies directed by Spanish and American filmmakers such as: Cesc Gay, Bollaín, Bigas-Luna, González-Iñárritu and Woody Allen. Class taught in Spanish, readings both in Spanish and English.

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## **ILAC 114N. Introduction to Lyric Poetry. 3-5 Units.**

A basic introduction to the elements of lyric poetry--image, metaphor, symbol, connotation, denotation, irony, rhyme and meter--drawing upon a selection of poems from major poets of the Hispanic World, including, G. A. Bécquer, Rosalía de Castro, Rubén Darío, Miguel de Unamuno, Antonio Machado, Juan Ramón Jiménez, García Lorca, Pablo Neruda, and Gabriela Mistral. Prerequisites: Two years of college-level Spanish. This is a bilingual course, taught both in English, and Spanish, with an emphasis on Spanish.

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## **ILAC 115. A short history of Iberian Cinema. 3-5 Units.**

A survey of Iberian cinema in the second half of the 20th century. Traces the slow making of an international success with directors like Saura, Almodóvar, Amenábar, Medem, Pons, Bollaín and Villaronga. Starting with the early Buñuel, the course examines cinema's shaping of the national imaginary and its articulation of collective memories suppressed during the Franco dictatorship, as well as the challenges of cultural continuity. Taught in Spanish. Same as: ILAC 315.

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## **ILAC 116. Approaches to Spanish and Spanish American Literature. 3-5 Units.**

Short stories, poetry, and theater. What analytical tools do the "grammars" of different genres call for? What contact zones exist between these genres? How have ideologies, the power of patronage, and shifting poetics shaped their production over time? Authors may include Arrabal, Borges, Cortázar, Cernuda, García Márquez, Lorca, Neruda, Rivas. Taught in Spanish.

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**ILAC 120. Advanced Critical Reading in Spanish. 3-5 Units.**

Strategies and tactics for research and writing in the humanities; focus is on the Spanish-speaking world. Objectives: how to write a funding proposal; how to conduct research online and in the library; annotated bibliographies; literature reviews; a book review; primary research and archive skills. Students will learn how to conduct research in Iberian and Latin American Studies, improve their written skills and learn how to think in the discipline. The emphasis of the course is on skill-building while exploring topics of interest to each student. (Meets Writing-in-the-Major requirement).

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Strategies and tactics for research and writing in the humanities; focus is on the Spanish-speaking world. Objectives: how to write a funding proposal; how to conduct research online and in the library; annotated bibliographies; literature reviews; a book review; primary research and archive skills. Students will learn how to conduct research in Iberian and Latin American Studies, improve their written skills and learn how to think in the discipline. The emphasis of the course is on skill-building while exploring topics of interest to each student. (Meets Writing-in-the-Major requirement).

**ILAC 122. Literature and Politics - Two Mediterranean Cases: Catalonia and Italy. 3-5 Units.**

A comparison between the different roles played by writers as members of the intellectual establishment in Catalonia, Spain and Italy. Focus on the relation between intellectuals and politics in shaping national identity. We will give especially consideration to the role played by intellectuals during the Fascist and Francoist dictatorships and during Spain's transition to democracy. Taught in English. Same as: ITALIAN 136.

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A comparison between the different roles played by writers as members of the intellectual establishment in Catalonia, Spain and Italy. Focus on the relation between intellectuals and politics in shaping national identity. We will give especially consideration to the role played by intellectuals during the Fascist and Francoist dictatorships and during Spain's transition to democracy. Taught in English. Same as: ITALIAN 136.

**ILAC 130. Introduction to Iberia: Cultural Perspectives. 3-5 Units.**

The historical dynamics, linguistic plurality, and social complexity of the Iberian world. Topics include: empire, independence Civil war; republicanism; the crisis at the end of the century: the year 98; the civil war; dictatorships, Franco, and Salazar. Major figures include Larra, Esproceda, B  quer, Rosal  a de Castro, Verdaguer, Gald  s, Maragall, Unamuno, Valle-Incl  n, Machado, and Lorca. Taught in Spanish.

**ILAC 130. Introduction to Iberia: Cultural Perspectives. 3-5 Units.**

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**ILAC 131. Introduction to Latin America: Cultural Perspectives. 3-5 Units.**

Major theoretical debates about the construction of Latin American identities, from the 19th Century to the present. Readings by writers, poets, philosophers, and historians, including Rodo, Retamar, O'Gorman, Vasconcelos, Henr  quez-Ure  a, Ramos, Paz, Carpentier, Lezama Lima, Borges, and Fuentes.

**ILAC 131. Introduction to Latin America: Cultural Perspectives. 3-5 Units.**

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**ILAC 136. Modern Iberian Literatures. 3-5 Units.**

Survey on modern Iberian literatures (Spanish, Catalan, Basque, Galician and Portuguese) through major canonical authors. Community building, tolerance, the ethics of memory, the value of human purpose as a tool for survival are some of the issues explored in key works by Eca de Queiros, Miguel de Unamuno, Garc  a Lorca, Fernando Pessoa, Antonio Machado, Merc   Rodoreda, Maria Angels Anglada, Ram  n Sainzarbitoria and Manuel Rivas. SPANLANG 13 or equivalent, SPANLANG 102 Recommended.

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**ILAC 140. Migration in 21st Century Latin American Film. 3-5 Units.**

Focus on how images and narratives of migration are depicted in recent Latin American film. It compares migration as it takes place within Latin America to migration from Latin America to Europe and to the U.S. We will analyze these films, and their making, in the global context of an evergrowing tension between "inside" and "outside"; we consider how these films represent or explore precariousness and exclusion; visibility and invisibility; racial and gender dynamics; national and social boundaries; new subjectivities and cultural practices. Films include: El ni  o pez, Bolivia, Ulises, Faustino Mayta visita a su prima, Copacabana, Chico y Rita, Sin nombre, Los que se quedan, Amador, and En la puta calle. Films in Spanish, with English subtitles. Discussions and assignments in Spanish. Same as: CHILATST 140.

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**ILAC 143. The Latin American Women's Novel. 3-5 Units.**

An exploration of women's novels as an intellectual counterculture of the male-dominated Latin American literary canon. Latin American women's writing and thought will be considered in a regional and global context of feminism and feminist theory. Authors include G  mez de Avellaneda, Bombal, Castellanos, Lispector, Eltit, Oloixarac, de Beauvoir, Kristeva, Engels, Cixous, and Butler. Course discussion in Spanish. Prerequisite: SPANLANG 3 or equivalent.

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**ILAC 145. Poets, Journalists and Collectors: Latin American Modernismo. 3-5 Units.**

Discusses the different artistic avatars exercised by Latin American modernistas at the turn of the 19th Century in the context of growing capitalism, technological innovation and social transformation. We focus on how modernistas as poets, journalists and collectors explored and transgressed the limits of the individual and his/her situation. We consider topics like cosmopolitanism, dandysm, autonomy of art, and the aesthetic cultivation of the self. Authors include: Delmira Agustini, Rubén Darío, Julián del Casal, Leopoldo Lugones, José Martí, Manuel Gutiérrez Nájera, José Enrique Rodó, José Asunción Silva, and Abraham Valdelomar. Spanish proficiency required.

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**ILAC 157. Medieval and Early Modern Iberian Literatures. 3-5 Units.**

Survey of major literary works (in Catalan, Portuguese, and Spanish) from the thirteenth through the seventeenth centuries. Topics include manuscript culture; lyric poetry and performance; cultural/linguistic contact and exchange; gender; empire; and the rise of the novel. Authors may include Alfonso X, Lull, Arcipreste de Hita, Zurara, Ausias March, Gil Vicente, Garcilaso de la Vega, Camoes, Gongora, Soror Violante do Ceu, Lope de Vega, Calderon de la Barca, and Antonio Vieira. Taught in Spanish.

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Survey of major literary works (in Catalan, Portuguese, and Spanish) from the thirteenth through the seventeenth centuries. Topics include manuscript culture; lyric poetry and performance; cultural/linguistic contact and exchange; gender; empire; and the rise of the novel. Authors may include Alfonso X, Lull, Arcipreste de Hita, Zurara, Ausias March, Gil Vicente, Garcilaso de la Vega, Camoes, Gongora, Soror Violante do Ceu, Lope de Vega, Calderon de la Barca, and Antonio Vieira. Taught in Spanish.

**ILAC 161. Modern Latin American Literature. 3-5 Units.**

From independence to the present. Topics include romantic allegories of the nation; modernism and postmodernism; avant-garde poetry; regionalism versus cosmopolitanism; indigenous and indigenist literature; magical realism and the literature of the boom; Afro-Hispanic literature; and testimonial narrative. Authors may include: Bolívar, Bello, Gómez de Avellaneda, Isaacs, Sarmiento, Machado de Assis, Darío, Martí-, Agustini, Vallejo, Huidobro, Borges, Cortázar, Neruda, Guillon, Rulfo, Ramos, García Marquez, Lispector, and Bolaño.

**ILAC 161. Modern Latin American Literature. 3-5 Units.**

From independence to the present. Topics include romantic allegories of the nation; modernism and postmodernism; avant-garde poetry; regionalism versus cosmopolitanism; indigenous and indigenist literature; magical realism and the literature of the boom; Afro-Hispanic literature; and testimonial narrative. Authors may include: Bolívar, Bello, Gómez de Avellaneda, Isaacs, Sarmiento, Machado de Assis, Darío, Martí-, Agustini, Vallejo, Huidobro, Borges, Cortázar, Neruda, Guillon, Rulfo, Ramos, García Marquez, Lispector, and Bolaño.

**ILAC 193Q. Spaces and Voices of Brazil through Film. 3-4 Units.**

The manners in which a country is perceived and defines itself is a result of many complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed throughout times, but has conserved some clear pervasive defining traits. This course is an introduction to the history, culture, politics and artistic production of Brazil as seen through feature films, documentaries and some complementary readings. Movies include, among others, Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September-among others. In English. Same as: PORTLANG 193Q.

**ILAC 193Q. Spaces and Voices of Brazil through Film. 3-4 Units.**

The manners in which a country is perceived and defines itself is a result of many complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed throughout times, but has conserved some clear pervasive defining traits. This course is an introduction to the history, culture, politics and artistic production of Brazil as seen through feature films, documentaries and some complementary readings. Movies include, among others, Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September-among others. In English. Same as: PORTLANG 193Q.

**ILAC 199. Individual Work. 1-12 Units.**

Open only to students in the department, or by consent of instructor.

**ILAC 199. Individual Work. 1-12 Units.**

Open only to students in the department, or by consent of instructor.

**ILAC 210. Queer Almodovar. 3-5 Units.**

Focus on the representation of non-normative sexualities and genders in films by Pedro Almodóvar, one of the most recognizable auteur directors in Europe today. Analysis of his hybrid and eclectic visual style complemented by critical and theoretical readings in queer studies. Taught in English. Same as: FEMST 210.

**ILAC 210. Queer Almodovar. 3-5 Units.**

Focus on the representation of non-normative sexualities and genders in films by Pedro Almodóvar, one of the most recognizable auteur directors in Europe today. Analysis of his hybrid and eclectic visual style complemented by critical and theoretical readings in queer studies. Taught in English. Same as: FEMST 210.

**ILAC 214. Crypto-Muslim Culture in Early Modern Spain. 3-5 Units.**

What is known about the secret religious practice and culture of the Moriscos, Spain's large minority community of Muslim converts to Christianity (1500-1609)? What role did their handwritten literature (largely Islamic texts written in Castilian but copied out in Arabic script) play in the formation and maintenance of their culture? What can these Crypto-Muslim communities teach us regarding the place of Muslim culture in Western Europe today? The course will be taught in English; knowledge of Spanish and/or Arabic script is useful but not necessary.

Same as: RELIGST 220B.

**ILAC 214. Crypto-Muslim Culture in Early Modern Spain. 3-5 Units.**

What is known about the secret religious practice and culture of the Moriscos, Spain's large minority community of Muslim converts to Christianity (1500-1609)? What role did their handwritten literature (largely Islamic texts written in Castilian but copied out in Arabic script) play in the formation and maintenance of their culture? What can these Crypto-Muslim communities teach us regarding the place of Muslim culture in Western Europe today? The course will be taught in English; knowledge of Spanish and/or Arabic script is useful but not necessary.

Same as: RELIGST 220B.

**ILAC 217. Spain & Catalonia face to face. History, Literature and Arts within two European national traditions. 3-5 Units.**

During the long period considered, the relationship between Spain and Catalonia has passed from aversion and misunderstanding to acceptance and understanding, hardly to sympathy. Emphasis on giving students a "longue durée" viewpoint on Spanish-Catalan relations in a European and Mediterranean framework. Political concerns, especially in the Romantic period, are largely mediated by literature, the arts and other cultural venues. Will emphasize cross-cultural references while considering the following topics: 1. Maragall and the Iberianist tradition, 2. "Modernisms" in and out the Iberian peninsula, 3. Avant-Garde movements in Spain and Catalonia, 4. Meditating in a desert: Catalan culture under Franco. Taught in Spanish. Readings in English and Spanish.

**ILAC 217. Spain & Catalonia face to face. History, Literature and Arts within two European national traditions. 3-5 Units.**

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**ILAC 218. Anticlericalism in the Iberian Novel of the 19th Century. 3-5 Units.**

The rapid social and cultural changes in which 19th-century novelists wrote; the anti-clerical stance as marker of society's attempts to modernize. Why were monks and priests reviled by many Spanish novelists? How and why did they re-write Spanish history around these figures? What was the role of the church and religious men in modern society? Questions of individualism, property, and labor in novels by major Iberian prose realists. In Spanish.

**ILAC 218. Anticlericalism in the Iberian Novel of the 19th Century. 3-5 Units.**

The rapid social and cultural changes in which 19th-century novelists wrote; the anti-clerical stance as marker of society's attempts to modernize. Why were monks and priests reviled by many Spanish novelists? How and why did they re-write Spanish history around these figures? What was the role of the church and religious men in modern society? Questions of individualism, property, and labor in novels by major Iberian prose realists. In Spanish.

**ILAC 223. The Generation of 1898 and Beyond. 3-5 Units.**

Preference for graduate students, majors are welcome. Course will focus on six major authors (Unamuno, Baroja, A. Machado, J. R. Jiménez, Valle-Inclán, García Lorca) and representative works, written between 1898 and 1930, dealing with an historical period of crisis and transition, and displaying major aesthetic innovations in both poetry and theater. Fundamental themes include the decline of feudal Galicia, the Spanish-American War of 1898, the emergence and social activism of new social forces, and the struggle for and betrayal of democracy, expressed through the various genres of the novel, poetry, and theater. Major works of Antonio Machado, Juan Ramón Jiménez, and Federico García Lorca will be examined, with special emphasis on the historical context of the first three decades of the 20th century and their contributions to the development of 20th century Spanish lyric poetry. Taught in either English or Spanish, depending on course enrollment.

**ILAC 223. The Generation of 1898 and Beyond. 3-5 Units.**

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**ILAC 225E. Theater, Society, and Politics in 20th-Century Spain. 3-5 Units.**

Ramón del Valle-Inclán and Federico García Lorca. The avant garde nature of their major plays and their engagement with social and political issues of the times including feudalism, the emerging liberal state, women's protest, class struggle, and civil war. Symbolism, expressionism, and realism.

**ILAC 225E. Theater, Society, and Politics in 20th-Century Spain. 3-5 Units.**

Ramón del Valle-Inclán and Federico García Lorca. The avant garde nature of their major plays and their engagement with social and political issues of the times including feudalism, the emerging liberal state, women's protest, class struggle, and civil war. Symbolism, expressionism, and realism.

**ILAC 241. Fiction Workshop in Spanish. 3-5 Units.**

Enrollment limited. Spanish and Spanish American short stories approached through narrative theory and craft. Assignments are creative in nature and focus on the formal elements of fiction (e.g. character and plot development, point of view, creating a scene, etc.). Students will write, workshop, and revise an original short story throughout the term. No previous experience with creative writing is required. Readings may include works by Ayala, Bolaño, Borges, Clarín, Cortázar, García Márquez, Piglia, Rodoreda, and others.

**ILAC 241. Fiction Workshop in Spanish. 3-5 Units.**

Enrollment limited. Spanish and Spanish American short stories approached through narrative theory and craft. Assignments are creative in nature and focus on the formal elements of fiction (e.g. character and plot development, point of view, creating a scene, etc.). Students will write, workshop, and revise an original short story throughout the term. No previous experience with creative writing is required. Readings may include works by Ayala, Bolaño, Borges, Clarín, Cortázar, García Márquez, Piglia, Rodoreda, and others.

**ILAC 243. The Millenium Novel in Latin America. 3-5 Units.**

Between 2000 and 2012, a young Spanish American novel emerges, taking at times a minimalist point of view to narrate individual stories with a subjective tone, or continuing a tradition of the historical panorama to present national tragedies that occurred in the last two or three decades. Focus is on this new type of novel from different countries, with such titles as "El cuerpo en que nací" by Guadalupe Entel; "Las teorías salvajes" by Pola Oloixarac; "El ruido de las cosas al caer" by Juan Gabriel Vazquez; and "Bonsai" by Alejandro Zambra, among others.

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**ILAC 245. Brazilian Songs. 3-5 Units.**

Brazilian culture through its lyrics, rhythms and songs: samba, bossa nova, tropicalia, MPB and its contemporary variations. Readings and class discussions in Portuguese. Assignments in English or in Portuguese.

**ILAC 245. Brazilian Songs. 3-5 Units.**

Brazilian culture through its lyrics, rhythms and songs: samba, bossa nova, tropicalia, MPB and its contemporary variations. Readings and class discussions in Portuguese. Assignments in English or in Portuguese.

**ILAC 251. Latin American Literary Theory. 3-5 Units.**

Latin American literary theory through the works of José Carlos Mariátegui, José Enrique Rodó, Alfonso Reyes, Antonio Candido, Roberto Schwartz, Angel Rama, Roberto Fernández Retamar, Antonio Cornejo Polar, Josefina Ludmer, Flora Sussekind. This course will focus on the concepts of "the lettered city", "hybridization", "psychoanalysis", "marxist theory", "class struggle", "literary politics", "latinamericanism". In sum: Literary theory from the inside of Latin American culture, considering also its Western influences. Taught in Spanish.

**ILAC 251. Latin American Literary Theory. 3-5 Units.**

Latin American literary theory through the works of José Carlos Mariátegui, José Enrique Rodó, Alfonso Reyes, Antonio Candido, Roberto Schwartz, Angel Rama, Roberto Fernández Retamar, Antonio Cornejo Polar, Josefina Ludmer, Flora Sussekind. This course will focus on the concepts of "the lettered city", "hybridization", "psychoanalysis", "marxist theory", "class struggle", "literary politics", "latinamericanism". In sum: Literary theory from the inside of Latin American culture, considering also its Western influences. Taught in Spanish.

**ILAC 257. Dictatorships in Latin America through testimonies and film. 3-5 Units.**

Focus on Pinochet coup, the Falkland Islands, the prison Libertad in Uruguay, the "Plan Condor." How literature, journalism and cinema denounced and revisited the worst political times in Latin America. Taught in Spanish.

Same as: Argentina, Chile, Uruguay in the 70s.

**ILAC 257. Dictatorships in Latin America through testimonies and film. 3-5 Units.**

Focus on Pinochet coup, the Falkland Islands, the prison Libertad in Uruguay, the "Plan Condor." How literature, journalism and cinema denounced and revisited the worst political times in Latin America. Taught in Spanish.

Same as: Argentina, Chile, Uruguay in the 70s.

**ILAC 261. Voices in Brazilian Fiction. 3-5 Units.**

Brazilian Literary canon. Novels and short stories from independence to the present. Topics include romanticism and realism; regionalism; modernism and postmodernism. Authors may include: José de Alencar, Machado de Assis, Oswald de Andrade, Graciliano Ramos, Guimarães Rosa, Lispector, Hilda Hilst, Silviano Santiago. Readings in Portuguese; Class discussions in English; Assignments in Portuguese or in English.

**ILAC 261. Voices in Brazilian Fiction. 3-5 Units.**

Brazilian Literary canon. Novels and short stories from independence to the present. Topics include romanticism and realism; regionalism; modernism and postmodernism. Authors may include: José de Alencar, Machado de Assis, Oswald de Andrade, Graciliano Ramos, Guimarães Rosa, Lispector, Hilda Hilst, Silviano Santiago. Readings in Portuguese; Class discussions in English; Assignments in Portuguese or in English.

**ILAC 277. Spanish in Society. 3-5 Units.**

Emphasis is on the documentation and analysis of the use of Spanish in real-world contexts. Readings include representative scholarship from linguistic anthropology, sociolinguistics, psychology, and sociology. Topics include fieldwork methods, the ethnography of communication, conversational narrative, body language, and language ideologies and politics. Students will conduct their own ethnographic fieldwork and present findings to class. Taught in English (with fieldwork component in Spanish).

**ILAC 277. Spanish in Society. 3-5 Units.**

Emphasis is on the documentation and analysis of the use of Spanish in real-world contexts. Readings include representative scholarship from linguistic anthropology, sociolinguistics, psychology, and sociology. Topics include fieldwork methods, the ethnography of communication, conversational narrative, body language, and language ideologies and politics. Students will conduct their own ethnographic fieldwork and present findings to class. Taught in English (with fieldwork component in Spanish).

**ILAC 278. Senior Seminar: Early 20th Century Iberian Poets. 3-5 Units.**

Major works of Antonio Machado, Juan Ramón Jiménez, and Federico García Lorca will be examined, with special emphasis on the historical context of the first three decades of the 20th century and their contributions to the development of 20th century Spanish lyric poetry.

**ILAC 278. Senior Seminar: Early 20th Century Iberian Poets. 3-5 Units.**

Major works of Antonio Machado, Juan Ramón Jiménez, and Federico García Lorca will be examined, with special emphasis on the historical context of the first three decades of the 20th century and their contributions to the development of 20th century Spanish lyric poetry.

**ILAC 278A. Senior Seminar: Latin American Fiction and Theory. 3-5 Units.**

20th Century Latin American novels, short stories, and Literary theories. Authors may include: J-L Borges, J.J.Saer, Machado de Assis, Graciliano Ramos, Guimarães Rosa, Lispector. Literary criticism by Gonzales Echevarría, Antonio Candido, H.Campos, M. Lienhard. Readings and class discussions in Spanish. Assignments in Spanish, English or Portuguese.

**ILAC 278A. Senior Seminar: Latin American Fiction and Theory. 3-5 Units.**

20th Century Latin American novels, short stories, and Literary theories. Authors may include: J-L Borges, J.J.Saer, Machado de Assis, Graciliano Ramos, Guimarães Rosa, Lispector. Literary criticism by Gonzales Echevarria, Antonio Candido, H.Campos, M. Lienhard. Readings and class discussions in Spanish. Assignments in Spanish, English or Portuguese.

**ILAC 280. Latin@ Literature. 3-5 Units.**

Examines a diverse set of narratives by U.S. Latin@s of Mexican, Puerto Rican, Cuban, Guatemalan, and Dominican heritage through the lens of latinidad. All share the historical experience of Spanish colonization and U.S. imperialism, yet their im/migration patterns differ, affecting social, cultural, and political trajectories in the US and relationships to "home" and "homeland," nation, diaspora, history, and memory. Explores how racialization informs genders as well as sexualities. Emphasis on textual analysis. Taught in English.

Same as: CHILATST 200, CSRE 200, ILAC 382.

**ILAC 280. Latin@ Literature. 3-5 Units.**

Examines a diverse set of narratives by U.S. Latin@s of Mexican, Puerto Rican, Cuban, Guatemalan, and Dominican heritage through the lens of latinidad. All share the historical experience of Spanish colonization and U.S. imperialism, yet their im/migration patterns differ, affecting social, cultural, and political trajectories in the US and relationships to "home" and "homeland," nation, diaspora, history, and memory. Explores how racialization informs genders as well as sexualities. Emphasis on textual analysis. Taught in English.

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Same as: CHILATST 200, CSRE 200, ILAC 382.

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Same as: CHILATST 200, CSRE 200, ILAC 382.

**ILAC 299. Individual Work. 1-12 Units.**

Open to department advanced undergraduates or graduate students by consent of professor. May be repeated for credit.

**ILAC 299. Individual Work. 1-12 Units.**

Open to department advanced undergraduates or graduate students by consent of professor. May be repeated for credit.

**ILAC 305. Rhythm: Ethics and Poetics of the Premodern. 3-5 Units.**

Focus is on the notion of rhythm as a theoretical frame for the analysis of medieval and early modern Iberian poetry. Topics include Ancient Greek and modern conceptions of rhythm and the links between poetics and ethics in the medieval period and beyond. Authors include: Aeschylus, Plato, Aristoxenus, Maurice Blanchot, Paul Celan, Emmanuel Levinas, Arcipreste de Hita, Ausiás March, Garcilaso de la Vega, and Luís de Camões. Taught in English.

**ILAC 305. Rhythm: Ethics and Poetics of the Premodern. 3-5 Units.**

Focus is on the notion of rhythm as a theoretical frame for the analysis of medieval and early modern Iberian poetry. Topics include Ancient Greek and modern conceptions of rhythm and the links between poetics and ethics in the medieval period and beyond. Authors include: Aeschylus, Plato, Aristoxenus, Maurice Blanchot, Paul Celan, Emmanuel Levinas, Arcipreste de Hita, Ausiás March, Garcilaso de la Vega, and Luís de Camões. Taught in English.

**ILAC 315. A short history of Iberian Cinema. 3-5 Units.**

A survey of Iberian cinema in the second half of the 20th century. Traces the slow making of an international success with directors like Saura, Almodóvar, Amenábar, Medem, Pons, Bollaín and Villaronga. Starting with the early Buñuel, the course examines cinema's shaping of the national imaginary and its articulation of collective memories suppressed during the Franco dictatorship, as well as the challenges of cultural continuity. Taught in Spanish.

Same as: ILAC 115.

**ILAC 315. A short history of Iberian Cinema. 3-5 Units.**

A survey of Iberian cinema in the second half of the 20th century. Traces the slow making of an international success with directors like Saura, Almodóvar, Amenábar, Medem, Pons, Bollaín and Villaronga. Starting with the early Buñuel, the course examines cinema's shaping of the national imaginary and its articulation of collective memories suppressed during the Franco dictatorship, as well as the challenges of cultural continuity. Taught in Spanish.

Same as: ILAC 115.

**ILAC 316. Realism and Surrealism in the Cinema of Luis Bunuel. 3-5 Units.**

Surrealism, realism, dark comedy, film genres transformed by Spanish director, Luis Bunuel in Spain, France and Mexico during the second half of the XX century. An examination of Bunuel's work from his Surrealist beginnings (*L'Age d'Or*, *Un Chien Andalou*), subsequent realistic films in Mexico (*Los Olvidados*, *Nazarin*), and a mixture of Surrealism and Realism (*Viridiana*, *Exterminating Angel*, *Simon del Desierto*), as well his work with dark comedy (*Archibaldo de la Cruz*, *Belle de Jour*, *Le charme discret de la bourgeoisie*). In Spanish.

**ILAC 316. Realism and Surrealism in the Cinema of Luis Bunuel. 3-5 Units.**

Surrealism, realism, dark comedy, film genres transformed by Spanish director, Luis Bunuel in Spain, France and Mexico during the second half of the XX century. An examination of Bunuel's work from his Surrealist beginnings (*L'Age d'Or*, *Un Chien Andalou*), subsequent realistic films in Mexico (*Los Olvidados*, *Nazarin*), and a mixture of Surrealism and Realism (*Viridiana*, *Exterminating Angel*, *Simon del Desierto*), as well his work with dark comedy (*Archibaldo de la Cruz*, *Belle de Jour*, *Le charme discret de la bourgeoisie*). In Spanish.

**ILAC 320. The Biographical Space in Contemporary Culture. 3-5 Units.**

Proposes a space of articulation between theoretical reflection and analytical practice that allows to address, from language, the symbolic plot of the constitution of subjects and identities in diverse auto/biographical registers--texts, images, representations, testimonies, narratives; the affirmation of their voices: the search for senses, memories and values. Through a trans-disciplinary perspective, prominence will be given to cultural objects, debates and issues of great relevance in the current Latin American scene.

**ILAC 320. The Biographical Space in Contemporary Culture. 3-5 Units.**

Proposes a space of articulation between theoretical reflection and analytical practice that allows to address, from language, the symbolic plot of the constitution of subjects and identities in diverse auto/biographical registers—texts, images, representations, testimonies, narratives; the affirmation of their voices: the search for senses, memories and values. Through a trans-disciplinary perspective, prominence will be given to cultural objects, debates and issues of great relevance in the current Latin American scene.

**ILAC 332. Race and Slavery in Nineteenth Century Spain. 3-5 Units.**

An analysis of the literature written in Spain during the nineteenth and twentieth centuries dealing with the empire post 1808. Authors discussed include Blanco White, Baroja, Avellaneda, and Rusiñol, among others.

**ILAC 332. Race and Slavery in Nineteenth Century Spain. 3-5 Units.**

An analysis of the literature written in Spain during the nineteenth and twentieth centuries dealing with the empire post 1808. Authors discussed include Blanco White, Baroja, Avellaneda, and Rusiñol, among others.

**ILAC 336. Early 20th Century Iberian Poetry. 3-5 Units.**

Poetry in restoration Spain, 1871-1930, against the background of the democratic tradition of Spanish liberalism. Emphasis is on stylistic analysis and concepts such as the generation of 1898, modernism, Krausism, pure poetry, and symbolic systems. Taught in either English or Spanish depending on class enrollment.

**ILAC 336. Early 20th Century Iberian Poetry. 3-5 Units.**

Poetry in restoration Spain, 1871-1930, against the background of the democratic tradition of Spanish liberalism. Emphasis is on stylistic analysis and concepts such as the generation of 1898, modernism, Krausism, pure poetry, and symbolic systems. Taught in either English or Spanish depending on class enrollment.

**ILAC 345. Biopolitics and Sovereignty in Andean Culture, 1920-1940. 3-5 Units.**

What is productive life? How is life aesthetically and politically valued? This course explores the inscription of life in changing political and aesthetic regimes of the Andean South in the turbulent decades of the 1920s-1940s. Based on theories of biopower and sovereignty, we explore topics such as domination, domestication, appropriation, exclusion, facism, solidarity, tellurism, race, mestizaje, and human/nature relations. We will consider poetry, narrative, journals, and the visual arts. Authors include: Gabriela Mistral, Pablo Neruda, Pablo de Rokha, Alcides Arguedas, Augusto Céspedes, Franz Tamayo, Leopoldo Marechal, Roberto Arlt, Jorge Luis Borges, César Vallejo, José Carlos Mariátegui, Ciro Alegría, and José María Arguedas. Spanish proficiency required.

**ILAC 345. Biopolitics and Sovereignty in Andean Culture, 1920-1940. 3-5 Units.**

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**ILAC 380E. Critical Concepts in Chican@ Literature. 3-5 Units.**

Combines primary texts of Chican@ literature with a metacritical interrogation of key concepts informing Chican@ literary criticism, the construction of Chican@ literary history, and a Chican@ literary canon. Interrogates the resistance paradigm and the "proper" subject of this literature, and critiques established genealogies and foundational authors and texts, as well as issues of periodization, including the notion of "emergence" (e.g. of feminist voices or dissident sexualities). Considers texts, authors and subjects that present alternatives to the resistance paradigm.

Same as: CHILATST 201C, CSRE 201C.

**ILAC 380E. Critical Concepts in Chican@ Literature. 3-5 Units.**

Combines primary texts of Chican@ literature with a metacritical interrogation of key concepts informing Chican@ literary criticism, the construction of Chican@ literary history, and a Chican@ literary canon. Interrogates the resistance paradigm and the "proper" subject of this literature, and critiques established genealogies and foundational authors and texts, as well as issues of periodization, including the notion of "emergence" (e.g. of feminist voices or dissident sexualities). Considers texts, authors and subjects that present alternatives to the resistance paradigm.

Same as: CHILATST 201C, CSRE 201C.

**ILAC 380E. Critical Concepts in Chican@ Literature. 3-5 Units.**

Combines primary texts of Chican@ literature with a metacritical interrogation of key concepts informing Chican@ literary criticism, the construction of Chican@ literary history, and a Chican@ literary canon. Interrogates the resistance paradigm and the "proper" subject of this literature, and critiques established genealogies and foundational authors and texts, as well as issues of periodization, including the notion of "emergence" (e.g. of feminist voices or dissident sexualities). Considers texts, authors and subjects that present alternatives to the resistance paradigm.

Same as: CHILATST 201C, CSRE 201C.

**ILAC 380E. Critical Concepts in Chican@ Literature. 3-5 Units.**

Combines primary texts of Chican@ literature with a metacritical interrogation of key concepts informing Chican@ literary criticism, the construction of Chican@ literary history, and a Chican@ literary canon. Interrogates the resistance paradigm and the "proper" subject of this literature, and critiques established genealogies and foundational authors and texts, as well as issues of periodization, including the notion of "emergence" (e.g. of feminist voices or dissident sexualities). Considers texts, authors and subjects that present alternatives to the resistance paradigm.

Same as: CHILATST 201C, CSRE 201C.

**ILAC 382. Latin@ Literature. 3-5 Units.**

Examines a diverse set of narratives by U.S. Latin@s of Mexican, Puerto Rican, Cuban, Guatemalan, and Dominican heritage through the lens of latinidad. All share the historical experience of Spanish colonization and U.S. imperialism, yet their im/migration patterns differ, affecting social, cultural, and political trajectories in the US and relationships to "home" and "homeland," nation, diaspora, history, and memory. Explores how racialization informs genders as well as sexualities. Emphasis on textual analysis. Taught in English.

Same as: CHILATST 200, CSRE 200, ILAC 280.

**ILAC 382. Latin@ Literature. 3-5 Units.**

Examines a diverse set of narratives by U.S. Latin@s of Mexican, Puerto Rican, Cuban, Guatemalan, and Dominican heritage through the lens of latinidad. All share the historical experience of Spanish colonization and U.S. imperialism, yet their im/migration patterns differ, affecting social, cultural, and political trajectories in the US and relationships to "home" and "homeland," nation, diaspora, history, and memory. Explores how racialization informs genders as well as sexualities. Emphasis on textual analysis. Taught in English.

Same as: CHILATST 200, CSRE 200, ILAC 280.

**ILAC 389E. Queer of Color Critique: Race, Sex, Gender in Cultural Representations. 3-5 Units.**

Examines major questions and issues that arise in considering race, sex, and gender together. Focus on critical and theoretical texts queering ethnic and diaspora studies and bringing race and ethnicity into queer studies. Close reading of texts in a variety of media negotiating racialized sexualities and sexualized identities. How is desire racialized? How is racial difference produced through sex acts? How to reconcile pleasure and desire with histories of imperialism and (neo)colonialism and structures of power?

Same as: CSRE 289E, FEMST 389E.

**ILAC 389E. Queer of Color Critique: Race, Sex, Gender in Cultural Representations. 3-5 Units.**

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Same as: CSRE 289E, FEMST 389E.

**ILAC 399. Individual Work. 1-12 Units.**

For Spanish and Portuguese department graduate students only. Prerequisite: consent of instructor.

**ILAC 399. Individual Work. 1-12 Units.**

For Spanish and Portuguese department graduate students only. Prerequisite: consent of instructor.

**ILAC 802. TGR Dissertation. 0 Unit.****ILAC 802. TGR Dissertation. 0 Unit.**

## Iberian Languages Courses

**IBERLANG 7. First-Year Basque Language and Culture, First Quarter. 5 Units.**

Speaking, reading, writing, and listening. Authentic and classroom materials. Interactive approach with emphasis on developing communicative expression. The cultural context in which Basque is spoken.

**IBERLANG 8. First-Year Basque Language and Culture, Second Quarter. 5 Units.**

Continuation of 7. Speaking, reading, writing, and listening. Authentic materials. Interactive approach with emphasis on developing communicative expression. The cultural context in which Basque is spoken. Prerequisite: 7 or equivalent.

**IBERLANG 395. Graduate Studies in Iberian. 2-5 Units.**

## Immunology Courses

**IMMUNOL 185. Brain and the Immune System. 3 Units.**

For advanced undergraduates, coterminal students, and graduate students. Molecular and cellular interactions between the nervous and immune systems. Focus is on the role of immune molecules in neural development, the bi-directional mechanisms by which the brain and immune system communicate with each other, and the role of the immune system in the diseased and infected brain. Topics include: molecular basis of fever, stress and inflammation, gender differences in autoimmune diseases, inflammation in neurodegenerative diseases, central nervous system infections, and the immune system in psychiatric disorders. Expert guest lectures, weekly discussion sections, and student presentations. Prerequisite: Biological Sciences or Human Biology core.

Same as: IMMUNOL 285.

**IMMUNOL 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**IMMUNOL 201. Advanced Immunology I. 3 Units.**

For graduate students, medical students and advanced undergraduates. Topics include the innate and adaptive immune systems; genetics, structure, and function of immune molecules; lymphocyte activation and regulation of immune responses. Prerequisites: undergraduate course in Immunology and familiarity with experimental approaches in biochemistry, molecular biology, and cell biology.

Same as: MI 211.

**IMMUNOL 202. Advanced Immunology II. 3 Units.**

Readings of immunological literature. Classic problems and emerging areas based on primary literature. Student and faculty presentations. Prerequisite: IMMUNOL 201/MI 211.

Same as: MCP 202.

**IMMUNOL 203. Advanced Immunology III. 2 Units.**

Key experiments and papers in immunology. Student presentations and interviews with faculty regarding their experimental process and scientific papers. Prerequisite: IMMUNOL 201/MI 211 or IMMUNOL 202/MCP 202.

**IMMUNOL 204. Innate Immunology. 3 Units.**

Innate immune mechanisms as the only defenses used by the majority of multicellular organisms. Topics include Toll signaling, NK cells, complement, antimicrobial peptides, phagocytes, neuroimmunity, community responses to infection, and the role of native flora in immunity. How microbes induce and defeat innate immune reactions, including examples from vertebrates, invertebrates, and plants.

Same as: MI 104, MI 204.

**IMMUNOL 205. Immunology in Health and Disease. 4 Units.**

Concepts and application of adaptive and innate immunology and the role of the immune system in human diseases. Case presentations of diseases including autoimmune diseases, infectious disease and vaccination, hematopoietic and solid organ transplantation, genetic and acquired immunodeficiencies, hypersensitivity reactions, and allergic diseases. Problem sets based on lectures and current clinical literature. Laboratory in acute and chronic inflammation.

**IMMUNOL 206A. Systems Immunology. 3-4 Units.**

Introduction to the major underpinnings of systems immunology: first principles of development of computational approaches to immunological questions and research; aspects of study design and analysis of data sets; literature and quantifying effects sizes as applied to clinical trial design. Final projects: individual and team reviewed grant proposals (3 units); individual or team development of grant proposals into projects and journal articles (4 units).

**IMMUNOL 206B. Directed Projects in Systems Immunology. 3-10 Units.**

Independent and team grant proposals, developed in Immunol 206A, will continue on as projects and contribute to ongoing research. Number of units assigned dependent upon the difficulty of and time spent on the project. May be repeated for credit.

**IMMUNOL 209. Translational Immunology. 1 Unitss.**

(Open to medical students in the Immunology concentration, graduate students, undergraduates by consent of instructor) Journal style format focusing on current basic immunology research and how it is translated into immunotherapies and clinical trials. Topics include hematopoiesis, transplantation, tolerance, immune monitoring, vaccination, autoimmunity and antibodies, rheumatoid arthritis, chronic pulmonary disease, and asthma. May be repeated for credit.

**IMMUNOL 210. Immunology Research Seminars for Medical Students. 2 Units.**

Required for medical students selecting the Immunology Concentration. Attendance at a minimum of ten seminars related to immunology outside of required medical school classes. A one-page essay on each seminar, what was presented and how it relates to a clinical immunologic problem, is required.

**IMMUNOL 215. Principles of Biological Technologies. 3 Units.**

The principles underlying novel as well as commonly utilized techniques to answer biological questions. Lectures and primary literature critiques on topics such as fluorescence microscopy, including applications such as FRET and single-cell analysis; human and murine genetic analysis; FACS; proteomics and analysis of noncoding RNAs. Class participation is emphasized. Prerequisite: biochemistry. Required of first-year graduate students in Microbiology and Immunology and the Immunology program. Same as: MI 215.

**IMMUNOL 231. Medicine for Innovators and Entrepreneurs. 3-4 Units.**

Interdisciplinary, project-based course in which bioscience, bioinformatics, biodesign, bioengineering students learn concepts and principles to understand human disease and work together to propose solutions to medical problems. Diabetes mellitus is used as a paradigm for understanding human disease. Guest medical school and outside faculty. Field trips to Stanford clinics and biotechnology companies. Prerequisite: college level biology. Same as: PEDS 231.

**IMMUNOL 260. HIV: The Virus, the Disease, the Research. 3-4 Units.**

Open to medical students, graduate students in biological sciences, undergraduates with strong biological background. Topics: immunopathogenesis immune deficits, opportunistic infections including TB, and malignancies; genomics viral genetic analyses that have traced the origin of HIV-1 and HIV-2 to primates, dated the spread of infection in humans, and characterized the evolution of the virus within infected individuals; antiretroviral drug development identification of drug targets, structure-based drug design, overcoming drug resistance, pivotal clinical trials, and role of community activism; clinical management solutions in high- and low-income countries; vaccine development learning from past failures and the future of engineering the human immune response. 4 units includes a final project assigned in consultation with the instructor to fit the individual student's background and area of HIV interest. Same as: MED 260.

**IMMUNOL 275. Tumor Immunology. 3 Units.**

Focuses on the ability of innate and adaptive immune responses to recognize and control tumor growth. Topics include: tumor antigens, tumor immunosurveillance and immunoediting, tumor immunotherapy, cancer vaccines and dendritic cell therapy. Tracks the historical developments of our understanding of modulating tumor immune response and discusses their relative significance in the light of current research findings. Prerequisite: for undergraduates, human biology or biology core. Same as: CBIO 275.

**IMMUNOL 280. Early Clinical Experience in Immunology. 1-3 Units.**

Clinical observation experience for medical students in the Immunology Scholarly Concentration. At the end of the observation period, which may span over one to two quarters, the student submits a case observation paper to his/her faculty sponsor. Prerequisite: IMMUNOL 205.

**IMMUNOL 285. Brain and the Immune System. 3 Units.**

For advanced undergraduates, coterminial students, and graduate students. Molecular and cellular interactions between the nervous and immune systems. Focus is on the role of immune molecules in neural development, the bi-directional mechanisms by which the brain and immune system communicate with each other, and the role of the immune system in the diseased and infected brain. Topics include: molecular basis of fever, stress and inflammation, gender differences in autoimmune diseases, inflammation in neurodegenerative diseases, central nervous system infections, and the immune system in psychiatric disorders. Expert guest lectures, weekly discussion sections, and student presentations. Prerequisite: Biological Sciences or Human Biology core. Same as: IMMUNOL 185.

**IMMUNOL 290. Teaching in Immunology. 1-15 Units.**

Practical experience in teaching by serving as a teaching assistant in an immunology course. Unit values are allotted individually to reflect the level of teaching responsibility assigned to the student. May be repeated for credit.

**IMMUNOL 299. Directed Reading in Immunology. 1-18 Units.**

Prerequisite: consent of instructor.

**IMMUNOL 305. Immunology Journal Club. 1 Unitss.**

Required of first- to fourth-year graduate students. Graduate students present and discuss recent papers in the literature. May be repeated for credit.

**IMMUNOL 311. Seminar in Immunology. 1 Unitss.**

Enrollment limited to Ph.D., M.D./Ph.D., and medical students whose scholarly concentrations are in Immunology. Current research topics.

**IMMUNOL 311A. Discussions in Immunology. 1 Unitss.**

Students discuss papers of speakers in 311, and meet with the speakers. Corequisite: 311.



**IMMUNOL 315. Special Topics in Immunology. 1 Unitss.**

Format for 2012-13 is a year long (three quarter) lecture series comprising directed readings and survey study of these topics in human and mouse immunology: cells of the immune system; innate and adaptive immunity; antibodies and antigens; histocompatibility complex; lymphocyte development and the rearrangement and expression of antigen receptor genes; T-cell and B-cell signaling and activation; immunological tolerance; transplantation; diseases caused by immune responses; allergy; congenital and acquired immunodeficiencies. Graduate students outside immunology and Postdoctoral fellows are welcome.

**IMMUNOL 399. Graduate Research. 1-15 Units.**

For Ph.D., M.D./Ph.D. students, and medical students whose scholarly concentrations are in Immunology.

**IMMUNOL 801. TGR Project. 0 Unit.****IMMUNOL 802. TGR Dissertation. 0 Unit.**

## Institute for International Studies Courses

**IIS 199. Interschool Honors Program in International Security Studies. 1-5 Units.**

Students from different schools meet in a year-long seminar to discuss, analyze, and conduct research on international security. Combines research methods, policy evaluation, oral presentation, and preparation of an honors thesis by each student. May be repeated for credit.

## Interdisciplinary Studies in the Humanities Courses

**HUMNTIES 321. Classical Seminar: Rethinking Classics. 4-5 Units.**

Literary and philosophical texts from Antiquity (including Homer, the Greek tragedians, Plato, Aristotle, Virgil, and Augustine). In each case, we will examine the cultural contexts in which each text was composed (e.g. political regimes and ideologies; attitudes towards gender and sexuality; hierarchies of class and status; discourses on "barbarians" and resident aliens). We will study various theoretical approaches to these books in an effort to "rethink" these texts in the 21st century.

Same as: CLASSGEN 321, DLCL 321.

**HUMNTIES 324. Enlightenment Seminar. 3-5 Units.**

The Enlightenment as a philosophical, literary, and political movement. Themes include the nature and limits of philosophy, the grounds for critical intellectual engagement, the institution of society and the public, and freedom, equality and human progress. Authors include Voltaire, Montesquieu, Rousseau, Hume, Diderot, and Condorcet.

Same as: DLCL 324, HISTORY 234, HISTORY 334, HISTORY 432A.

## International Policy Studies Courses

**IPS 200. Global Affairs: Social Media and Blog Writing Workshop. 1-2 Units.****IPS 201. Managing Global Complexity. 3 Units.**

Is international relations theory valuable for policy makers? The first half of the course will provide students with a foundation in theory by introducing the dominant theoretical traditions and insights in international relations. The second half of the course focuses on several complex global problems that cut across policy specializations and impact multiple policy dimensions. Students will assess the value of major theories and concepts in international relations for analyzing and addressing such complex global policy issues.

**IPS 202. Topics in International Macroeconomics. 5 Units.**

Topics: standard theories of open economy macroeconomics, exchange rate regimes, causes and consequences of current account imbalances, the economics of monetary unification and the European Monetary Union, recent financial and currency crises, the International Monetary Fund and the reform of the international financial architecture. Prerequisites: Econ 52 and Econ 165.

**IPS 203. Issues in International Economics. 5 Units.**

Topics in international trade and international trade policy: trade, growth and poverty, the World Trade Organization (WTO), regionalism versus multilateralism, the political economy of trade policy, trade and labor, trade and the environment, and trade policies for developing economies. Prerequisite: ECON 51, ECON 166.

**IPS 204A. Microeconomics. 4 Units.**

Microeconomic concepts relevant to decision making. Topics include: competitive market clearing, price discrimination; general equilibrium; risk aversion and sharing, capital market theory, Nash equilibrium; welfare analysis; public choice; externalities and public goods; hidden information and market signaling; moral hazard and incentives; auction theory; game theory; oligopoly; reputation and credibility. Prerequisites: ECON 50 and MATH 51 or equiv.

Same as: PUBLPOL 301A.

**IPS 204B. Cost-Benefit Analysis and Evaluation. 4-5 Units.**

Relationship between microeconomic analysis and public policy making. Economic rationales for policy interventions. Economic models of politics and application to policy making. Relationship of income distribution to policy choice. Welfare evaluation of public and private decisions. Education policy, social security, and health care. Prerequisites: PUBLPOL 301A (for graduate students) or ECON 50, and 102B (for undergraduates).

Same as: PUBLPOL 301B.

**IPS 205. Introductory Statistics for Policy. 5 Units.**

Introduction to key elements of probability statistical analysis focusing on international and public policy relevant applications. Topics will include the algebra of events and probability, discrete and continuous random variables, exploratory data analysis and elements of mathematical statistics. The two lectures per week will be structured such that they will involve both theoretical and practical components. Students will be introduced to R statistical programming and LaTeX.

**IPS 206. Applied Statistics for Policy. 5 Units.****IPS 207. Governance, Corruption, and Development. 3-5 Units.**

The role of governance in the growth and development experience of countries with a focus on the economics of corruption. Topics covered: the concept and measurement of governance; theory and evidence on the impact of corruption on growth and development outcomes, including investment, financial flows, human capital accumulation, poverty and income inequality; the link between governance and financial crises with a focus on the recent global crisis; the cultural, economic, and political determinants of corruption; and policy implications for improving governance. Prerequisite: ECON 50.

**IPS 207A. Judgment and Decision Making. 4 Units.**

(Same as LAW 333.) Introduction to problem framing and problem solving. Theories and research on heuristics and biases in human inference, judgment, and decision making. Experimental and theoretical work in prospect theory emphasizing loss and risk aversion. Challenges that psychology offers to the rationalist expected utility model; attempts to meet this challenge through integration with modern behavioral economics. Decision making biases and phenomena of special relevance to public policy such as group polarization, group think, and collective action. Same as: PUBLPOL 305A.

**IPS 207B. Public Policy and Social Psychology: Implications and Applications. 4 Units.**

Theories, insights, and concerns of social psychology relevant to how people perceive issues, events, and each other, and links between beliefs and individual and collective behavior. Topics include: situationist and subjectivist traditions of applied and theoretical social psychology; social comparison, dissonance, and attribution theories; social identity, stereotyping, racism, and sources of intergroup conflict and misunderstanding; challenges to universality assumptions regarding human motivation, emotion, and perception of self and others; the problem of producing individual and collective changes in norms and behavior. Same as: PSYCH 216, PUBLPOL 305B.

**IPS 208. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors. Same as: ETHICSOC 171, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307.

**IPS 209. Practicum. 1-10 Units.**

Applied policy exercises in various fields. Multidisciplinary student teams apply skills to a contemporary problem in a major international policy exercise with a public sector client such as a government agency. Problem analysis, interaction with the client and experts, and presentations. Emphasis is on effective written and oral communication to lay audiences of recommendations based on policy analysis.

**IPS 209A. IPS Master's Thesis. 1-10 Units.**

For IPS M.A. students only (by petition). Regular meetings with thesis advisers required.

**IPS 210. The Politics of International Humanitarian Action. 3-5 Units.**

The relationship between humanitarianism and politics in international responses to civil conflicts and forced displacement. Focus is on policy dilemmas and choices, and the consequences of action or inaction. Case studies include northern Iraq (Kurdistan), Bosnia, Rwanda, Kosovo, and Darfur.

**IPS 211. The Transition from War to Peace: Peacebuilding Strategies. 3-5 Units.**

How to find sustainable solutions to intractable internal conflicts that lead to peace settlements. How institutions such as the UN, regional organizations, and international financial agencies attempt to support a peace process. Case studies include Bosnia, East Timor, Kosovo, Burundi, Liberia, and Afghanistan.

**IPS 213. International Mediation and Civil Wars. 3-5 Units.**

This graduate seminar will examine international mediation efforts to achieve negotiated settlements for civil wars over the last two decades. Contending approaches to explain the success or failure of international mediation efforts will be examined in a number of cases from Africa (Sudan, Sierra Leone, Burundi), the Balkans (Bosnia, Macedonia), and Asia (Cambodia, Indonesia/Aceh).

**IPS 215. Development Issues in South Asia. 5 Units.**

1) Study of socio-economic trends from independence up to the present time in South Asia. 2) The complex interactions between development, and political governance, national identity and socio-economic institutions. 3) Case studies of exemplary outcomes: the Kerala development experience, India's IT industry, Bangladesh's microfinance initiative and education in Sri Lanka. 4) Student assessment will be based on class presentation and paper.

Same as: INTNLREL 115.

**IPS 219. Intelligence and National Security. 3-4 Units.**

How intelligence supports U.S. national security and foreign policies. How it has been used by U.S. presidents to become what it is today; organizational strengths and weaknesses; how it is monitored and held accountable to the goals of a democratic society; and successes and failures. Current intelligence analyses and national intelligence estimates are produced in support of simulated policy deliberations.

**IPS 221. International Political Economy and International Organizations: Theory and Practice. 3-5 Units.**

What is the appropriate balance between government regulation and market freedom? Introduction to important theoretical and policy debates in international political economy. Topics include: political economy of trade; exchange rate policy; the liberalization of trade and finance; the global move to openness; development, debt and aid; and the role of international organizations. Discussion of application of academic insights to key policy debates, including whether governments should offset the welfare costs of globalization, whether the IMF and World Bank should be reformed to meet the needs of the 21st century, and how the international community should respond to financial crises. Students will research, write and orally present policy briefs on specific policy questions. Same as: POLISCI 214G.

**IPS 221A. Globalization and Its Discontents: An Introduction to International Political Economy. 3-5 Units.**

What is globalization? Its impacts on different countries and population including those that multilateral organizations such as the World Bank, International Monetary Fund, and World Trade Organization have on the economic policies of member states and the functioning of the global economy. Topics include: political economy of trade; exchange rate policy; the liberalization of trade and finance; the global move to openness; development, debt and aid; and the role of international organizations.

**IPS 222. Economic Development. 5 Units.**

General theories of economic development with focus on development policies. Topics include: agriculture, industrialization, role of financial development, income distribution, human resource development, international relations, and economic aid.

**IPS 230. Democracy, Development, and the Rule of Law. 5 Units.**

Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts. Same as: INTNLREL 114D, POLISCI 114D, POLISCI 314D.

**IPS 234. Religion and Multiculturalism. 3 Units.**

Multiculturalism has become a major theory supporting religious accommodations for minority groups. However, such accommodations can give rise to a number of problems, especially if the accommodated group adheres to norms that are illiberal in nature. Exploration of the different justifications for accommodating religious groups from the point of view of multicultural theory. Discussion of the different problems that such accommodations might generate and identify potential solutions. Examination of issues from the point of view of both Western liberal democracies and nation states. Special emphasis will be given to the Israeli millet system.

**IPS 235. From Innovation to Implementation: How Government Can Develop and Apply New Ideas. 3-5 Units.**

What are the barriers to reform and innovative thinking in government? What are the factors that need to be taken into account when implementing change? What are the bureaucratic structures and power relationships that policy-makers must understand and navigate in order to embed reform? The aim of this seminar is to give students a detailed understanding of how political change happens and an understanding of why it often doesn't. Using cases studies from successful and unsuccessful reform programs around the world, this course will expose students to innovations in key public sector issue areas including education, healthcare, well-being, and government transparency and accountability; provides a sense of what's it's like actually trying to make change happen in a government context, and will equip students with the skills and understanding to be able to make change happen in a government setting.  
Same as: PUBLPOL 235.

**IPS 241. International Security in a Changing World. 5 Units.**

This class surveys the most pressing international security issues facing the world today and includes an award-winning two-day international crisis simulation led by Stanford faculty and former policymakers. Guest lecturers have included former Secretary of Defense William Perry, former U.S. Ambassador to Afghanistan Gen. Karl Eikenberry, and former Secretary of State Condoleezza Rice. Major topics covered: cyber security, nuclear proliferation, insurgency and intervention, terrorism, the Arab Spring, and the future of U.S. leadership in the world. No prior background in international relations is necessary.  
Same as: POLISCI 114S.

**IPS 244. U.S. Policy toward Northeast Asia. 5 Units.**

Case study approach to the study of contemporary U.S. policy towards Japan, Korea, and China. Historical evolution of U.S. foreign policy and the impact of issues such as democratization, human rights, trade, security relations, military modernization, and rising nationalism on U.S. policy. Case studies include U.S.-Japan trade tensions, anti-Americanism in Korea, and cross-straits relations between China and Taiwan.

**IPS 245. An Introduction to Theories of Authoritarian Resilience and Vulnerability. 3-5 Units.**

The Arab spring demonstrated that even long-standing authoritarian regimes may be vulnerable to sudden collapse. Introduction to theories of authoritarian vulnerability and resilience. Why are some autocrats more or less durable in the face of challenges to their rule? Exploration of theories rooted in regime type, resources, state capacity, parties, popular protest, and leadership. The second part of the course will then explore the utility of competing approaches through close examinations of regime crises in Ethiopia in 1974, Iran in 1978 and China in 1989.

**IPS 246. China on the World Stage. 3-5 Units.**

China's reemergence as a global player is transforming both China and the international system. Other nations view China's rise with a mixture of admiration, anxiety, and opportunism. Some welcome China's rise as a potential counterweight to US preeminence; others fear the potential consequences of Sino-American rivalry and erosion of the US-led international system that has fostered unprecedented peace and prosperity. This course provides an overview of China's engagement with countries in all regions and on a wide range of issues since it launched the policy of opening and reform in 1978. The goal is to provide a broad overview and systematic comparisons across regions and issues, and to examine how China's global engagement has changed over time.

**IPS 250. International Conflict: Management and Resolution. 3 Units.**

(Same as LAW 656) Interdisciplinary. Theoretical insights and practical experience in resolving inter-group and international conflicts. Sources include social psychology, political science, game theory, and international law. Personal, strategic, and structural barriers to solutions. How to develop a vision of a mutually bearable shared future, trust in the enemy, and acceptance of loss that a negotiated settlement may produce. Spoilers who seek to sabotage agreements. Advantages and disadvantages of unilateral versus reciprocal measures. Themes from the Stanford Center of International Conflict and Negotiation (SCICN). Prerequisite for undergraduates: consent of instructor.  
Same as: PSYCH 383.

**IPS 263. Energy and Climate Cooperation in the Western Hemisphere. 4 Units.**

Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.  
Same as: EARTHSYS 132, EARTHSYS 232, INTNLREL 146A.

**IPS 264. Behind the Headlines: An Introduction to Contemporary South Asia. 3-5 Units.**

Introduction to South Asia. Analyzes historical forces that shaped the region, recent history and current state of key countries: the economic and political rise of India; rise of the Taliban and Al Qaeda in Afghanistan; Pakistan's government, military, and mullahs; and China's impact on the region. Explores U.S. policy in depth: U.S. intervention in- and upcoming withdrawal from - Afghanistan, U.S. relations with Pakistan and its policy shift toward India, with implications for the strategic balance in Asia. Satisfies the IPS policy writing requirement.

**IPS 270. The Geopolitics of Energy. 3-5 Units.**

This course examines how the interplay of political, economic, and technological forces may reshape future energy production and consumption. Building upon international political economy theory, we will address questions such as: What policies are energy importers pursuing to ensure reliable, plentiful and cheap energy supply? What are the socioeconomic and political challenges and strategic options energy exporters face? How can technological breakthroughs in alternative energy and carbon policies affect the distribution of power between traditional energy exporters and importers?.

**IPS 271. Sanela Diana Jenkins International Human Rights Colloquium. 1 Unitss.**

This one-unit seminar will comprise 10 international and domestic human rights scholars, judges and activists who have made significant contributions to international justice, the International Criminal Court (ICC) and the ad hoc tribunals (the ICTY and the ICTY) and hybrid tribunals (those in Sierra Leone, Cambodia and East Timor). We will examine the pros and the cons of the international criminal justice system, and its less formal cousins such as truth and reconciliation commissions and Gacaca. It is open to all Stanford undergraduate and graduate students. Course requirements are attendance, participation, and assignments through commentaries and reflections posted on the Program on Human Rights FB page.

Same as: INTNLREL 110, POLISCI 204, POLISCI 304.

**IPS 280. Transitional Justice, International Criminal Tribunals, and the International Criminal Court. 3-5 Units.**

Historical backdrop of the Nuremberg and Tokyo Tribunals. The creation and operation of the Yugoslav and Rwanda Tribunals (ICTY and ICTR). The development of hybrid tribunals in East Timor, Sierra Leone, and Cambodia, including evaluation of their success in addressing perceived shortcomings of the ICTY and ICTR. Examination of the role of the International Criminal Court and the extent to which it will succeed in supplanting all other ad hoc international justice mechanisms and fulfill its goals. Analysis focuses on the politics of creating such courts, their interaction with the states in which the conflicts took place, the process of establishing prosecutorial priorities, the body of law they have produced, and their effectiveness in addressing the needs of victims in post-conflict societies.

Same as: ETHICSOC 280, INTNLREL 180A.

**IPS 298. Practical Training. 1-3 Units.**

Students obtain internship in a relevant research or industrial activity to enhance their professional experience consistent with their degree program and area of concentration. Prior to enrolling students must get internship approved by associate director. At the end of the quarter, a three page final report must be supplied documenting work done and relevance to degree program. Meets the requirements for Curricular Practical Training for students on F-1 visas. Student is responsible for arranging own internship. Limited to International Policy Studies students only. May be repeated for credit.

**IPS 299. Directed Reading. 1-5 Units.**

IPS students only. May be repeated for credit.

**IPS 300. Issues in International Policy Studies. 1 Unitss.**

Presentations of techniques and applications of international policy analysis by students, faculty, and guests, including policy analysis practitioners.

**IPS 314S. Decision Making in U.S. Foreign Policy. 5 Units.**

Priority to IPS students. Formal and informal processes involved in U.S. foreign policy decision making. The formation, conduct, and implementation of policy, emphasizing the role of the President and executive branch agencies. Theoretical and analytical perspectives; case studies.

Same as: POLISCI 314S.

**IPS 802. TGR Dissertation. 0 Unit.****INTNLREL 61Q. Food and security. 3 Units.**

The course will provide a broad overview of key policy issues concerning agricultural development and food security, and will assess how global governance is addressing the problem of food security. At the same time the course will provide an overview of the field of international security, and examine how governments and international institutions are beginning to include food in discussions of security.

Same as: EARTHYSYS 61Q, EESS 61Q.

**INTNLREL 71Q. Aesthetics of Dissent: the Case of Islamic Iran. 2 Units.**

Censorship, Borges tells us, is the mother of metaphors. The Islamic regime in Iran censors all aesthetic production in the country. But Iranian dissident artists, from film-makers and fiction writers to composers in a thriving under-ground musical scene, have cleverly found ways to fight these draconian measures. They have developed an impressive body of work that is as sophisticated in style as it is rich in its discourse of democracy and dissent. The purpose of the seminar is to understand the aesthetic tropes of dissent in Iran, and the social and theological roots of rules of censorship. Masterpieces of post-revolutionary film, fiction, and music will be discussed in the context of tumultuous history of dissent in Islamic Iran.

Same as: COMPLIT 40Q.

**INTNLREL 102. The History of the International System since 1914. 5 Units.**

After defining the characteristics of the international system at the beginning of the twentieth century, this course reviews the primary developments in its functioning in the century that followed. Topics include the major wars and peace settlements; the emergence of Nazism and Communism; the development of the Cold War and nuclear weapons; the rise of China, India, and the EU; and the impact of Islamic terrorism. The role of international institutions and international society will also be a focus as will the challenge of environment, health, poverty, and climate issues to the functioning of the system.

Same as: HISTORY 102.

**INTNLREL 110. Sanela Diana Jenkins International Human Rights Colloquium. 1 Unitss.**

This one-unit seminar will comprise 10 international and domestic human rights scholars, judges and activists who have made significant contributions to international justice, the International Criminal Court (ICC) and the ad hoc tribunals (the ICTY and the ICTY) and hybrid tribunals (those in Sierra Leone, Cambodia and East Timor). We will examine the pros and the cons of the international criminal justice system, and its less formal cousins such as truth and reconciliation commissions and Gacaca. It is open to all Stanford undergraduate and graduate students. Course requirements are attendance, participation, and assignments through commentaries and reflections posted on the Program on Human Rights FB page.

Same as: IPS 271, POLISCI 204, POLISCI 304.

**INTNLREL 110C. America and the World Economy. 5 Units.**

Examination of contemporary US foreign economic policy. Areas studied: the changing role of the dollar; mechanism of international monetary management; recent crises in world markets including those in Europe and Asia; role of IMF, World Bank and WTO in stabilizing world economy; trade politics and policies; the effects of the globalization of business on future US prosperity. Enroll in PoliSci 110C for WIM credit.

Same as: POLISCI 110C, POLISCI 110X.

**INTNLREL 110D. War and Peace in American Foreign Policy. 5 Units.**

(Students not taking this course for WIM, register for 110Y.) The causes of war in American foreign policy. Issues: international and domestic sources of war and peace; war and the American political system; war, intervention, and peace making in the post-Cold War period.

Same as: POLISCI 110D, POLISCI 110Y.

## International Relations Courses

**INTNLREL 1. Introduction to International Relations. 5 Units.**

Approaches to the study of conflict and cooperation in world affairs. Applications to war, terrorism, trade policy, the environment, and world poverty. Debates about the ethics of war and the global distribution of wealth.

Same as: POLISCI 1.

**INTNLREL 114D. Democracy, Development, and the Rule of Law. 5 Units.**

Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts. Same as: IPS 230, POLISCI 114D, POLISCI 314D.

**INTNLREL 115. Development Issues in South Asia. 5 Units.**

1) Study of socio-economic trends from independence up to the present time in South Asia. 2) The complex interactions between development, and political governance, national identity and socio-economic institutions. 3) Case studies of exemplary outcomes: the Kerala development experience, India's IT industry. Bangladesh's microfinance initiative and education in Sri Lanka. 4) Student assessment will be based on class presentation and paper.

Same as: IPS 215.

**INTNLREL 122A. The Political Economy of the European Union. 5 Units.**

EU institutions, the legislative process, policies, relations with the U.S., and enlargement and the future of the EU. History and theories of EU integration. Democratic accountability of the institutions, and the emerging party system. Principal policies in agriculture, regional development, the internal market, single currency, and competition. Emphasis is on policies that affect the relations with the U.S. including trade and security. Results of the EU's constitutional convention.

**INTNLREL 123. The Future of the European Union: Challenges and Opportunities. 5 Units.**

First, this course analyzes the EU's greatest challenge, preserving the monetary union, and discusses the political and economic reforms needed to achieve that goal. In this context the course also studies the fiscal and budgetary policies of the EU. Second, the course discusses the EU's role in global politics, its desire to play a more prominent role, and the ways to reach that objective. Third, the course analyzes the EU's institutional challenges in its efforts to enhance its democratic character.

**INTNLREL 128B. International Problem-Solving Through NGOs: Policy, Players, Strategies, and Ethics. 2 Units.**

This course will focus on advanced international problem-solving through the lens of international NGOs, while integrating other relevant players that address global issues within a lens of ethics and accountability. Particular aspects of NGOs that will be assessed are: policy, business, strategy, and engagement with other players. Students will consider the major issues that international NGOs face in their effort to effect positive change in an increasingly complex global environment. The course draws heavily on a series of sophisticated case studies involving a variety of NGOs, areas of specialization, and geographic regions. Topics may include: poverty and famine; the natural resources curse; terrorism; HIV/Aids and other epidemics and neglected diseases; natural disasters and emergencies; climate change; and contagion of unethical behavior. A final project tailored to each student's interest will be in lieu of a final exam. Students will have the opportunity to work with several internationally prominent guests. Same as: PUBLPOL 128, PUBLPOL 228.

**INTNLREL 136R. Introduction to Global Justice. 5 Units.**

Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

Same as: ETHICSOC 136R, PHIL 76, POLISCI 136R, POLISCI 336.

**INTNLREL 140A. International Law and International Relations. 5 Units.**

What is the character of international legal rules? Do they matter in international politics, and if so, to what degree? The foundational theories, principles, and sources of public international law. Prominent theories of international relations and how they address the role of law in international politics. Practical problems such as human rights, humanitarian intervention, and enforcement of criminal law. International law as a dynamic set of rules, at times influenced by power, at other times constraining it, but always essential to studying international relations.

**INTNLREL 140C. The U.S., U.N. Peacekeeping, and Humanitarian War. 5 Units.**

The involvement of U.S. and the UN in major wars and international interventions since the 1991 Gulf War. The UN Charter's provisions on the use of force, the origins and evolution of peacekeeping, the reasons for the breakthrough to peacemaking and peace enforcement in the 90s, and the ongoing debates over the legality and wisdom of humanitarian intervention. Case studies include Croatia and Bosnia, Somalia, Rwanda, Kosovo, East Timor, and Afghanistan.

**INTNLREL 141A. Camera as Witness: International Human Rights Documentaries. 5 Units.**

Rarely screened documentary films, focusing on global problems, human rights issues, and aesthetic challenges in making documentaries on international topics. Meetings with filmmakers.

**INTNLREL 142. Challenging the Status Quo: Social Entrepreneurs Advancing Democracy, Development and Justice. 5 Units.**

This seminar is part of a broader program on Social Entrepreneurship at CDDRL. It will use practice to better inform theory. Working with four visiting social entrepreneurs from developing and developed country contexts students will use case studies of successful and failed social change strategies to explore relationships between social entrepreneurship, gender, democracy, development and justice. It interrogates current definitions of democracy and development and explores how they can become more inclusive of marginalized populations. Limited enrollment. To be considered for enrollment in this course, please complete the application posted on the International Relations website by March 31 or email manan@stanford.edu or feghali@stanford.edu to access the application form.. Prerequisite : INTNLREL 114D.

**INTNLREL 144. NEW GLOBAL HUMAN RIGHTS. 3 Units.**

Examination of emerging trends in international human rights with an analysis of new categories of human rights victims, human rights actors, and human rights technologies.

**INTNLREL 145. Genocide and Humanitarian Intervention. 1 Unitss.**

The course, a colloquium, traces the history of genocide in the 20th century and the question of humanitarian intervention to stop it, a topic that has been especially controversial since the end of the Cold War. The pre-1990s discussion begins with the Armenian genocide during the First World War and includes the Holocaust and Cambodia under the Khmer Rouge in the 1970s. Coverage of genocide and humanitarian intervention since the 1990s includes the wars in Bosnia, Rwanda, Kosovo, the Congo, and Sudan. The final session of the course will be devoted to a discussion of the International Criminal Court and the separate criminal tribunals that have been tasked with investigating and punishing the perpetrators of genocide.

**INTNLREL 146A. Energy and Climate Cooperation in the Western Hemisphere. 4 Units.**

Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

Same as: EARTHSYS 132, EARTHSYS 232, IPS 263.

**INTNLREL 149. The Economics and Political Economy of the Multilateral Trade System. 5 Units.**

The historical development of the multilateral trade system, the current agenda of the World Trade Organization, and prospects for trade liberalization. Emphasis is on the economic rationale for multilateral trade rules, the political problems facing countries in supporting further liberalization, and the challenges to the legitimacy of WTO procedures and practices. Issues include the greater participation of developing countries, the impact of new members, and the relationship between the WTO and other multilateral bodies. Guest speakers; student research paper presentations.

**INTNLREL 151. Decoding the Arab Spring and the Future of the Middle East. 5 Units.**

The seminar will focus on events of the Arab Spring and the future of the Middle East under new political players. The course will explore themes such as: the issues that forged the identity of the Arab Spring; common features among the Arab Spring countries; mechanisms of street protests against police states, history and current relationship between the military and new political powers; differences and similarities between secularists and Islamists towards public policy; why the Islamists are winning in public polls; scenarios for the region and some countries under new constitutions and parties.

**INTNLREL 154. The Cold War: An International History. 5 Units.**

Though it ended twenty years ago, we still live in a world shaped by the Cold War. Beginning with its origins in the mid-1940s, this course will trace the evolution of the global struggle, until its culmination at the end of the 1980s. Students will be asked to ponder the fundamental nature of the Cold War, what kept it alive for nearly fifty years, how it ended, and its long term legacy for the world.

Same as: HISTORY 266C.

**INTNLREL 168. America as a World Power: U.S. Foreign Relations, 1914 to Present. 5 Units.**

This course will examine the modern history of American foreign relations, from 1914 to the present. Beginning with the fateful decision to intervene in the First World War, it will examine the major crises and choices that have defined the *“American Century.”* Our study of U.S. foreign relations will consider such key factors as geopolitics, domestic politics, bureaucracy, psychology, race, and culture. Students will be expected to undertake their own substantial examination of a critical episode in the era studied.

Same as: HISTORY 252K.

**INTNLREL 173. Presidents and Foreign Policy in Modern History. 5 Units.**

Nothing better illustrates the evolution of the modern presidency than the arena of foreign policy. This class will examine the changing role and choices of successive presidential administrations over the past century, examining such factors as geopolitics, domestic politics, the bureaucracy, ideology, psychology, and culture. Students will be encouraged to think historically about the institution of the presidency, while examining specific case studies, from the First World War to the conflicts of the 21st century.

Same as: HISTORY 261G.

**INTNLREL 180A. Transitional Justice, International Criminal Tribunals, and the International Criminal Court. 3-5 Units.**

Historical backdrop of the Nuremberg and Tokyo Tribunals. The creation and operation of the Yugoslav and Rwanda Tribunals (ICTY and ICTR). The development of hybrid tribunals in East Timor, Sierra Leone, and Cambodia, including evaluation of their success in addressing perceived shortcomings of the ICTY and ICTR. Examination of the role of the International Criminal Court and the extent to which it will succeed in supplanting all other ad hoc international justice mechanisms and fulfill its goals. Analysis focuses on the politics of creating such courts, their interaction with the states in which the conflicts took place, the process of establishing prosecutorial priorities, the body of law they have produced, and their effectiveness in addressing the needs of victims in post-conflict societies.

Same as: ETHICSOC 280, IPS 280.

**INTNLREL 191. IR Journal. 1 Unitss.**

(Staff).

**INTNLREL 197. Directed Reading in International Relations. 1-5 Units.**

Open only to declared International Relations majors. (Staff).

**INTNLREL 198. Senior Thesis. 2-10 Units.**

Open only to declared International Relations majors with approved senior thesis proposals.

**INTNLREL 200A. International Relations Honors Field Research. 3 Units.**

For juniors planning to write an honors thesis during senior year. Initial steps to prepare for independent research. Professional tools for conceptualizing a research agenda and developing a research strategy. Preparation for field research through skills such as data management and statistics, references and library searches, and fellowship and grant writing. Creating a work schedule for the summer break and first steps in writing. Prerequisite: acceptance to IR honors program.

**INTNLREL 200B. International Relations Honors Seminar. 3 Units.**

Second of two-part sequence. For seniors working on their honors theses. Professional tools, analysis of research findings, and initial steps in writing of thesis. How to write a literature review, formulate a chapter structure, and set a timeline and work schedule for the senior year. Skills such as data analysis and presentation, and writing strategies. Prerequisites: acceptance to IR honors program, and 199 or 200A.

**INTNLREL 206. Palestinian Nationalism, Past and Present. 5 Units.**

The Palestinian national movement and its role in the Arab-Israeli conflict. The roots of the movement in the Ottoman Empire, its growth through the British Mandate, the 1948 and 1967 wars, the Intifada, and the Israeli-Palestinian peace process. Emphasis is on components which contributed to or delayed the growth of a distinct Palestinian identity, including Zionism.

**INTNLREL 207. Tribe, State, and Society in the Modern Middle East. 5 Units.**

The staying power of tribal identities and values in the Middle East. Examples include the Iraqi Sunni tribal insurgency against the U.S. The role of tribes in the formation of Middle Eastern states and how tribal values continue to impact social, political, and economic issues today.

## Introduction to the Humanities Courses

## Italian General Courses

# Italian Language Courses

## **ITALLANG 1. First-Year Italian, First Quarter. 5 Units.**

All-in-Italian communicative and interactive approach. Emphasis is on the development of appropriate discourse in contemporary cultural contexts. Interpretation of authentic materials, written and oral presentations, and plenty of conversational practice. Language lab, multimedia, and online activities.

## **ITALLANG 1A. Accelerated First-Year Italian, Part 1. 5 Units.**

Accelerated sequence that completes first-year Italian in two rather than three quarters. For students with previous knowledge of Italian or with a strong background in another Romance language. Prerequisite: advanced-level proficiency in another Romance language Prerequisite: Placement Test or consent of instructor.

## **ITALLANG 2. First-Year Italian, Second Quarter. 5 Units.**

Continuation of ITALLANG 1. All-in-Italian communicative and interactive approach. Emphasis is on the development of appropriate discourse in contemporary cultural contexts. Interpretation of authentic materials, written and oral presentations, and plenty of conversational practice. Language lab, multimedia, and online activities. Prerequisite: Placement Test, ITALLANG 2 or consent of instructor.

## **ITALLANG 2A. Accelerated First-Year Italian, Part 2. 5 Units.**

Continuation of ITALLANG 1A. Accelerated sequence that completes first-year Italian in two rather than three quarters. For students with previous knowledge of Italian or with a strong background in another Romance language. Prerequisite: Placement Test, ITALLANG 1A or consent of instructor. Fulfills the University language requirement.

## **ITALLANG 3. First-Year Italian, Third Quarter. 5 Units.**

Continuation of ITALLANG 2. All-in-Italian communicative and interactive approach. Emphasis is on the development of appropriate discourse in contemporary cultural contexts. Interpretation of authentic materials, written and oral presentations, and plenty of conversational practice. Language lab, multimedia, and online activities. Prerequisite: Placement Test, ITALLANG 2 or consent of instructor. Fulfills the University language requirement.

## **ITALLANG 5A. Intensive First-Year Italian, Part A. 5 Units.**

Same as ITALLANG 1. Accelerated. Covers 1 quarter of Italian. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials. Only Stanford graduate students restricted to 9 units may register for 205A,B,C.

## **ITALLANG 5B. Intensive First-Year Italian, Part B. 5 Units.**

Same as ITALLANG 2. Continuation of 5A. Accelerated. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials. Only Stanford graduate students restricted to 9 units may register for 205A,B,C. Prerequisite 1 or 5A.

## **ITALLANG 5C. Intensive First-Year Italian, Part C. 5 Units.**

Same as ITALLANG 3. Continuation of 5B. Accelerated. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials. Only Stanford graduate students restricted to 9 units may register for 205A,B,C. Prerequisite 2 or 5B. Fulfills the University language requirement.

## **ITALLANG 15S. Intermediate Italian Oral Conversation. 3 Units.**

May be repeated once for credit.

## **ITALLANG 20. Intermediate Oral Communication: Italy Today. 3 Units.**

Second-year conversational and presentational skills developed through exposure to based on movie clips, slide shows, and other authentic multimedia materials. Guest lectures on Italian culture including opera, pop music, wine, and food culture. Preview of the Florentine experience with Florence returnees sharing their experiences in Italy. Prerequisite: ITALLANG 2A, ITALLANG 3 or consent of instructor. Repeatable for credit twice.

## **ITALLANG 21. Second Year Italian, First Quarter. 3-4 Units.**

Continuation of 3. Second-Year Italian, First Quarter - Sequence integrating culture and language in the development of socioculturally appropriate discourse. Authentic materials include news and film clips, video and audio files, and short stories. Reading, writing, listening, and speaking competence based on cross cultural understanding. Prerequisite: Placement Test, ITALLANG 3 or consent of instructor.

## **ITALLANG 21A. Accelerated Second-Year Italian, Part 1. 4-5 Units.**

Continuation of ITALLANG 2A. For students going to Florence. Completes second-year sequence in two rather than three quarters. Prerequisite: placement test, ITALLANG 2A, ITALLANG 3 or consent of instructor.

## **ITALLANG 22. Second-Year Italian, Second Quarter. 3-4 Units.**

Continuation of ITALLANG 21. Sequence integrating culture and language in the development of socioculturally appropriate discourse. Authentic materials include news and film clips, video and audio files, and excerpts from short stories. Reading, writing, listening, and speaking competence based on cross-cultural understanding. Prerequisite: Placement Test, ITALLANG 21 or equivalent or consent of instructor.

## **ITALLANG 22A. Accelerated Second-Year Italian, Part 2. 4-5 Units.**

Continuation of ITALLANG 21A or OSPFLOR 21F (for Florence returnees). Part A of a second-year sequence in two rather than three quarters. Satisfies the foreign language requirement for International Relations majors. Prerequisite: Placement Test, ITALLANG 21A or OSPFLOR 21F.

## **ITALLANG 23. Second-Year Italian, Third Quarter. 3-4 Units.**

Continuation of ITALLANG 22. Sequence integrating culture and language in the development of socioculturally appropriate discourse. Authentic materials include news and film clips, video and audio files, and short stories. Reading, writing, listening, and speaking competence based on cross cultural understanding. Prerequisite: Placement Test, ITALLANG 22 or equivalent. Satisfies the foreign language requirement for International Relations majors.

## **ITALLANG 99. Language Specials. 1-5 Units.**

Prerequisite: consent of instructor.

## **ITALLANG 102. Advanced Oral Communication: Modern Cinema. 3 Units.**

For Florence returnees or those who have completed second-year Italian. Use of movie sequences by Italian film directors such as Benigni, Moretti, Salvatores, Soldini, and Tornatore to improve communication skills and review language functions. Emphasis is on presentation, conversation, and debate. Prerequisite: placement test, 101 or consent of instructor.

## **ITALLANG 103. Advanced Oral Communication: Italian Classic Cinema. 3 Units.**

For Florence returnees or those who have completed second-year Italian. Use of classical movie sequences by Italian film directors such as Antonioni, De Sica, Fellini, Rossellini, and Visconti to improve communication skills and review language functions. Emphasis is on presentation, conversation, and debate. Prerequisite: second-year Italian or consent of instructor.

**ITALLANG 113. Italian Cultural Studies. 3-4 Units.**

Literary texts, news reports, comic books, film reviews, music lyrics, and sociological surveys used to examine Italy's language, culture, and society today. Advanced grammatical analysis and reading comprehension. Prerequisite: second-year Italian or equivalent.

**ITALLANG 114. Advanced Stylistics and Composition. 3-4 Units.**

Goal is advanced proficiency in written Italian. Textual and grammatical analysis of literary and non-literary texts, oral reports, translations, and writing assignments. Prerequisite: Placement Test, second-year Italian or equivalent.

**ITALLANG 115. Academic and Creative Writing. 3-4 Units.**

Continuation of 114. Academic prose: formal structures and academic terminology. Creative prose: short stories, expressive language, and when and how to break the rules for effect. Prerequisite: second-year Italian or equivalent.

**ITALLANG 126. Italy and Italians Today. 2 Units.**

May be repeated for credit.

**ITALLANG 205A. Intensive First-Year Italian for Stanford Grads, Part A. 3-5 Units.**

Same as ITALLANG 5A. Accelerated. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials. Only Stanford graduate students restricted to 9 units may register for 205A,B,C or 2 of the courses for a total of 9 units.

**ITALLANG 205B. Intensive First-Year Italian for Stanford Grads, Part B. 3-5 Units.**

Same as ITALLANG 5B. Accelerated. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials. Only Stanford graduate students restricted to 9 units may register for 205A,B,C or 2 of the courses for a total of 9 units Prerequisite 205A or equivalent.

**ITALLANG 205C. Intensive First-Year Italian for Stanford Grads, Part C. 3-5 Units.**

Same as ITALLANG 5C. Accelerated. Emphasis is on the development of authentic discourse. Online activities, conversational practice, and interpretation and production of oral and written materials. Only Stanford graduate students restricted to 9 units may register for 205A,B,C or 2 of the courses for a total of 9 units Prerequisite 205B or equivalent.

**ITALLANG 250. Reading Italian. 4 Units.**

For seniors or graduate students seeking to meet the University reading requirement for advanced degrees. Reading strategies for comprehension of secondary literature for academic research. Fulfills the University foreign language requirement for advanced degrees if student earns a grade of 'B.' Prerequisite: one year of Italian or reading proficiency in another Romance language.

**ITALLANG 394. Graduate Studies in Italian Conversation. 1-3 Units.**

Prerequisite: consent of instructor. (Staff).

**ITALLANG 395. Graduate Studies in Italian. 2-5 Units.**

Prerequisite: consent of instructor. (Staff).

## Italian Literature Courses

## Italian Literature Courses

**ITALIAN 41N. Imagining Italy. 3 Units.**

Preference to freshmen. To the English and American literary imagination, Italy has long been a source of fascination. During the past hundred years, writers from Nathaniel Hawthorne to Frances Mayes have explored the broad range of contradictory resonances of the Italian setting, in fiction, travel essays, and memoirs. While some writers have celebrated the sensuality of Italian culture and landscape, others have imagined Italy as a more dangerous place -- as dangerous as the erotic love with which it is often identified. The range of literary responses to Italy by writers in English during the past hundred years will be examined, and the ways in which our culture has continued to construct myths of Italy will be explored. We will also see how these myths have been transformed into commodities in today's consumer culture, making "Italy" one of the most profitable fictions in the marketplace. Taught in English.

**ITALIAN 120. Love Italian Style. 4 Units.**

Gateway course for Italian studies. An examination of representations of love and sexuality in Italian literature, art, film, and popular culture from the Italian Renaissance to the current period. Beginning with the figure of Silvio Berlusconi and ending with Dante's love for Beatrice, the course considers differences in social practices and mores over time, the role of literary and artistic representations in establishing cultural expectations about love, the question of gender roles and identity in Italian society, as well as contemporary stereotypes about love in Italy and Italians in love. Taught in Italian. Prerequisites: ITALLANG 22A or equivalent.

**ITALIAN 127. Inventing Italian Literature: Dante, Boccaccio, Petrarca. 4 Units.**

The origins of Italian literature. Poetry such as 13th-century love lyrics, Dante's Vita Nuova and Petrarca's Canzoniere; prose such as stories from Boccaccio's Decameron. Taught in Italian. Prerequisites: ITALLANG 22A or equivalent.

**ITALIAN 128. The Italian Renaissance and the Path to Modernity. 4 Units.**

The literature, art, and history of the Renaissance and beyond. Readings from the 15th through 18th centuries include Moderata Fonte, Machiavelli, Ariosto, Tasso, Galileo, and Goldoni. Taught in Italian. Prerequisites: ITALLANG 22A or equivalent (2 years of Italian).

**ITALIAN 129. Modern Italian History and Literature. 4 Units.**

The history of the Italian nation and national literary identity in the 19th and 20th centuries. The relationship between literary texts and their historical context from the Risorgimento to the Resistance. Focus is on the romantic lyric, futurism, fascism, and the changing status of women. Authors include Foscolo, Leopardi, D'Annunzio, Aleramo, Marinetti, Pirandello, Ungaretti, and Montale. Prerequisite: ITALLANG 22A or equivalent. Taught in Italian.

**ITALIAN 133. Desire and Deviance in Italian Cinema. 3-5 Units.**

Survey of Italian films from neorealism to the present day with an emphasis on sexuality, desire and transgression. Taught in English; films in Italian with English subtitles; readings in English. Mandatory evening film screenings.

**ITALIAN 136. Literature and Politics - Two Mediterranean Cases: Catalonia and Italy. 3-5 Units.**

A comparison between the different roles played by writers as members of the intellectual establishment in Catalonia, Spain and Italy. Focus on the relation between intellectuals and politics in shaping national identity. We will give especially consideration to the role played by intellectuals during the Fascist and Francoist dictatorships and during Spain's transition to democracy. Taught in English. Same as: ILAC 122.



**ITALIAN 154. Film & Philosophy. 4 Units.**

Issues of freedom, morality, faith, knowledge, personal identity, and the value of truth explored through film; philosophical investigation of the filmic medium itself. Screenings to include *Twelve Monkeys* (Gilliam), *Ordet* (Dreyer), *The Dark Knight* (Nolan), *Vicky Cristina Barcelona* (Allen), and *Eternal Sunshine of the Spotless Mind* (Kaufman). Taught in English.

Same as: COMPLIT 154A, FRENCH 154, PHIL 193C, PHIL 293C.

**ITALIAN 155. The Mafia in Society, Film, and Fiction. 4 Units.**

The mafia has become a global problem through its infiltration of international business, and its model of organized crime has spread all over the world from its origins in Sicily. At the same time, film and fiction remain fascinated by a romantic, heroic vision of the mafia. Compares both Italian and American fantasies of the Mafia to its history and impact on Italian and global culture. Taught in English.

**ITALIAN 166. Women's Voices in Contemporary Italian Literature. 3-5 Units.**

The traditional canon of Italian literature consists almost exclusively of male authors. Yet Italian women writers have been active since the time of Dante. This presents an overview of women's prose fiction of the last 100 years, from Sibilla Aleramo's groundbreaking feminist novel *\*Una donna\** (1906) to novels from the 80's and 90's. We will examine such issues as the central issue of sexual violence in many female autobiographies; the experience of motherhood; the conflict between maternal love and the desire for self-determination and autonomy; paths to political awareness; reinventing the historical novel. Taught in English.

Same as: ITALIAN 366.

**ITALIAN 181. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track; majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English.

Same as: CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENCH 181, GERMAN 181, PHIL 81, SLAVIC 181.

**ITALIAN 199. Individual Work. 1-12 Units.****ITALIAN 220. Early Modern Seminar. 3-5 Units.**

Explores some of the key texts of European early modernity and the critical paradigms according to which the idea of the "Renaissance" has been formed, analyzed, and questioned since the 19th century. Will aim to provide a broad introduction to Early Modern studies from the point of view of the Italian Renaissance and its reception in different European contexts. Taught in English.

Same as: DLCL 323.

**ITALIAN 226. Modern Italian Poetry and Ultimate Questions. 3-5 Units.**

More than in any other tradition, Italian poets of the twentieth century focus on "ultimate questions," and look all the way back to Dante in doing so: why do we die? is there a God? what does it mean to love? are we responsible for our neighbors? is beauty related to truth? what do we learn from the past? what makes life meaningful? Poets include Ungaretti, Montale, Caproni, Sereni, Rosselli, Pasolini, Luzi, Merini, and Zanzotto. Taught in Italian. Prerequisites: Second-year Italian minimum.

**ITALIAN 228. Science, Technology, and Society in the Face of the Looming Disaster. 3-5 Units.**

The major topic will be the indeterminacy regarding the survival of humankind. With the advent of the atomic bomb humankind became potentially the maker of its own demise. Will combine a number of significant case studies (environmental disasters, industrial catastrophes, threat of nuclear devastation, technological risks) with the lessons drawn from a form of literature that is at the intersection of STS and the Humanities, in particular the early warnings made by such thinkers as Ivan Illich, Martin Heidegger, Hans Jonas, Günther Anders, and Hannah Arendt. Same as: FRENCH 228, POLISCI 233F.

**ITALIAN 234. Courtly Love: Deceit and Desire in the Middle Ages. 3-5 Units.**

A comparative seminar on medieval love books and their reception. We will examine and question the notion of "amour courtois," which arose in the lyrics and romances of medieval France and was codified in Romantic-era criticism. Primary readings will be enriched by thinking about this notion through the lens of modern theories of desire, such as those of Girard, Lacan, and Zizek. Conducted in English with readings in translation. Same as: COMPLIT 221A, FRENCH 234.

**ITALIAN 247. Shakespeare and Italy. 3-5 Units.**

Focus on Italy's presence in Shakespeare's corpus; his use of Italian literary sources, and the Italian settings of some of his plays. It will also look at the reception of Shakespeare in Italy, especially in Italian opera and film. Readings will include Petrarch, Boccaccio, Bandello and Machiavelli; Shakespeare's sonnets and some of his major plays that are set in Italy. We will also discuss Verdi's opera, *Otello*, and Zeffirelli's movie *Romeo and Juliette*, among others Italian renditions of Shakespeare's plays. Taught in English.

**ITALIAN 251. Writing, Memory, and Self-Fashioning. 3-5 Units.**

Writing is not a mere recording of the past, but a selection and reinvention of our experiences. We will look at how writing is central to the philosophical project of fashioning the self, even as it reveals that much of what we call the self is a fictional construct. Materials include fiction and memoirs (Primo Levi, Michel Tournier, Melania Mazzucco, Jonathan Littell), and theoretical works in philosophy (Bergson, James, Freud, Jung, Derrida, Wyschogrod, Nehamas), psycholinguistics, and neuroscience. Taught in English.

Same as: FRENCH 251.

**ITALIAN 366. Women's Voices in Contemporary Italian Literature. 3-5 Units.**

The traditional canon of Italian literature consists almost exclusively of male authors. Yet Italian women writers have been active since the time of Dante. This presents an overview of women's prose fiction of the last 100 years, from Sibilla Aleramo's groundbreaking feminist novel *\*Una donna\** (1906) to novels from the 80's and 90's. We will examine such issues as the central issue of sexual violence in many female autobiographies; the experience of motherhood; the conflict between maternal love and the desire for self-determination and autonomy; paths to political awareness; reinventing the historical novel. Taught in English.

Same as: ITALIAN 166.

**ITALIAN 369. Introduction to Graduate Studies: Criticism as Profession. 5 Units.**

A number of faculty will present published work and discuss their research and composition process. We will read critical, theoretical, and literary texts that address, in different ways, "What is a World?" Taught in English. Same as: COMPLIT 369, DLCL 369, FRENCH 369, GERMAN 369.

**ITALIAN 395. Philosophical Reading Group. 1 Unitss.**

Discussion of one contemporary or historical text from the Western philosophical tradition per quarter in a group of faculty and graduate students. For admission of new participants, a conversation with H. U. Gumbrecht is required. May be repeated for credit. Taught in English. Same as: COMPLIT 359A, FRENCH 395.

**ITALIAN 399. Individual Work. 1-12 Units.**

Repeatable for Credit.

**ITALIAN 802. TGR Dissertation. 0 Unit.**

## Japanese General Courses

**JAPANGEN 51. Japanese Business Systems. 3-5 Units.**

Japanese sociocultural dynamics in industrial and corporate structures, negotiating styles, decision making, and crisis management. Practicum on Japan market strategies.

Same as: JAPANGEN 251.

**JAPANGEN 60. Asian Art and Culture. 5 Units.**

The religious and philosophical ideas and social attitudes of India, China, and Japan and how they are expressed in architecture, painting, woodblock prints, sculpture, and in such forms as garden design and urban planning. Same as: ARTHIST 2.

**JAPANGEN 75N. Around the World in Seventeen Syllables: Haiku in Japan, the U.S., and the Digital World. 3-4 Units.**

Preference to freshmen. Origins of the haiku form in Japan, its place in the discourse of Orientalism during the 19th and early 20th centuries in the West, its appropriation by U.S. devotees of Zen and the beat poets after WW II, and its current transformation into a global form through the Internet.

**JAPANGEN 79. Japanese Ghosts: The Supernatural in Japanese Art and Entertainment. 4 Units.**

The complex meanings of ghosts in Japanese culture. Representations of the supernatural in images, drama, oral narratives, prose, film, comics and animation at different moments in Japanese history.

Same as: JAPANGEN 179.

**JAPANGEN 82N. Joys and Pains of Growing Up and Older: Secret Lives of Old People in Japan. 3 Units.**

What do old and young people share in common? With a focus on Japan, a country with a large long-living population, this seminar spotlights older people's lives as a reflection of culture and society, history, and current social and personal changes. Through discussion of multidisciplinary studies on age, analysis of narratives, and films, we will gain a closer understanding of Japanese society and the multiple meanings of growing up and older. Students will also create a short video/audio profile of an older individual, and we will explore cross-cultural comparisons.

**JAPANGEN 92. Traditional East Asian Culture: Japan. 5 Units.**

Required for Chinese and Japanese majors. Introduction to Japanese culture in historical context. Previous topics include: shifting paradigms of gender relations and performance, ancient mythology, court poetry and romance, medieval war tales, and the theaters of Noh, Bunraku, and Kabuki.

**JAPANGEN 121. Translating Japan, Translating the West. 3-4 Units.**

Translation lies at the heart of all intercultural exchange. This course introduces students to the specific ways in which translation has shaped the image of Japan in the West, the image of the West in Japan, and Japan's self-image in the modern period. What texts and concepts were translated by each side, how, and to what effect? No prior knowledge of Japanese language necessary.

Same as: JAPANGEN 221.

**JAPANGEN 125. Emotions of Japanese Cinema (Postindustrial Version). 4 Units.**

Seminar aims to elucidate the affective terrain of postindustrial Japan and to rethink affect theory from the perspective of Japanese cinema. Films have English subtitles and core readings are in English. Additional readings for those with access to Japanese.

Same as: FILMSTUD 235, JAPANGEN 225.

**JAPANGEN 137. Classical Japanese Literature in Translation. 4 Units.**

Prose, poetry, and drama from the 10th-19th centuries. Historical, intellectual, and cultural context. Works vary each year. May be repeated for credit with consent of instructor.

Same as: JAPANGEN 237.

**JAPANGEN 138. Introduction to Modern Japanese Literature and Culture. 3-4 Units.**

This class introduces key literary texts from Japan's modern era (1868-present), locating these works in the larger political, social, and cultural trends of the period. Primary texts include: Futabatei Shimei's *Floating Clouds*, Higuchi Ichiyō's *Child's Play*, Natsume Sōseki's *Kokoro*, Kobayashi Takiji's *Cannery Boat*, Ōe Kenzaburō's *The Catch*, and Yoshimoto Banana's *Kitchen*. Examination of these literary works will be contextualized within larger political trends (e.g., the modernization program of the Meiji regime, the policies of Japan's wartime government, and postwar Japanese responses to the cold war), social developments (e.g., changing notions of social class, the women's rights movement, and the social effects of the postwar economic expansion), and cultural movements (e.g., literary reform movement of the 1890s, modernism of the 1920s and 30s, and postmodernism of the 1980s). The goal of the class is to use literary texts as a point of entry to understand the grand narrative of Japan's journey from its tentative re-entry into the international community in the 1850s, through the cataclysm of the Pacific War, to the remarkable prosperity of the bubble years in the 1980s.

Same as: JAPANGEN 238.

**JAPANGEN 141. Japanese Performance Traditions. 3-4 Units.**

Major paradigms of gender in Japanese performance traditions from ancient to modern times, covering Noh, Kabuki, Bunraku, and Takarazuka.

Same as: JAPANGEN 241.

**JAPANGEN 148. Modern Japanese Narratives: Literature and Film. 3-5 Units.**

Central issues in modern Japanese visual and written narrative. Focus is on competing views of modernity, war, and crises of individual and collective identity and responsibility. Directors and authors include Kurosawa, Mizoguchi, Ozu, Ogai, Akutagawa, Tanizaki, Abe, and Oe.

Same as: JAPANGEN 248.

**JAPANGEN 149. Screening Japan: Issues in Crosscultural Interpretation. 3-4 Units.**

Is the cinematic language of moving images universal? How have cultural differences, political interests, and genre expectations affected the ways in which Japanese cinema makes meaning across national borders? Sources include the works of major Japanese directors and seminal works of Japanese film criticism, theory, and scholarship in English. No Japanese language skills required.

Same as: JAPANGEN 249.

**JAPANGEN 160. Early Modern Japan: The Floating World of Chikamatsu. 4 Units.**

Early modern Japan as dramatized in the puppet theater of Chikamatsu Monzaemon (1653-1725), Japan's leading dramatist, who depicted militarization, commercialization, and urbanization in the Tokugawa period (1603-1868). Emperors, shogun, daimyo, samurai, merchants, monks, geisha, and masterless ronin in his bunraku plays as denizens of a floating world. Themes of loyalty, love, heroism, suicide, and renunciation in the early modern world. In English.

Same as: JAPANGEN 260.

**JAPANGEN 179. Japanese Ghosts: The Supernatural in Japanese Art and Entertainment. 4 Units.**

The complex meanings of ghosts in Japanese culture. Representations of the supernatural in images, drama, oral narratives, prose, film, comics and animation at different moments in Japanese history.

Same as: JAPANGEN 79.

**JAPANGEN 184. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting. 4 Units.**

Changes marking the transition from medieval to early modern Japanese society that generated a revolution in visual culture, as exemplified in subjects deemed fit for representation; how commoners joined elites in pictorializing their world, catalyzed by interactions with the Dutch.

Same as: ARTHIST 184, ARTHIST 384, JAPANGEN 384.

**JAPANGEN 185. Arts of War and Peace: Late Medieval and Early Modern Japan, 1500-1868. 4 Units.**

Narratives of conflict, pacification, orthodoxy, nostalgia, and novelty through visual culture during the change of episteme from late medieval to early modern, 16th through early 19th centuries. The rhetorical messages of castles, teahouses, gardens, ceramics, paintings, and prints; the influence of Dutch and Chinese visuality; transformation in the roles of art and artist; tensions between the old and the new leading to the modernization of Japan. Same as: ARTHIST 187, ARTHIST 387.

**JAPANGEN 187. Romance, Desire, and Sexuality in Modern Japanese Literature. 3-4 Units.**

This class is structured around three motifs: love suicide (as a romantic ideal), female desire, and same-sex sexuality. Over the course of the quarter we will look at how these motifs are treated in the art and entertainment from three different moments of Japanese history: the Edo period (1615-1868), the modern period (1920-65), and the contemporary period (1965-present). We will start by focusing on the most traditional representations of these topics. Subsequently, we will consider how later artists and entertainers revisited the conventional treatments of these motifs, informing them with new meanings and social significance. We will devote particular attention to how this material comments upon issues of gender, sexuality, and human relationships in the context of Japan. Informing our perspective will be feminist and queer theories of reading and interpretation. Same as: JAPANGEN 287.

**JAPANGEN 198. Senior Colloquium in Japanese Studies. 1 Unitss.**

Research, write, and present capstone essay or honors thesis.

Same as: KORGEN 198.

**JAPANGEN 200. Directed Reading in Asian Languages. 1-12 Units.**

For Japanese literature. Prerequisite: consent of instructor. (Staff).

**JAPANGEN 201. Teaching Japanese Humanities. 1 Unitss.**

Prepares graduate students to teach humanities at the undergraduate level. Topics include syllabus development and course design, techniques for generating discussion, effective grading practices, and issues particular to the subject matter.

**JAPANGEN 220. The Situation of the Artist in Traditional Japan. 5 Units.**

Topics may include: workshop production such as that of the Kano and Tosa families; the meaning of the signature on objects including ceramics and tea wares; the folk arts movement; craft guilds; ghost painters in China; individualism versus product standardization; and the role of lineage. How works of art were commissioned; institutions supporting artists; how makers purveyed their goods; how artists were recognized by society; the relationship between patrons, desires and artists, modes of production. Same as: ARTHIST 485.

**JAPANGEN 221. Translating Japan, Translating the West. 3-4 Units.**

Translation lies at the heart of all intercultural exchange. This course introduces students to the specific ways in which translation has shaped the image of Japan in the West, the image of the West in Japan, and Japan's self-image in the modern period. What texts and concepts were translated by each side, how, and to what effect? No prior knowledge of Japanese language necessary.

Same as: JAPANGEN 121.

**JAPANGEN 225. Emotions of Japanese Cinema (Postindustrial Version). 4 Units.**

Seminar aims to elucidate the affective terrain of postindustrial Japan and to rethink affect theory from the perspective of Japanese cinema. Films have English subtitles and core readings are in English. Additional readings for those with access to Japanese.

Same as: FILMSTUD 235, JAPANGEN 125.

**JAPANGEN 237. Classical Japanese Literature in Translation. 4 Units.**

Prose, poetry, and drama from the 10th-19th centuries. Historical, intellectual, and cultural context. Works vary each year. May be repeated for credit with consent of instructor.

Same as: JAPANGEN 137.

**JAPANGEN 238. Introduction to Modern Japanese Literature and Culture. 3-4 Units.**

This class introduces key literary texts from Japan's modern era (1868-present), locating these works in the larger political, social, and cultural trends of the period. Primary texts include: Futabatei Shimei's Floating Clouds, Higuchi Ichiyō's Child's Play, Natsume Sōseki's Kokoro, Kobayashi Takiji's Cannery Boat, Ōe Kenzaburō's The Catch, and Yoshimoto Banana's Kitchen. Examination of these literary works will be contextualized within larger political trends (e.g., the modernization program of the Meiji regime, the policies of Japan's wartime government, and postwar Japanese responses to the cold war), social developments (e.g., changing notions of social class, the women's rights movement, and the social effects of the postwar economic expansion), and cultural movements (e.g., literary reform movement of the 1890s, modernism of the 1920s and 30s, and postmodernism of the 1980s). The goal of the class is to use literary texts as a point of entry to understand the grand narrative of Japan's journey from its tentative re-entry into the international community in the 1850s, through the cataclysm of the Pacific War, to the remarkable prosperity of the bubble years in the 1980s.

Same as: JAPANGEN 138.

**JAPANGEN 241. Japanese Performance Traditions. 3-4 Units.**

Major paradigms of gender in Japanese performance traditions from ancient to modern times, covering Noh, Kabuki, Bunraku, and Takarazuka.

Same as: JAPANGEN 141.

**JAPANGEN 248. Modern Japanese Narratives: Literature and Film. 3-5 Units.**

Central issues in modern Japanese visual and written narrative. Focus is on competing views of modernity, war, and crises of individual and collective identity and responsibility. Directors and authors include Kurosawa, Mizoguchi, Ozu, Ogai, Akutagawa, Tanizaki, Abe, and Oe.

Same as: JAPANGEN 148.

**JAPANGEN 249. Screening Japan: Issues in Crosscultural Interpretation. 3-4 Units.**

Is the cinematic language of moving images universal? How have cultural differences, political interests, and genre expectations affected the ways in which Japanese cinema makes meaning across national borders? Sources include the works of major Japanese directors and seminal works of Japanese film criticism, theory, and scholarship in English. No Japanese language skills required.

Same as: JAPANGEN 149.

**JAPANGEN 251. Japanese Business Systems. 3-5 Units.**

Japanese sociocultural dynamics in industrial and corporate structures, negotiating styles, decision making, and crisis management. Practicum on Japan market strategies.

Same as: JAPANGEN 51.

**JAPANGEN 260. Early Modern Japan: The Floating World of Chikamatsu. 4 Units.**

Early modern Japan as dramatized in the puppet theater of Chikamatsu Monzaemon (1653-1725), Japan's leading dramatist, who depicted militarization, commercialization, and urbanization in the Tokugawa period (1603-1868). Emperors, shogun, daimyo, samurai, merchants, monks, geisha, and masterless ronin in his bunraku plays as denizens of a floating world. Themes of loyalty, love, heroism, suicide, and renunciation in the early modern world. In English.

Same as: JAPANGEN 160.

**JAPANGEN 287. Romance, Desire, and Sexuality in Modern Japanese Literature. 3-4 Units.**

This class is structured around three motifs: love suicide (as a romantic ideal), female desire, and same-sex sexuality. Over the course of the quarter we will look at how these motifs are treated in the art and entertainment from three different moments of Japanese history: the Edo period (1615-1868), the modern period (1920-65), and the contemporary period (1965-present). We will start by focusing on the most traditional representations of these topics. Subsequently, we will consider how later artists and entertainers revisited the conventional treatments of these motifs, informing them with new meanings and social significance. We will devote particular attention to how this material comments upon issues of gender, sexuality, and human relationships in the context of Japan. Informing our perspective will be feminist and queer theories of reading and interpretation. Same as: JAPANGEN 187.

**JAPANGEN 287A. The Japanese Tea Ceremony: The History, Aesthetics, and Politics Behind a National Pastime. 5 Units.**

The tea ceremony, a premodern multimedia phenomenon, integrates architecture, garden design, ceramics, painting, calligraphy, and treasured objects into a choreographed ritual wherein host, objects, and guests perform roles on a tiny stage. Aesthetic, philosophical, and political dimensions. The evolution of tea taste including its inception in Zen monasteries, use for social control during the 16th century, the development of a class of tea connoisseurs, and 20th-century manipulation by the emerging industrialist class.

Same as: ARTHIST 287A.

**JAPANGEN 384. Aristocrats, Warriors, Sex Workers, and Barbarians: Lived Life in Early Modern Japanese Painting. 4 Units.**

Changes marking the transition from medieval to early modern Japanese society that generated a revolution in visual culture, as exemplified in subjects deemed fit for representation; how commoners joined elites in pictorializing their world, catalyzed by interactions with the Dutch.

Same as: ARTHIST 184, ARTHIST 384, JAPANGEN 184.

## Japanese Language Courses

**JAPANLNG 1. First-Year Japanese Language, Culture, and Communication, First Quarter. 5 Units.**

(Formerly JAPANLNG 7.) First-year sequence enables students to converse, write, and read essays on topics such as personal history, experiences, familiar people. 300 kanji characters. See [http://japanese.stanford.edu/?page\\_id=5](http://japanese.stanford.edu/?page_id=5).

**JAPANLNG 2. First-Year Japanese Language, Culture, and Communication, Second Quarter. 5 Units.**

(Formerly JAPANLNG 8.) Continuation of 1. First-year sequence enables students to converse, write, and read essays on topics such as personal history, experiences, familiar people. Prerequisite: placement test, 7 or consent of instructor. 300 kanji characters. [http://japanese.stanford.edu/?page\\_id=5](http://japanese.stanford.edu/?page_id=5).

**JAPANLNG 3. First-Year Japanese Language, Culture, and Communication, Third Quarter. 5 Units.**

(Formerly JAPANLNG 9.) Continuation of 2. First-year sequence enables students to converse, write, and read essays on topics such as personal history, experiences, familiar people. Fulfills University Foreign Language Requirement. Prerequisite: placement test, 8 or consent of instructor. 300 kanji characters. [http://japanese.stanford.edu/?page\\_id=5](http://japanese.stanford.edu/?page_id=5).

**JAPANLNG 4A. First-Year Japanese Language Essentials, First Quarter. 3 Units.**

(Formerly JAPANLNG 7A.) For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji exercises. See [http://japanese.stanford.edu/?page\\_id=73](http://japanese.stanford.edu/?page_id=73).

**JAPANLNG 4B. First-Year Japanese Language Essentials, Second Quarter. 3 Units.**

(Formerly JAPANLNG 8A.) Continuation of JAPANLNG 4A. For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji exercises. Prerequisite: Placement Test, JAPANLNG 4A or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=73](http://japanese.stanford.edu/?page_id=73).

**JAPANLNG 4C. First-Year Japanese Language Essentials, Third Quarter. 3 Units.**

(Formerly JAPANLNG 9A.) Continuation of JAPANLNG 4B. For students who want to build communication skills in limited time. Online listening exercises, audiovisual materials, kanji exercises. Prerequisite: Placement Test, JAPANLNG 4B or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=73](http://japanese.stanford.edu/?page_id=73).

**JAPANLNG 5. Intensive First-Year Japanese Language. 12-15 Units.**

Equivalent to 7, 8, and 9 combined. See [http://japanese.stanford.edu/?page\\_id=323](http://japanese.stanford.edu/?page_id=323). Same as 305.

**JAPANLNG 11A. Intermediate Japanese Conversation, First Quarter. 2 Units.**

(Formerly JAPANLNG 27.) Develops oral proficiency through simple sentence patterns, audio materials, and oral presentations. For the practical use of Japanese. Prerequisite: JAPANLNG 3, or consent of instructor.

**JAPANLNG 11B. Intermediate Japanese Conversation, Second Quarter. 2 Units.**

(Formerly JAPANLNG 28.) Continuation of JAPANLNG 11A. Develops oral proficiency through simple sentence patterns, audio materials, tapes, and, oral presentations. For the practical use of Japanese. Prerequisite: JAPANLNG 11A or consent of the instructor.

**JAPANLNG 11C. Intermediate Japanese Conversation, Third Quarter. 2 Units.**

(Formerly JAPANLNG 29.) Continuation of JAPANLNG 11B. Develops oral proficiency through simple sentence patterns, audio materials, and oral presentations. For the practical use of Japanese. Prerequisite: JAPANLNG 11B or consent of instructor.

**JAPANLNG 14A. Second-Year Japanese Language Essentials, First Quarter. 3 Units.**

(Formerly JAPANLNG 17A.) Continuation of JAPANLNG 4C. For students who want to build communication skills in limited time. Prerequisite: JAPANLNG 4C or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=89](http://japanese.stanford.edu/?page_id=89).

**JAPANLNG 14B. Second-Year Japanese Language Essentials, Second Quarter. 3 Units.**

(Formerly JAPANLNG 18A.) Continuation of JAPANLNG 14A. For students who want to build communication skills in limited time. Prerequisite: JAPANLNG 14A or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=89](http://japanese.stanford.edu/?page_id=89).

**JAPANLNG 14C. Second-Year Japanese Language Essentials, Third Quarter. 3 Units.**

(Formerly JAPANLNG 19A.) Continuation of JAPANLNG 14B. For students who want to build communication skills in limited time. Prerequisite: JAPANLNG 14B or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=89](http://japanese.stanford.edu/?page_id=89).

**JAPANLNG 20. Intensive Second-Year Japanese. 12-15 Units.**

JAPANLNG 20: Intensive Second-Year Japanese Equivalent to 17,18,19 combined. Prerequisite: 9 or consent of instructor. Same as 320. See [http://japanese.stanford.edu/?page\\_id=323](http://japanese.stanford.edu/?page_id=323).

**JAPANLNG 21. Second-Year Japanese Language, Culture, and Communication, First Quarter. 5 Units.**

(Formerly JAPANLNG 17.) Goal is to further develop and enhance spoken and written Japanese in order to handle advanced concepts such as comparison and contrast of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. Prerequisite: Placement Test, JAPANLNG 3 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=23](http://japanese.stanford.edu/?page_id=23).

**JAPANLNG 22. Second-Year Japanese Language, Culture, and Communication, Second Quarter. 5 Units.**

(Formerly JAPANLNG 18.) Continuation of JAPANLNG 21. Goal is to further develop and enhance spoken and written Japanese in order to handle advanced concepts such as comparison and contrast of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. Prerequisite: Placement Test, JAPANLNG 21, or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=23](http://japanese.stanford.edu/?page_id=23).

**JAPANLNG 23. Second-Year Japanese Language, Culture, and Communication, Third Quarter. 5 Units.**

(Formerly JAPANLNG 19.) Goal is to further develop and enhance spoken and written Japanese in order to handle advanced concepts such as comparison and contrast of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. (Formerly JAPANLNG 18B.) Prerequisite: 18 or consent of instructor. [http://japanese.stanford.edu/?page\\_id=23](http://japanese.stanford.edu/?page_id=23).

**JAPANLNG 31A. Intermediate to Advanced Conversation, First Quarter. 2 Units.**

Oral proficiency through role play, oral presentations, and discussion. Recommended for those who have participated in Kyoto SCTI program. May be taken concurrently with JAPANLNG 21, 22, and 23. Prerequisite: 9K, or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=421](http://japanese.stanford.edu/?page_id=421).

**JAPANLNG 31B. Intermediate to Advanced Conversation, Second Quarter. 2 Units.**

Continuation of JAPANLNG 31A. (Oral proficiency through role play, oral presentations, and discussion. Recommended for those who have participated in Kyoto SCTI program. May be taken concurrently with JAPANLNG 21, 22, and 23. Prerequisite: JAPANLNG 31A or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=421](http://japanese.stanford.edu/?page_id=421).

**JAPANLNG 31C. Intermediate to Advanced Conversation, Third Quarter. 2 Units.**

(Continuation of JAPANLNG 31B. Oral proficiency through role play, oral presentations, and discussion. Recommended for those who have participated in Kyoto SCTI program. May be taken concurrently with JAPANLNG 21, 22, and 23. Prerequisite: JAPANLNG 32B or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=421](http://japanese.stanford.edu/?page_id=421).

**JAPANLNG 32G. Accelerated Beginning Business Japanese II. 4 Units.**

For GSB students only. Limited enrollment.

**JAPANLNG 33G. Accelerated Beginning Business Japanese III. 4 Units.**

For GSB students only. Limited enrollment.

**JAPANLNG 99. Language Specials. 1-5 Units.**

Prerequisite: consent of instructor. (Staff).

**JAPANLNG 101. Third-Year Japanese Language, Culture, and Communication, First Quarter. 5 Units.**

(Formerly JAPANLNG 117.) Goal is to express thoughts and opinions in paragraph length in spoken and written forms. Materials include current Japanese media and literature for native speakers of Japanese. Cultural and social topics related to Japan and its people. Prerequisite: Placement Tests, JAPANLNG 23, or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=39](http://japanese.stanford.edu/?page_id=39).

**JAPANLNG 102. Third-Year Japanese Language, Culture, and Communication, Second Quarter. 5 Units.**

(Formerly JAPANLNG 118.) Continuation of 101. Goal is to express thoughts and opinions in paragraph length in spoken and written forms. Materials include current Japanese media and literature for native speakers of Japanese. Cultural and social topics related to Japan and its people. Prerequisite: 117 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=39](http://japanese.stanford.edu/?page_id=39).

**JAPANLNG 103. Third-Year Japanese Language, Culture, and Communication, Third Quarter. 5 Units.**

(Formerly JAPANLNG 119.) Continuation of 102. Goal is to express thoughts and opinions in paragraph length in spoken and written forms. Materials include current Japanese media and literature for native speakers of Japanese. Cultural and social topics related to Japan and its people. Prerequisite: 118 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=39](http://japanese.stanford.edu/?page_id=39) Prerequisite.

**JAPANLNG 104A. Japanese for Professionals, First Quarter. 3 Units.**

Recommended for students who have the basic grammatical foundation (equivalent to completion of JAPANLNG 14C or 3), and are ready to develop further communication skills in a limited time not only in their field of interest but also in a professional environment. Prerequisite: JAPANLNG 14C, JAPANLNG 3 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=223](http://japanese.stanford.edu/?page_id=223).

**JAPANLNG 104B. Japanese for Professionals, Second Quarter. 3 Units.**

Continuation of JAPANLNG 104A. Recommended for students who have the basic grammatical foundation, and are ready to develop further communication skills in a limited time not only in their field of interest but also in a professional environment. Prerequisite: JAPANLNG 104A or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=223](http://japanese.stanford.edu/?page_id=223).

**JAPANLNG 104C. Japanese for Professionals, Third Quarter. 3 Units.**

Continuation of JAPANLNG 104B. Recommended for students who have the basic grammatical foundation, and are ready to develop further communication skills in a limited time not only in their field of interest but also in a professional environment. Prerequisite: JAPANLNG 104B or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=223](http://japanese.stanford.edu/?page_id=223).

**JAPANLNG 111A. Advanced Japanese Conversation, First Quarter. 2 Units.**

(Formerly JAPANLNG 121.) Focus is on improving speaking skills to narrate and describe things in detail. Audiovisual materials and oral presentations. Prerequisite: JAPANLNG 19K, JAPANLNG 31C, or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=417](http://japanese.stanford.edu/?page_id=417).

**JAPANLNG 111B. Advanced Japanese Conversation, Second Quarter. 2 Units.**

(Formerly JAPANLNG 122.) Continuation of JAPANLNG 111A. Focus is on improving speaking skills to narrate and describe in detail. Audiovisual materials and oral presentations. Prerequisite: JAPANLNG 111A or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=417](http://japanese.stanford.edu/?page_id=417).

**JAPANLNG 111C. Advanced Japanese Conversation, Third Quarter. 2 Units.**

(Formerly JAPANLNG 123.) Continuation of JAPANLNG 111B. Focus is on improving speaking skills to narrate and describe in detail. Audiovisual materials and oral presentations. Prerequisite: JAPANLNG 111B or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=417](http://japanese.stanford.edu/?page_id=417).

**JAPANLNG 113F. Japanese Through Film, Part 1. 2-4 Units.**

Contemporary Japanese culture through Japanese films, documentaries, news, and TV dramas. Structured for students with a strong desire to advance their Japanese communication skills quickly and who have limited class preparation time. In-depth discussion and exploration of current issues, cultural icons, idiomatic expressions and nonverbal social cues. Prerequisite: JAPANLNG 23 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=255](http://japanese.stanford.edu/?page_id=255).

**JAPANLNG 114F. Japanese Through Film, Part 2. 2-4 Units.**

Continuation of JAPANLNG 113F. Contemporary Japanese culture through Japanese films, documentaries, news, and TV dramas. Structured for students with a strong desire to advance their Japanese communication skills quickly and who have limited class preparation time. In-depth discussion and exploration of current issues, cultural icons, idiomatic expressions and nonverbal social cues. Prerequisite: JAPANLNG 113F or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=255](http://japanese.stanford.edu/?page_id=255).

**JAPANLNG 115F. Japanese Through Film, Part 3. 2-4 Units.**

Continuation of JAPANLNG 114F. Contemporary Japanese culture through Japanese films, documentaries, news, and TV dramas. Structured for students with a strong desire to advance their Japanese communication skills quickly and who have limited class preparation time. In-depth discussion and exploration of current issues, cultural icons, idiomatic expressions and nonverbal social cues. Prerequisite: JAPANLNG 114F, or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=255](http://japanese.stanford.edu/?page_id=255).

**JAPANLNG 200. Directed Reading. 1-5 Units.**

Prerequisite: 213 and consent of instructor.

**JAPANLNG 211. Fourth-Year Japanese, First Quarter. 3-5 Units.**

Structure of Japanese, writings in different genres and styles, using such knowledge in writing, and expressing opinions on a variety of topics. Original writings, including fiction, essays, newspaper, and journal articles. Recommended taken in sequence. Prerequisite: JAPANLNG 103 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=263](http://japanese.stanford.edu/?page_id=263).

**JAPANLNG 212. Fourth-Year Japanese, Second Quarter. 3-5 Units.**

Continuation of JAPANLNG 211. Structure of Japanese, writings in different genres and styles, using such knowledge in writing, and expressing opinions on a variety of topics. Original writings, including fiction, essays, newspaper, and journal articles. Recommended taken in sequence. Prerequisite: JAPANLNG 211 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=263](http://japanese.stanford.edu/?page_id=263).

**JAPANLNG 213. Fourth-Year Japanese, Third Quarter. 3-5 Units.**

Continuation of JAPANLNG 212. Structure of Japanese, writings in different genres and styles, using such knowledge in writing, and expressing opinions on a variety of topics. Original writings, including fiction, essays, newspaper, and journal articles. Recommended taken in sequence. Prerequisite: JAPANLNG 212 or consent of instructor. See [http://japanese.stanford.edu/?page\\_id=263](http://japanese.stanford.edu/?page_id=263).

**JAPANLNG 305. Intensive First-Year Japanese for Stanford Graduate Students. 6-15 Units.**

Equivalent to 3 quarters of JAPANLNG 395 combined. Same as JAPANLNG5. Stanford Grads only. [http://japanese.stanford.edu/?page\\_id=323](http://japanese.stanford.edu/?page_id=323). Sum.

**JAPANLNG 320. Intensive Second-Year Japanese for Stanford Graduate Students. 6-15 Units.**

Equivalent to 3 quarters of JAPANLNG 395 combined. Same as 20. Stanford Grads only. See [http://japanese.stanford.edu/?page\\_id=323](http://japanese.stanford.edu/?page_id=323).

**JAPANLNG 394. Graduate Studies in Japanese Conversation. 1-3 Units.**

Prerequisite: consent of instructor. (Staff).

**JAPANLNG 395. Graduate Studies in Japanese. 2-5 Units.**

Prerequisite: consent of instructor. (Staff).

## Japanese Literature Courses

**JAPANLIT 146. Introduction to Premodern Japanese. 3-5 Units.**

Readings from Heian, Kamakura, Muromachi, and early Edo periods with focus on grammar and reading comprehension. Prerequisite: JAPANLNG 129B or 103, or equivalent. Same as: JAPANLIT 246.

**JAPANLIT 157. Points in Japanese Grammar. 2-4 Units.**

Meaning and grammatical differences of similar expressions, and distinctions that may not be salient in English. Prerequisite: JAPANLNG 18B or 22, or equivalent. Same as: JAPANLIT 257.

**JAPANLIT 170. The Tale of Genji and Its Historical Reception. 4 Units.**

Approaches to the tale including 12th-century allegorical and modern feminist readings. Influence upon other works including poetry, Noh plays, short stories, modern novels, and comic book (manga) retellings. Prerequisite for graduate students: JAPANLNG 129B or 103, or equivalent. Same as: JAPANLIT 270.

**JAPANLIT 189A. Honors Research. 2-5 Units.****JAPANLIT 189B. Honors Research. 5 Units.**

Open to senior honors students to write thesis.

**JAPANLIT 199. Individual Reading in Japanese. 1-4 Units.**

Asian Languages majors only. May be repeated for credit. Prerequisites: JAPANLNG 129B or 103, and consent of instructor.

**JAPANLIT 200. Directed Reading in Japanese. 1-12 Units.****JAPANLIT 201. Proseminar: Introduction to Graduate Study in Japanese. 2-5 Units.**

Bibliographical and research methods; major trends in literary and cultural theory and critical practice. May be repeated once for credit. Prerequisite: JAPANLNG 103 or 129B, or consent of instructor.

**JAPANLIT 202. Bibliographic and Research Methods in Japanese. 1-3 Units.**

The use of library and online resources for the study of Japanese literature, language, and culture. Prerequisite: JAPANLNG 103 or 129B, or consent of instructor.

**JAPANLIT 235. Academic Readings in Japanese I. 2-4 Units.**

Strategies for reading academic writings in Japanese. Readings of scholarly papers and advanced materials in Japanese in students' research areas in the humanities and social sciences. Prerequisites: JAPANLNG 103, 129B, or equivalent; and consent of instructor.

**JAPANLIT 236. Academic Readings in Japanese II. 2-4 Units.**

Strategies for reading academic writings in Japanese. Readings of scholarly papers and advanced materials in Japanese in students' research areas in the humanities and social sciences. May be taken independently of 264. May be repeated for credit. Prerequisites: JAPANLNG 103, 129B, or equivalent; and consent of instructor.

**JAPANLIT 246. Introduction to Premodern Japanese. 3-5 Units.**

Readings from Heian, Kamakura, Muromachi, and early Edo periods with focus on grammar and reading comprehension. Prerequisite: JAPANLNG 129B or 103, or equivalent.

Same as: JAPANLIT 146.

**JAPANLIT 247. Readings in Premodern Japanese. 2-5 Units.**

Edo and Meiji periods with focus on grammar and reading comprehension. May be repeated for credit. Prerequisite: 246 or equivalent.

**JAPANLIT 257. Points in Japanese Grammar. 2-4 Units.**

Meaning and grammatical differences of similar expressions, and distinctions that may not be salient in English. Prerequisite: JAPANLNG 18B or 22, or equivalent.

Same as: JAPANLIT 157.

**JAPANLIT 260. Japanese Poetry and Poetics. 2-4 Units.**

Heian through Meiji periods with emphasis on relationships between the social and aesthetic. Works vary each year. This year's genre is the diary. Prerequisites: 246, 247, or equivalent.

**JAPANLIT 266. Introduction to Sino-Japanese. 3-5 Units.**

Readings in Sino-Japanese (*kambun*) texts of the Heian, Kamakura, and Muromachi periods, with focus on grammar and reading comprehension. Prerequisite: 246 or equivalent.

**JAPANLIT 267. Readings in Sino-Japanese. 2-4 Units.**

Readings in Sino-Japanese (*kambun*) texts of the Edo and Meiji periods, with focus on grammar and reading comprehension. Prerequisite: 264 or equivalent.

**JAPANLIT 270. The Tale of Genji and Its Historical Reception. 4 Units.**

Approaches to the tale including 12th-century allegorical and modern feminist readings. Influence upon other works including poetry, Noh plays, short stories, modern novels, and comic book (manga) retellings. Prerequisite for graduate students: JAPANLNG 129B or 103, or equivalent. Same as: JAPANLIT 170.

**JAPANLIT 276. Modern Japanese Short Stories. 2-4 Units.**

This course explores the postwar Japanese short story. We will read representative works by major authors, such as Ishikawa Jun, Hayashi Fumiko, Abe Kobe and Murakami Haruki. Attention will be devoted to both accurate reading of the Japanese prose and more general discussion of the literary features of the texts.

**JAPANLIT 279. Research in Japanese Linguistics. 2-4 Units.**

Introduction to graduate research in Japanese linguistics. Fields of research, methods and bibliographical background. Conduct a pilot research project in a chosen area. May be repeated for credit. Prerequisite: JAPANLNG 119 or consent of instructor.

**JAPANLIT 281. Japanese Pragmatics. 2-4 Units.**

Sociocultural and discourse factors reflected in the choice of linguistic forms, and their theoretical implications. Prerequisites: one year of Japanese and a course in linguistics, or two years of Japanese, or consent of instructor.

**JAPANLIT 287. Pictures of the Floating World: Images from Japanese Popular Culture. 5 Units.**

Printed objects produced during the Edo period (1600-1868), including the Ukiyo-e (pictures of the floating world) and lesser-studied genres such as printed books (ehon) and popular broadsheets (kawaraban). How a society constructs itself through images. The borders of the acceptable and censorship; theatricality, spectacle, and slippage; the construction of play, set in conflict against the dominant neo-Confucian ideology of fixed social roles.

Same as: ARTHIST 287.

**JAPANLIT 296. Modern Japanese Literature. 2-5 Units.**

Advanced readings. May be repeated for credit. Prerequisite: JAPANLNG 213. Formerly JAPANLIT 396.

**JAPANLIT 298. The Theory and Practice of Japanese Literary Translation. 2-5 Units.**

Theory and cultural status of translation in modern Japanese and English. Comparative analysis of practical translation strategies. Final project is a literary translation of publishable quality. Prerequisite: fourth-year Japanese or consent of instructor.

**JAPANLIT 299. Master's Thesis or Translation. 1-5 Units.**

A total of 5 units, taken in one or more quarters. (Staff).

**JAPANLIT 350. Japanese Historical Fiction. 3-5 Units.**

Authors include Mori Ogai, Akutagawa Ryunosuke, Tanizaki Jun'ichiro, Enchi Fumiko, Shiba Ryotaro, Fujisawa Shuhei, and Hiraiwa Yumie. Genre theory, and historical and cultural context. Works vary each year. May be repeated for credit.

**JAPANLIT 377. Seminar: Structure of Japanese. 2-4 Units.**

Linguistic constructions in Japanese. Topics vary annually. In 2009-10, focus is on noun-modifying constructions in Japanese from multiple perspectives including syntax, semantics, pragmatics, and acquisition. Contrasts with similar constructions in other languages. Typological implications. Prerequisites: courses in Japanese linguistics, consent of instructor.

**JAPANLIT 381. Topics in Pragmatics and Discourse Analysis. 2-4 Units.**

Naturally occurring discourse (conversational, narrative, or written) and theoretical implications. Discourse of different age groups, expressions of identity and persona, and individual styles. May be repeated for credit.

**JAPANLIT 396. Seminar: Modern Japanese Literature. 2-5 Units.**

Works and topics vary each year. May be repeated for credit. Prerequisite: fourth-year Japanese or consent of instructor.

**JAPANLIT 399. Dissertation Research. 1-12 Units.**

For doctoral students in Japanese working on dissertations.

**JAPANLIT 400. Advanced Language Training. 1-15 Units.**

For students at the Yokohama Center. For more information, see the Inter-University Center for Japanese Studies in Yokohama at <http://stanford.edu/dept/IUC/>.

**JAPANLIT 801. TGR Project. 0 Unit.****JAPANLIT 802. TGR Dissertation. 0 Unit.**

## Jewish Studies Courses

### **JEWISHST 5. Biblical Greek. 3-5 Units.**

This is a one term intensive class in Biblical Greek. After quickly learning the basics of the language, we will then dive right into readings from the New Testament and the Septuagint, which is the ancient Greek translation of the Hebrew Bible. By the end of the term everyone will be able to read the Greek Bible with ease. No previous knowledge of Greek required.

Those wishing to continue study of Biblical Greek may enroll in Biblical Greek II (CLASSGRK 5B) when offered.

Same as: CLASSGRK 5, RELIGST 5.

### **JEWISHST 5B. Biblical Greek II. 3-5 Units.**

This is a continuation of the Winter Quarter Biblical Greek Course. We will be reading selections primarily from the New Testament (both Gospels and Epistles) as well as focusing on knowledge of key vocabulary and grammar needed to read the Greek Bible with ease. Readings will be supplemented with sections from the Septuagint and Early Christian texts (Apostolic Fathers and Early Creeds). Pre-requisite: ClassGrk 5 or a similar introductory course in Ancient Greek.

Same as: CLASSGRK 5B, RELIGST 5B.

### **JEWISHST 5N. Religion and Politics: comparing Europe to the US. 3-4 Units.**

This course explores the relationship between religion and politics as it is understood in the United States and Europe. In recent years, this relationship has turned somewhat tense, in part because of the rise of Islam as a public religion in Europe, and in part due to the rising influence of religious groups in public culture. We will study the different understandings and definitions of the separation of "church and state" in Western democratic cultures, and the differing notions of the "public sphere." Through case studies, we will investigate the nature of public conflicts, what particular issues lead to conflict, and why. For instance, why has the head covering of Muslim girls and women become politicized in Europe, and how? What are the arguments surrounding the Cordoba House, known as the Ground Zero Mosque, and how does this conflict compare to the controversies surrounding recent constructions of mosques in European cities? The course is interdisciplinary and comparative in nature. It considers historical, political, sociological, and religious studies approaches, introducing students to the particular perspectives of these disciplines. For resources we will draw on various forms of media, documentaries, and scholarly literature.

Same as: RELIGST 5N.

### **JEWISHST 15A. The Bible and Archaeology. 4 Units.**

An introduction to how archaeology has been used to illumine the Bible and biblical history. Did Abraham exist? Was there an Exodus? Did Joshua really conquer Canaan? What does archaeology reveal about ancient Israel beyond what is recorded in the Bible? This course will address such questions as it seeks to introduce biblical archaeology to students with no prior introduction to either the Bible or to archaeology.

Same as: CLASSGEN 15, RELIGST 15A.

### **JEWISHST 16SI. Religion and Spirituality: LGBTQ Perspectives., 1-2 Units.**

Many lesbian, gay, bisexual, transgender, and queer (LGBTQ) people today are finding that mainstream religious institutions do not meet their unique spiritual needs, and they are looking elsewhere to create meaningful spiritual lives. Examine various ways that LGBTQ people are creating and practicing religion and spirituality in the United States. Explore the diversity of American LGBTQ religious and spiritual traditions, both within and beyond the boundaries of traditional religions. Religious and spiritual practices created by and for LGBTQ people and communities, rather than the responses of religious institutions towards the reality of LGBTQ people in their midst. Students will be required to attend an LGBTQ worship service in a tradition of their choice. By the end of the course, students will have a better understanding of, and appreciation for, the diversity of religious and spiritual traditions within LGBTQ communities.

Same as: RELIGST 16SI.

### **JEWISHST 17N. Intimacy, Secrets and the Past: Biography in History and Fiction. 3-4 Units.**

Biography is one of the most popular- and controversial- modes of writing about the past and perhaps its greatest draw is in its promise to reveal the otherwise sequestered details of life, its everyday secrets otherwise sequestered from view. This, of course, is also at the heart of most modern fiction, and the two modes of writing have many other similarities as well as, needless to say, differences. The rhythms of life writing in biography as well as fiction will be explored in this class, along with the difficulties (factual, ethical, and otherwise) of ferreting out the secrets of individual lives. Among the figures explored in the course will be Sigmund Freud, Sabina Spielrein, Sylvia Plath, Hannah Arendt, and Woody Allen.

Same as: HISTORY 17N.

### **JEWISHST 23. Exploring Judaism. 4 Units.**

Introduction to the varied beliefs, ritual practices, and sacred stories of Judaism, moving from foundational texts like the Bible and the Talmud to recent changes in Jewish religious life that have arisen in response to secular and feminist critiques, the Holocaust, and the emergence of the State of Israel.

Same as: RELIGST 23.

### **JEWISHST 50A. Reading Hebrew, First Quarter. 2-4 Units.**

Introduction to Hebrew literature through short stories and poetry by notable Israeli writers. In Hebrew. Prerequisite: one year of Hebrew or equivalent.

Same as: AMELANG 50A.

### **JEWISHST 95. How to Read the Bible. 4 Units.**

What does the Bible mean? Seeks to help students answer this question for themselves by introducing some of the many ways in which the Bible has been read over the ages. The focus will be the book of Genesis, but the real subject is the history of biblical interpretation; how Genesis has been understood by theologians, writers, artists, scholars and others; and the ultimate goal is not merely to engage the Bible itself but to gain a better appreciation of the act of reading, why people read differently and the consequences of that difference for religious history.

Same as: RELIGST 95.

### **JEWISHST 101A. First-Year Hebrew, First Quarter. 5 Units.**

Same as: AMELANG 128A.

### **JEWISHST 101B. First-Year Hebrew, Second Quarter. 5 Units.**

Continuation of AMELANG 128A. Prerequisite: Placement Test, AMELANG 128A, or consent of instructor

Same as: AMELANG 128B.



**JEWISHST 101C. First-Year Hebrew, Third Quarter. 5 Units.**

Continuation of AMELANG 128B. Prerequisite: Placement Test, AMELANG 128B or consent of instructor. Fulfill the University Foreign Language Requirement.  
Same as: AMELANG 128C.

**JEWISHST 102. Land and Literature. 4 Units.**

Israel has captured the imagination of writers throughout the generations. It has been portrayed as promised land, holy land, homeland, empty land, occupied land, and land of dreams. Ideological views and political events have shaped writers' conception of Israel. Readings include poems, prose, and theoretical texts about place and literature. No knowledge of Hebrew required.

Same as: AMELANG 127.

**JEWISHST 102A. Second-Year Hebrew, First Quarter. 4 Units.**

Continuation of AMELANG 128C. Prerequisite: Placement Test, AMELANG 128C or consent of instructor.  
Same as: AMELANG 129A.

**JEWISHST 102B. Second-Year Hebrew, Second Quarter. 4 Units.**

Continuation of AMELANG 129A. Prerequisite: Placement Test, AMELANG 129A or consent of instructor.  
Same as: AMELANG 129B.

**JEWISHST 102C. Second-Year Hebrew, Third Quarter. 4 Units.**

Continuation of AMELANG 129B. Prerequisite: Placement Test, AMELANG 129B or consent of instructor.  
Same as: AMELANG 129C.

**JEWISHST 103A. Third-Year Hebrew, First Quarter. 1-4 Units.**

Continuation of AMELANG 129C. Prerequisite: Placement Test, AMELANG 129C, or consent of instructor.  
Same as: AMELANG 130A.

**JEWISHST 104. Hebrew Forum. 2-4 Units.**

Intermediate and advanced level. Biweekly Hebrew discussion on contemporary issues with Israeli guest speakers. Vocabulary enhancement. Focus on exposure to academic Hebrew.  
Same as: AMELANG 131.

**JEWISHST 104A. First-Year Yiddish, First Quarter. 4 Units.**

Reading, writing, and speaking.  
Same as: AMELANG 140A.

**JEWISHST 104B. First-Year Yiddish, Second Quarter. 4 Units.**

Continuation of AMELANG 140A. Prerequisite: AMELANG 140A or consent of instructor.  
Same as: AMELANG 140B.

**JEWISHST 104C. First-Year Yiddish, Third Quarter. 4 Units.**

Continuation of AMELANG 140B. Prerequisite: AMELANG 140B or consent of instructor. Fulfills the University Foreign Language Requirement.  
Same as: AMELANG 140C.

**JEWISHST 106. Reflection on the Other: The Jew in Arabic Literature, the Arab in Hebrew Literature. 4 Units.**

How literary works outside the realm of western culture struggle with questions such as identity, minority, and the issue of the other. How the Arab is viewed in Hebrew literature and how the Jew is viewed in Arabic literature. Historical, political, and sociological forces that have contributed to the shaping of the writer's views. Arab and Jewish (Israeli) culture.  
Same as: AMELANG 126, COMPLIT 145.

**JEWISHST 107A. Biblical Hebrew, First Quarter. 1 Unitss.**

Establish a basic familiarity with the grammar and vocabulary of Biblical Hebrew and will begin developing a facility with the language. Students that are enrolled in this course must also enroll in Beginning Hebrew. This course requires no prior knowledge of Hebrew and will begin with learning the alphabet. By the end of the year, students will be able to translate basic biblical texts, will be familiar with common lexica and reference grammars, and will have sufficient foundational knowledge to enable them to continue expanding their knowledge either in a subsequent course or own their own.  
Same as: AMELANG 170A, RELIGST 170A.

**JEWISHST 107B. Biblical Hebrew, Second Quarter. 1 Unitss.**

Continuation of 170A  
Same as: AMELANG 170B.

**JEWISHST 107C. Biblical Hebrew, Third Quarter. 1 Unitss.**

Continuation of 170B.  
Same as: AMELANG 170C.

**JEWISHST 117. From Generation to Generation: Scientific and Cultural Approaches to Jewish Genetics. 1 Unitss.**

This series of guest lectures aims to explore the connections between genetics and Jewish Studies. How do different Jewish populations relate to each other? To what extent are Jewish populations of the present descended from those of the past? What are the causes of diseases that occur disproportionately in Jewish populations? These and other questions will be addressed in a program that crosses the boundaries between science and Jewish Studies, culture and biology.  
Same as: BIO 127.

**JEWISHST 120. Genesis and Gender: Male and Female in Judaism, Christianity, and Islam. 4 Units.**

What does it mean to be a man or a woman? And what role have classical and religious traditions played in shaping understandings of gender differences? Investigation of the construction of gender identities, roles, and differences in Greek and Roman sources and three monotheistic faiths. Interpretation and retellings of the story of Adam and Eve in the Bible and the Qur'an, commentaries, lives and practices of religious communities, religious iconography down to the present.  
Same as: RELIGST 130.

**JEWISHST 122B. Early Christianity, Early Judaism, and Gender. 4 Units.**

An exploration of gender in Early Christianity and Early Judaism. Possible topics include: an examination of Pre-Christian writings which are indicative of the foundational social contexts in which early Christian and Jewish writers operated; how women's preaching was portrayed in Paul's letters and the implications for what was actually going on in the community in Corinth; later interpretations of Paul's attitudes towards women and marriage, which diverge between a pro-marriage and further restrictive understanding of women's involvement in the Church in the pastorals (1 and 2 Timothy and Titus) and a pro-ascetic, cross-dressing, understanding of greater women's freedom in the Acts of Paul and Thecla; female Christian martyrs who had visions of themselves as men entering battle and male Rabbis who understood themselves as female virgins and who hid in warehouses to avoid martyrdom; and a survey of early Rabbinic laws pertaining to men and women and what they reveal about early Jewish conceptions of gender.  
Same as: CLASSGEN 134, RELIGST 132B.

**JEWISHST 128. The Five Books of Moses. 4 Units.**

A survey of the first five books of the Hebrew Bible/Old Testament--Genesis, Exodus, Leviticus, Numbers and Deuteronomy--that will explore their authorship, form and meaning.  
Same as: RELIGST 128.

**JEWISHST 139. Rereading Judaism in Light of Feminism. 4 Units.**

During the past three decades, Jewish feminists have asked new questions of traditional rabbinic texts, Jewish law, history, and religious life and thought. Analysis of the legal and narrative texts, rituals, theology, and community to better understand contemporary Jewish life as influenced by feminism.

Same as: FEMST 139.

**JEWISHST 140. Introduction to Hebrew Literature. 3-5 Units.**

The influence of biblical poetry, piyut, and medieval Hebrew poetry on the development of Modern Hebrew poetry. With focus on voice, space, lyrical Subjectivity, Intertextuality, and Poetic Forms. Guest Speakers include Tamar Zwi, Susan Einbinder, Berry Saharoff, and Raymond Scheindlin.

Same as: COMPLIT 140, COMPLIT 240A.

**JEWISHST 147. German Capstone: Reading Franz Kafka. 3-5 Units.**

This class will address major works by Franz Kafka and consider Kafka as a modernist writer whose work reflects on modernity. We will also examine the role of Kafka's themes and poetics in the work of contemporary writers. (Meets Writing-in-the-Major requirement)

Same as: COMPLIT 111, COMPLIT 311C, GERMAN 190, GERMAN 390, JEWISHST 349.

**JEWISHST 149. Senior Seminar. 3-5 Units.**

Major terms of narratology; how different literary, cinematic, and popular culture narratives raise ethical issues, stir public debates and contribute to understanding human values. Readings include Biblical texts, Antigone, Kleist, Kafka, Coetzee, V for Vendetta, South Park, Kant, Arendt, Nussbaum, Rorty, and Levinas. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature.

Same as: COMPLIT 199, COMPLIT 367, JEWISHST 347.

**JEWISHST 150A. Creative Resistance and the Holocaust. 3-5 Units.**

"Creative resistance," a little-known phenomenon and a new term, emerges astonishingly during times of devastation. Under the Nazis, it took form in graffiti, diaries, chronicles, poems, paintings, photos, and music. How did a human spirit of creativity arise from such duress, and to what end? Why would acts of imagination, incapable of stopping destruction, count as resistance? Guests include a string quartet playing music by a prisoner, and a guest speaker who is a survivor of seven camps. Works include Goya's counter-Napoleon etchings, poems from World War I and Iraq, and contemporary examples.

Same as: ENGLISH 140A.

**JEWISHST 182C. Heretics to Headscarves. 5 Units.**

Broad survey of religious discrimination and persecution in the Euro-American tradition, and the rise of tolerationist ideas and practices, from Augustine's rationale for punishing dissenters to the current European debates over the regulation of Islam. Topics include the Inquisition; struggles over toleration in Reformation Europe; the impact of Locke, Bayle, and Spinoza; Spanish practice in the Americas; and the American constitutional experiment in free exercise.

Same as: HISTORY 202C, POLISCI 224H.

**JEWISHST 187C. Social Democracy from Marx to Gross National Happiness. 5 Units.**

The history of the 'short twentieth century' is often told as the struggle between Capitalism and Communism, as if there were no further alternatives. But the search for a "Third Way" between them was a constant feature of the 20th century, with roots deep in the 19th. One such system, Social Democracy, has a strong claim to be providing its citizens with both prosperity and justice. Explores the relationship of ideas and politics and about Social Democracy considered as a "third system": a social, economic and political system in its own right and, at the same time, a radical critique of both Capitalism and Marxist Communism. Topics include: the development of Social Democratic thought, movements, tactics policies and practices to be examined through the analysis of the writings of Marx, Bernstein, the English Fabians, and the 20th century Scandinavian and German thinkers and practitioners of Social Democracy; the history and practice of political parties, labor movements, and governments; the institutionalization of Social Democracy in Britain, Western, Central and Northern Europe, and in the so-called "developing societies"; contemporary debates as "Social Europe" and "Gross National Happiness"; and the growth of a "social democratic sensibility" and culture. Several films will be screened during the course.

Same as: HISTORY 107C.

**JEWISHST 187D. Zionism and Its Critics. 4-5 Units.**

Zionism from its genesis in the 1880s up until the establishment of the state of Israel in May, 1948, exploring the historical, ideological and political dimensions of Zionism. Topics include: the emergence of Zionist ideology in connection to and as a response to challenges of modernity; emancipation; Haskalah (Jewish enlightenment); other national and ideological movements of the period; the ideological crystallization of the movement; and the immigration waves to Palestine.

Same as: HISTORY 187D.

**JEWISHST 199B. Directed Reading in Yiddish, Second Quarter. 1-5 Units.**

For intermediate or advanced students. May be repeated for credit.

**JEWISHST 221C. Aramaic Jewish texts. 2-5 Units.**

Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud and Geonic materials and attempt to follow the development of the language through time. The course is intended for students with substantial knowledge of Hebrew.

Same as: JEWISHST 321C, RELIGST 221C, RELIGST 321C.

**JEWISHST 225. Research Methods and Resources in Jewish Studies. 1-3 Units.**

Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription).

Same as: JEWISHST 325, RELIGST 265, RELIGST 365.

**JEWISHST 226B. Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict. 5 Units.**

Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.

Same as: CLASSGEN 126, CLASSGEN 226, JEWISHST 326B, RELIGST 226B, RELIGST 326B.

**JEWISHST 226C. Mystics and Merrymakers: Innovations in Modern Judaism. 3-4 Units.**

How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revised, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival.

Same as: JEWISHST 326C, RELIGST 226C, RELIGST 326C.

**JEWISHST 226D. Jewish-Christian Relations in Antiquity. 1-2 Units.**

Constructions of identity, community, ethnicity: these considerations frame the investigation of ancient Christian rhetoric and theology contra Iudaeos. This historical project will be set within the larger intellectual and cultural context of a) learned Graeco-Roman traditions of ethnic stereotyping; b) forensic rhetoric; and c) philosophical paideia; and these traditions will be considered within their larger social context of the Mediterranean city (I-III). Specifically, various Christian, and especially Latin traditions contra Iudaeos (IV-VI) will be studied.

Same as: CLASSGEN 126B, RELIGST 226D.

**JEWISHST 228. King Solomon and the Search for Wisdom. 4 Units.**

What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.

Same as: JEWISHST 328, RELIGST 282, RELIGST 382.

**JEWISHST 241. Visions of the Future in Literature. 4 Units.**

Emphasis on personal and collective future as perceived and described in works translated from Hebrew or written originally in English. Focus on novels, short stories, poems and movies that deal both with the future of Israel and the Middle East and the future of individuals in the area. Guest speaker on Science Fiction and the Graphic Novel. The course is part of "The Future of Storytelling" activities organized by Taube Center for Jewish Studies.

Same as: COMPLIT 281.

**JEWISHST 282. Circles of Hell: Poland in World War II. 5 Units.**

Looks at the experience and representation of Poland's wartime history from the Nazi-Soviet Pact (1939) to the aftermath of Yalta (1945). Examines Nazi and Soviet ideology and practice in Poland, as well as the ways Poles responded, resisted, and survived. Considers wartime relations among Polish citizens, particularly Poles and Jews. In this regard, interrogates the traditional self-characterization of Poles as innocent victims, looking at their relationship to the Holocaust, thus engaging in a passionate debate still raging in Polish society.

Same as: HISTORY 228, HISTORY 328, JEWISHST 382.

**JEWISHST 286C. Jews and the Russian Revolution. 5 Units.**

This course evaluates the role of Jews in Russian radicalism beginning in the 1870s and '80s and focuses on their participation in the Revolutions of 1905 and especially 1917. The connections if any, between Judaism, Messianism, and radicalism will be evaluated, as will the socio-economic and cultural lives of Jews in Russia and how these inflected political attitudes radical and conservative. The course will trace the impact of the revolution on Jewish life into the mid, and late-1920s. The belief that Jews were once responsible for the revolution emerged as one of the cardinal principles of the Russian Right, eventually also the European Right and it would be embedded in the central ideas of Nazism and these developments, too, will be examined.

Same as: HISTORY 286C, HISTORY 386C, JEWISHST 386C.

**JEWISHST 287D. Tel Aviv: Site, Symbol, City. 4-5 Units.**

Tel Aviv, the first Israeli/Hebrew city, from a cultural history perspective combining high and low cultural artifacts, examining the symbolic constructions of the city as a site of Hebrew modernism and postmodernism. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's coffee houses; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; the effects of contemporary globalization and the reconstruction of Tel Aviv as the symbolic site of Israeli post-nationalism. Sources include art, cinema, and literature, pop music and archival materials from Green Library's Eliasaf Robinson Collection.

Hebrew reading knowledge, although helpful, is not required.

Same as: HISTORY 287D, HISTORY 387D, JEWISHST 387D.

**JEWISHST 287E. Jewish Intellectuals and the Crisis of Modernity. 4-5 Units.**

Intellectual responses of Jewish political thinkers, historians and authors to the age of extremes. Readings include Theodor Adorno, Herbert Marcuse, Eric Fromm, Hannah Arendt, Leo Strauss, Karl Popper, Isaiah Berlin, Tony Judt, and George Steiner. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in postwar years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945. No prior knowledge of political science, philosophy and/or Jewish studies is required.

Same as: HISTORY 287E, HISTORY 387E, JEWISHST 387E.

**JEWISHST 287K. Gentlemen and Jews: History of the Jews of England. 4-5 Units.**

Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there a unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?

Same as: HISTORY 287K, HISTORY 387K, JEWISHST 387K.

**JEWISHST 287S. Research Seminar in Middle East History. 4-5 Units.**

Student-selected research topics.

Same as: HISTORY 481, JEWISHST 481.

**JEWISHST 288. Palestine and the Arab-Israeli Conflict. 4-5 Units.**

1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin)

Same as: HISTORY 288, HISTORY 388, JEWISHST 388.

**JEWISHST 291X. Knowing God: Learning Religion in Popular Culture. 4 Units.**

This course will examine how people learn religion outside of school, and in conversation with popular cultural texts and practices. Taking a broad social-constructivist approach to the variety of ways people learn, this course will explore how people assemble ideas about faith, identity, community, and practice, and how those ideas inform individual, communal and global notions of religion. Much of this work takes place in formal educational environments including missionary and parochial schools, Muslim madrasas or Jewish yeshivot. However, even more takes place outside of school, as people develop skills and strategies in conversation with broader social trends. This course takes an interdisciplinary approach to questions that lie at the intersection of religion, popular culture, and education.

Same as: EDUC 231X, RELIGST 231X.

**JEWISHST 293X. Religion and Education. 4 Units.**

This course will examine interactions between religion and education, focusing on both formal and experiential sites in which people and communities explore, articulate, encounter, and perform religious ideologies and identities. The class will focus on different religious traditions and their encounters the institutions and structures of education in American culture, both in the United States and as it manifests in American culture transnationally.

Same as: EDUC 293X, RELIGST 293X.

**JEWISHST 299A. Directed Reading in Yiddish, First Quarter. 1-5 Units.**

Directed Reading in Yiddish, First Quarter.

**JEWISHST 321C. Aramaic Jewish texts. 2-5 Units.**

Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyut, Talmud and Geonic materials and attempt to follow the development of the language through time. The course is intended for students with substantial knowledge of Hebrew.

Same as: JEWISHST 221C, RELIGST 221C, RELIGST 321C.

**JEWISHST 325. Research Methods and Resources in Jewish Studies. 1-3 Units.**

Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription). Same as: JEWISHST 225, RELIGST 265, RELIGST 365.

**JEWISHST 326B. Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict. 5 Units.**

Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Judaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.

Same as: CLASSGEN 126, CLASSGEN 226, JEWISHST 226B, RELIGST 226B, RELIGST 326B.

**JEWISHST 326C. Mystics and Merymakers: Innovations in Modern Judaism. 3-4 Units.**

How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revisioned, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival.

Same as: JEWISHST 226C, RELIGST 226C, RELIGST 326C.

**JEWISHST 328. King Solomon and the Search for Wisdom. 4 Units.**

What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.

Same as: JEWISHST 228, RELIGST 282, RELIGST 382.

**JEWISHST 347. Senior Seminar. 3-5 Units.**

Major terms of narratology; how different literary, cinematic, and popular culture narratives raise ethical issues, stir public debates and contribute to understanding human values. Readings include Biblical texts, Antigone, Kleist, Kafka, Coetzee, V for Vendetta, South Park, Kant, Arendt, Nussbaum, Rorty, and Levinas. Satisfies the capstone seminar requirement for the major tracks in Philosophy and Literature.

Same as: COMPLIT 199, COMPLIT 367, JEWISHST 149.

**JEWISHST 349. German Capstone: Reading Franz Kafka. 3-5 Units.**

This class will address major works by Franz Kafka and consider Kafka as a modernist writer whose work reflects on modernity. We will also examine the role of Kafka's themes and poetics in the work of contemporary writers. (Meets Writing-in-the-Major requirement)

Same as: COMPLIT 111, COMPLIT 311C, GERMAN 190, GERMAN 390, JEWISHST 147.

**JEWISHST 382. Circles of Hell: Poland in World War II. 5 Units.**

Looks at the experience and representation of Poland's wartime history from the Nazi-Soviet Pact (1939) to the aftermath of Yalta (1945). Examines Nazi and Soviet ideology and practice in Poland, as well as the ways Poles responded, resisted, and survived. Considers wartime relations among Polish citizens, particularly Poles and Jews. In this regard, interrogates the traditional self-characterization of Poles as innocent victims, looking at their relationship to the Holocaust, thus engaging in a passionate debate still raging in Polish society.

Same as: HISTORY 228, HISTORY 328, JEWISHST 282.

**JEWISHST 385A. Core in Jewish History, 17th-19th Centuries. 4-5 Units.**

Same as: HISTORY 385A.

**JEWISHST 385B. Core in Jewish History, 20th Century. 4-5 Units.**

Instructor consent required.

Same as: HISTORY 385B.

**JEWISHST 386C. Jews and the Russian Revolution. 5 Units.**

This course evaluates the role of Jews in Russian radicalism beginning in the 1870s and '80s and focuses on their participation in the Revolutions of 1905 and especially 1917. The connections if any, between Judaism, Messianism, and radicalism will be evaluated, as will the socio-economic and cultural lives of Jews in Russia and how these inflected political attitudes radical and conservative. The course will trace the impact of the revolution on Jewish life into the mid, and late-1920s. The belief that Jews were once responsible for the revolution emerged as one of the cardinal principles of the Russian Right, eventually also the European Right and it would be embedded in the central ideas of Nazism and these developments, too, will be examined.

Same as: HISTORY 286C, HISTORY 386C, JEWISHST 286C.

**JEWISHST 387D. Tel Aviv: Site, Symbol, City. 4-5 Units.**

Tel Aviv, the first Israeli/Hebrew city, from a cultural history perspective combining high and low cultural artifacts, examining the symbolic constructions of the city as a site of Hebrew modernism and postmodernism. Topics include: the utopian origins behind the establishment of Tel Aviv in Zionist texts; artists, poets, and writers in Tel Aviv's coffee houses; as the capital of Bauhaus architecture; the emergence of Israeli pop culture in Tel Aviv of the late 60s and 70s; the effects of contemporary globalization and the reconstruction of Tel Aviv as the symbolic site of Israeli post-nationalism. Sources include art, cinema, and literature, pop music and archival materials from Green Library's Eliasaf Robinson Collection. Hebrew reading knowledge, although helpful, is not required.

Same as: HISTORY 287D, HISTORY 387D, JEWISHST 287D.

**JEWISHST 387E. Jewish Intellectuals and the Crisis of Modernity. 4-5 Units.**

Intellectual responses of Jewish political thinkers, historians and authors to the age of extremes. Readings include Theodor Adorno, Herbert Marcuse, Eric Fromm, Hannah Arendt, Leo Strauss, Karl Popper, Isaiah Berlin, Tony Judt, and George Steiner. Analyses of enlightenment, nationalism, socialism and totalitarianism; their life stories, and their direct and indirect role in creating a transatlantic political discourse in postwar years. Contextualizes historically the fundamental features of Jewish intellectual activity after 1945. No prior knowledge of political science, philosophy and/or Jewish studies is required.

Same as: HISTORY 287E, HISTORY 387E, JEWISHST 287E.

**JEWISHST 387K. Gentlemen and Jews: History of the Jews of England. 4-5 Units.**

Focuses on key chapters in the cultural and political histories of Britain and its Jews, between 1650 and 1950 and examines the advantages, as well as possible difficulties, that emerge when connecting Anglo-Jewish history to mainstream British history. What is unique about Jewish emancipation in England, and what are its connections to the formation of British national identity? Is there a unique path in which Jewish Enlightenment developed in England? What was the contribution of Jews to British Imperialism? Is there a cultural affinity between English philosemitism and liberalism?

Same as: HISTORY 287K, HISTORY 387K, JEWISHST 287K.

**JEWISHST 388. Palestine and the Arab-Israeli Conflict. 4-5 Units.**

1882 to the present. Comparison of representative expressions of competing historical interpretations. U.S. policy towards the conflict since 1948. (Beinin)

Same as: HISTORY 288, HISTORY 388, JEWISHST 288.

**JEWISHST 393X. The Education of American Jews. 4 Units.**

This course will take an interdisciplinary approach to the question of how American Jews negotiate the desire to retain a unique ethnic sensibility without excluding themselves from American culture more broadly. Students will examine the various ways in which people debate, deliberate, and determine what it means to be an "American Jew". This includes an investigation of how American Jewish relationships to formal and informal educational encounters through school, popular culture, religious ritual, and politics.

Same as: EDUC 313X, RELIGST 313X.

**JEWISHST 481. Research Seminar in Middle East History. 4-5 Units.**

Student-selected research topics.

Same as: HISTORY 481, JEWISHST 287S.

**JEWISHST 486A. Graduate Research Seminar in Jewish History. 4-5 Units.**

Same as: HISTORY 486A.

**JEWISHST 486B. Graduate Research Seminar in Jewish History. 4-5 Units.**

Prerequisite: HISTORY 486A.

Same as: HISTORY 486B.

## Korean General Courses

**KORGEN 101. Korean Culture in the New Millennium. 4 Units.**

For over a decade now, South Korea has established itself as a tireless generator of soft power, the popularity of its pop-culture spreading from Asia to the rest of the world. This class will look into the economic engine that moves this "cultural contents" industry, and will examine some of its expressions in the form of K-pop, soap operas, tourism, food, sports, and fashion in order to illuminate the ways in which Korean culture is being (self-)narrated and consumed in this era of globalization of the 21st century.

Same as: KORGEN 201.

**KORGEN 120. Modern and Contemporary Korean literature in translation. 4 Units.**

This introductory survey will examine the development of South and North Korean literature from the turn of the 20th century until the present. The course will be guided by historical and thematic inquiries as we explore literature in the colonial period, in the period of postwar industrialization, and contemporary literature from the last decade. We will supplement our readings with critical writing about Korea from the fields of cultural studies and the social sciences in order to broaden the terms of our engagement with our primary texts.

Same as: KORGEN 220.

**KORGEN 140. Children's Literature and Childhood in East Asia. 3-5 Units.**

Literature for children often reflects society's deepest-held convictions and anxieties, and is therefore a critical site for the examination of what is deemed to be the most imperative knowledge for the young generation. In this respect, the analysis of both texts and visual culture for children, including prose, poetry, folk tales, film, and picture books illuminates prevalent discourses of national identity, family, education and gender. Through an examination of a diverse range of genres and supported by the application of literary theories, students will obtain an understanding, in broad strokes, of the birth of childhood and the emergence of children's literature of China, Korea and Japan from the turn of the century until the present.

Same as: KORGEN 240.

**KORGEN 198. Senior Colloquium in Japanese Studies. 1 Units.**

Research, write, and present capstone essay or honors thesis.

Same as: JAPANEN 198.

**KORGEN 201. Korean Culture in the New Millennium. 4 Units.**

For over a decade now, South Korea has established itself as a tireless generator of soft power, the popularity of its pop-culture spreading from Asia to the rest of the world. This class will look into the economic engine that moves this "cultural contents" industry, and will examine some of its expressions in the form of K-pop, soap operas, tourism, food, sports, and fashion in order to illuminate the ways in which Korean culture is being (self-)narrated and consumed in this era of globalization of the 21st century. Same as: KORGEN 101.

**KORGEN 220. Modern and Contemporary Korean literature in translation. 4 Units.**

This introductory survey will examine the development of South and North Korean literature from the turn of the 20th century until the present. The course will be guided by historical and thematic inquiries as we explore literature in the colonial period, in the period of postwar industrialization, and contemporary literature from the last decade. We will supplement our readings with critical writing about Korea from the fields of cultural studies and the social sciences in order to broaden the terms of our engagement with our primary texts.

Same as: KORGEN 120.

**KORGEN 240. Children's Literature and Childhood in East Asia. 3-5 Units.**

Literature for children often reflects society's deepest-held convictions and anxieties, and is therefore a critical site for the examination of what is deemed to be the most imperative knowledge for the young generation. In this respect, the analysis of both texts and visual culture for children, including prose, poetry, folk tales, film, and picture books illuminates prevalent discourses of national identity, family, education and gender. Through an examination of a diverse range of genres and supported by the application of literary theories, students will obtain an understanding, in broad strokes, of the birth of childhood and the emergence of children's literature of China, Korea and Japan from the turn of the century until the present.

Same as: KORGEN 140.

## Korean Language Courses

**KORLANG 1. First-Year Korean, First Quarter. 5 Units.**

Communication skills, vocabulary, and grammar patterns. Culturally appropriate conduct relevant to contexts such as greetings, gestures, and body language.

**KORLANG 1H. Beginning Korean for Heritage Learners, First Quarter. 3 Units.**

For students with previous knowledge of Korean or a strong background in listening and speaking. Focus is on reading, writing, and spelling rather than speaking and listening. Sources include textbook, workbook, and digitized listening materials. Prerequisite: consent of instructor.

**KORLANG 2. First-Year Korean, Second Quarter. 5 Units.**

Continuation of KORLANG 1. Communication skills, vocabulary, and grammar patterns. Culturally appropriate conduct relevant to contexts such as greetings, gestures, and body language. Prerequisite: Placement Test, KORLANG 1 or consent of instructor.

**KORLANG 2H. Beginning Korean for Heritage Learners, Second Quarter. 3 Units.**

Continuation of KORLANG 1H. For students with previous knowledge of Korean or a strong background in listening and speaking. Focus is on reading, writing, and spelling rather than speaking and listening. Sources include textbook, workbook, and digitized listening materials. Prerequisite: KORLANG 1H or consent of instructor.

**KORLANG 3. First-Year Korean, Third Quarter. 5 Units.**

Continuation of KORLANG 2. Communication skills, vocabulary, and grammar patterns. Culturally appropriate conduct relevant to contexts such as greetings, gestures, and body language. Prerequisite: Placement Test, KORLANG 2 or consent of instructor. Fulfills the University language requirement.

**KORLANG 3H. Beginning Korean for Heritage Learners, Third Quarter. 3 Units.**

Continuation of KORLANG 2H. For students with previous knowledge or a strong background in listening and speaking. Focus is on reading, writing, and spelling rather than speaking and listening. Sources include textbook, workbook, and digitized listening materials. Prerequisite: KORLANG 2H or consent of instructor.

**KORLANG 21. Second-Year Korean, First Quarter. 4-5 Units.**

Continuation of KORLANG 3. More complex sentences and grammatical patterns. Conversation in daily situations such as making a polite request or suggestion, reading simple texts, and Korean culture. Prerequisite: Placement Test, KORLANG 3 or consent of instructor.

**KORLANG 22. Second-Year Korean, Second Quarter. 4-5 Units.**

Continuation of KORLANG 21. More complex sentences and grammatical patterns. Conversation in daily situations such as making a polite request or suggestion, reading simple texts, and Korean culture. Prerequisite: Placement Test, KORLANG 21 or consent of instructor.

**KORLANG 23. Second-Year Korean, Third Quarter. 4-5 Units.**

Continuation of KORLANG 22. More complex sentences and grammatical patterns. Conversation in daily situations such as making a polite request or suggestion, reading simple texts, and Korean culture. Prerequisite: Placement Test, KORLANG 22 or consent of instructor.

**KORLANG 101. Third-Year Korean, First Quarter. 3-4 Units.**

Continuation of KORLANG 23. Materials about Korean culture and society. Proficiency in interpersonal, interpretive, and presentational communication. Vocabulary, reading, and aural/oral skills. Prerequisite: Placement Test, KORLANG 23 or consent of instructor.

**KORLANG 102. Third-Year Korean, Second Quarter. 3-4 Units.**

Continuation of KORLANG 101. Materials about Korean culture and society. Proficiency in interpersonal, interpretive, and presentational communication. Vocabulary, reading, and aural/oral skills. Prerequisite: Placement Test, KORLANG 101 or consent of instructor.

**KORLANG 103. Third-Year Korean, Third Quarter. 3-4 Units.**

Continuation of KORLANG 102. Materials about Korean culture and society. Proficiency in interpersonal, interpretive, and presentational communication. Vocabulary, reading, and aural/oral skills. Prerequisite: Placement Test, KORLANG 102 or consent of instructor.

**KORLANG 110. Korean Pronunciation and Intonation. 1-2 Units.**

Goal is intelligibility and fluency. Lab assignments. Prerequisite: 3 or consent of instructor.

**KORLANG 111. Medical Korean, First Quarter. 2-3 Units.**

Medical vocabulary; cultural attitude. Video clips, technical journal and prescription reading, and class simulations. Prerequisite: 23 or consent of instructor.

**KORLANG 112. Medical Korean, Second Quarter. 2 Units.**

Medical vocabulary; cultural attitude. Video clips, technical journal and prescription reading, and class simulations. Prerequisite: 23 or consent of instructor.

**KORLANG 120A. Korean Culture. 1-3 Units.**

Examination of Korean culture and society to develop fluency and vocabulary through newspapers and short essays. May be repeated for credit. Prerequisites: 103 and consent of instructor.

**KORLANG 120B. Korean Culture. 1-2 Units.**

Examination of Korean culture and society to develop fluency and vocabulary through newspapers and short essays. May be repeated for credit. Prerequisites: 103 and consent of instructor.

**KORLANG 120C. Korean Culture. 1-2 Units.**

Examination of Korean culture and society to develop fluency and vocabulary through newspapers and short essays. May be repeated for credit. Prerequisites: 103 and consent of instructor.

**KORLANG 120K. Korean Language and Culture through Drama and Film. 3-4 Units.**

Korean culture and society through contemporary Korean drama and films. Advanced vocabulary, grammar, and idiomatic expressions. Prerequisite: placement test, 103 or consent of instructor.

**KORLANG 130. Reading Korean. 3-4 Units.**

Contemporary literature and academic texts. Prerequisite: KORLANG 103 or consent of instructor.

**KORLANG 200. Directed Reading in Korean. 1-5 Units.**

Prerequisite: consent of instructor. (Staff).

**KORLANG 395. Graduate Studies in Korean. 1-5 Units.**

Prerequisite: consent of instructor.

## Latin American Studies Courses

**LATINAM 197. Directed Individual Research. 1-10 Units.**

For students engaged in interdisciplinary work that cannot be arranged by department. May be repeated for credit. Prerequisite: consent of instructor.

**LATINAM 198. Honors Thesis. 1-10 Units.**

Restricted to those writing an honors thesis in Latin American Studies.

**LATINAM 200. Seminar on Contemporary Issues in Latin American Studies. 1 Unit.**

Guest scholars present analyses of major Latin American themes.

**LATINAM 398. Master's Thesis. 1-10 Units.**

Restricted to students writing a master's thesis in Latin American Studies. May be repeated for credit.

**LATINAM 801. TGR Project. 0 Unit.**

## Law Courses

**LAW 201. Civil Procedure I. 4 Units.**

This course is part of the required first-year JD curriculum. This course is a study of the process of civil litigation from the commencement of a lawsuit through final judgment under modern statutes and rules of court, with emphasis on the federal rules of civil procedure.

**LAW 203. Constitutional Law. 3 Units.**

This course is part of the required first-year JD curriculum. This course offers an introduction to American constitutional law. In addition to examining questions of interpretive method, the course focuses on the powers of the federal government and the allocation of decisionmaking authority among government institutions, including both federalism and separation of powers.

**LAW 205. Contracts. 4 Units.**

This course is part of the required first-year JD curriculum. It provides exposure to basic contract law. The course will identify the scope and purpose of the legal protection accorded to interests predicated on contract and will focus on problems of contract formation, interpretation, performance, and remedies for breach.

**LAW 207. Criminal Law. 4 Units.**

This course is part of the required first-year JD curriculum. It examines the traditional general issues in the substantive criminal law, including the purposes of punishment and the appropriate limits on the use of the criminal sanction. It focuses predominantly on how criminal statutes are organized around objective offense elements (conduct, causation, and attendant circumstances) and mental states, and to a lesser degree on inchoate crimes, complicity, justification and excuse.

**LAW 217. Property. 4 Units.**

This course is part of the required first-year JD curriculum. It deals with possession and ownership of land and with the incidents thereof, including private and public restrictions on its use and development, nuisance, trespass, concurrent interests, landlord and tenant, and eminent domain.

**LAW 218. JSD Research Colloquium. 0 Unit.**

Required for and limited to JSD candidates. The objective of the colloquium is to assist students in developing their dissertation research proposals. Weekly colloquium sessions will include a mix of lectures and discussions on selected methodological topics, relevant to the candidates' dissertation research; guest lectures by empirical legal research scholars; presentations by and discussions with more advanced doctoral candidates; and presentations by the first year JSD candidates.

**LAW 219. Legal Research and Writing. 2 Units.**

This course is part of the required first-year JD curriculum. Students work under the close supervision of a legal research and writing instructor, learning the techniques of legal library research, writing legal memoranda, drafting documents, preparing an appellate brief, and arguing orally before a moot court.

**LAW 220. Regulatory Economics. 4 Units.**

(Same as ECON 158). This course examines public policies for dealing with problems arising in markets in which competitive forces are weak. The focus is on monopolies, oligopolies, cartels, and other environments where market mechanisms are unlikely to produce outcomes that benefit consumers more than the alternatives involving costly government intervention. The two main areas examined are competition policy and economic regulation. Competition policy refers to policies that define certain market behavior as illegal because it is harmful to competition. Economic regulation refers to policies in which government controls prices and/or decides which firms can participate in a market. Other areas of regulation, such as product and workplace safety standards, are not included in this course.

**LAW 221. Intellectual Property: Commercial Law. 3 Units.**

This seminar, co-taught by eBay's first In-House Counsel and former Director of Law & Public Policy, Brad Handler, examines the ways in which intellectual property rights are asserted, exchanged, protected, and respected, both in theory and in practice. Special attention is devoted to the regulatory and strategic considerations involved in the business and legal decisions implicating intellectual property. See SLS Registrar's website for prerequisites.

**LAW 222. Advanced Legal Research. 3 Units.**

The course is designed to prepare law students for research in practice and clerkships. The course will review who produces legal authority and how this material is organized, published, indexed and kept current. Objectives for the course: 1) to show students how to evaluate legal research sources and use them effectively, with particular emphasis on cost-effective research 2) to expand skills in primary and secondary US legal sources 3) to introduce students to the array of non-legal information resources that could be useful to legal practice. Since learning legal research requires a hands-on approach, students are required to complete homework assignments and in-class exercises. Each student is also required to analyze a recent California Supreme Court opinion.

**LAW 223. Torts. 4 Units.**

This course is part of the required first-year JD curriculum. It considers issues involved in determining whether the law should require a person to compensate for harm intentionally or unintentionally caused. These problems arise in situations as diverse as automobile collisions, operations of nuclear facilities, and consumption of defective food products. Among other considerations, the course explores various resolutions in terms of their social, economic, and political implications.

**LAW 224. Federal Litigation. 2 Units.**

This course is part of the required first-year JD curriculum. It is an introductory course in the litigation process. Students represent the plaintiff or defendant in a simulated public interest case set in a federal district court that raises complex issues of federal civil procedure, privacy, and first amendment law. Students plan litigation strategy, draft pleadings, conduct discovery, write short briefs, and orally argue major motions for dismissal, class action certification, and preliminary injunctive relief. While developing students' written and oral advocacy skills, the course also focuses on substantive issues of civil procedure and constitutional law.

**LAW 225A. Immigrants' Rights Clinic: Clinical Practice. 4 Units.**

The Immigrants' Rights Clinic offers students the opportunity to provide direct representation to indigent immigrants, including immigrant survivors of domestic violence, non-citizens in removal (deportation) proceedings, and asylum seekers. Students enrolled in the clinic participate in all aspects of case development, including interviewing clients and witnesses, investigating facts, writing pleadings, developing case strategy, conducting legal research, and/or arguing cases. Clinic students also work on a variety of multi-disciplinary legal advocacy projects on behalf of immigrants' rights organizations and community groups. Students conduct various forms of advocacy, including impact litigation, media work, public education, lobbying, litigation in international tribunals, and grassroots organizing. No prior substantive experience or background in immigration or immigrants' rights work is necessary. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 225B. Immigrants' Rights Clinic: Clinical Methods. 4 Units.**

The Immigrants' Rights Clinic offers students the opportunity to provide direct representation to indigent immigrants, including immigrant survivors of domestic violence, non-citizens in removal (deportation) proceedings, and asylum seekers. Students enrolled in the clinic participate in all aspects of case development, including interviewing clients and witnesses, investigating facts, writing pleadings, developing case strategy, conducting legal research, and/or arguing cases. Clinic students also work on a variety of multi-disciplinary legal advocacy projects on behalf of immigrants' rights organizations and community groups. Students conduct various forms of advocacy, including impact litigation, media work, public education, lobbying, litigation in international tribunals, and grassroots organizing. No prior substantive experience or background in immigration or immigrants' rights work is necessary. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 225C. Immigrants' Rights Clinic: Clinical Coursework. 4 Units.**

The Immigrants' Rights Clinic offers students the opportunity to provide direct representation to indigent immigrants, including immigrant survivors of domestic violence, non-citizens in removal (deportation) proceedings, and asylum seekers. Students enrolled in the clinic participate in all aspects of case development, including interviewing clients and witnesses, investigating facts, writing pleadings, developing case strategy, conducting legal research, and/or arguing cases. Clinic students also work on a variety of multi-disciplinary legal advocacy projects on behalf of immigrants' rights organizations and community groups. Students conduct various forms of advocacy, including impact litigation, media work, public education, lobbying, litigation in international tribunals, and grassroots organizing. No prior substantive experience or background in immigration or immigrants' rights work is necessary. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 226. Accounting. 3 Units.**

The objective of financial accounting is to measure economic activity for decision-making. Financial statements are a key product of this measurement process and an important component of firms' financial reporting activities. This course is aimed at developing students' ability to read, understand, and use corporate financial statements. The primary focus is on understanding the mapping between underlying economic events and financial statements, and how this mapping can affect inferences about future firm profitability. To this end, the course will provide an introduction to: (1) accrual accounting concepts, principles and conventions; (2) the process of preparing and presenting the primary financial statements (income statement, balance sheet, and statement of cash flows); (3) the judgment involved and discretion allowed in making accounting choices; (4) the effects of accounting discretion on the quality of the (reported) financial information; and (5) the fundamentals of financial statement analysis. Class time will be allocated to a combination of short lectures and discussions of the assigned cases. The assigned cases are based on actual corporate financial statements and/or "real life" financial situations.

**LAW 229. Equal Protection: Race and the Law. 3 Units.**

This course will examine the application of constitutional and statutory antidiscrimination law to race related controversies across a variety of settings. The course will begin with an exploration of the historical developments that led to antidiscrimination law, and with an introduction to the competing frameworks that define current antidiscrimination law: the discriminatory purpose and anti-classification approaches that feature prominently in equal protection doctrine, and the disparate impact framework that is incorporated into some statutory law. After some exploration of the historical origins of antidiscrimination law and its alternative formulations, the course will then turn to the specific contexts in which controversies arise. The settings that will be examined include criminal justice, college admissions, political participation, primary/secondary education, employment, housing, hate speech, and the formation of family relationships. In each of these settings, we will devote close attention to the role of antidiscrimination law in specific controversies. Throughout, our intellectual goals will be twofold: to understand the special challenges that race poses, and to appreciate more generally some of the dilemmas of legal regulation.

**LAW 233. Antitrust. 3 Units.**

This course will explore the basic concepts in antitrust and competition. We will examine cartels, monopolization, vertical restraints and mergers.



**LAW 236. Art and the Law. 2 Units.**

This course covers the legal, public policy, and ethical issues that concern artists, art dealers, auction houses, museums, collectors, and others who comprise the world of visual art. Our focus will be on artists' rights (including copyright, resale royalties, moral rights, and freedom of expression issues), how the market in art functions (such as the artist-dealer relationship, auction rules, and issues faced by collectors), and the legal and ethical rules governing the collection, donation, and display of visual art, particularly for museums and their donors. The course focuses on certain recurrent themes: How do statutes and courts define (or attempt to define) art-and how is art defined differently for different legal purposes? How does the special character of art justify or require different treatment under the law from that accorded other tangible personal property, and how does (and should) the expressive nature of art affect the way it is owned, protected, regulated, or funded? We anticipate having two or three visitors to the class during the quarter, such as a gallery owner, auctioneer, and museum director. In addition, will also have the students participate in at least one or two interactive negotiation simulation exercises inspired by real situations and controversies in the art world.

**LAW 238. Administrative Law. 4 Units.**

Administrative agencies interpret statutes, promulgate regulations, and adjudicate disputes, thereby affecting vast areas of life -- from employment to food and drug safety, from the environment to energy markets, and from telecommunications to immigration. This course surveys the law of the administrative state, considering rationales for delegation to administrative agencies, procedural and substantive constraints of agency decision-making, and the judicial review of agency actions.

**LAW 239. Writing Workshop: Law and Creativity. 3 Units.**

Practicing law is very much a creative enterprise. Effective advocates and counselors provide innovative and thoughtful solutions to complex problems. But there often isn't enough attention devoted in law school either to thinking creatively or to reflecting in a creative way on the issues students confront inside and outside the classroom. This course response to this gap by building a bridge between law and the arts, with the goal of helping students hone their ability to think creatively and use disciplined imagination. Law & Creativity meets twice a week and has dual components designed to inform one another. The first session is structured as a seminar in which students gather to examine and discuss creative treatments of legal and professional issues in a variety of media (including film, fiction, and nonfiction). The second session follows the creative-writing workshop model in which students submit their own fiction and creative nonfiction pieces for group discussion. Through the workshop process, students develop the skills necessary to constructively critique and workshop one another's work, and learn a variety of techniques for improving their own creative writing.

**LAW 240. Bankruptcy. 3 Units.**

This course is a study of the rights of secured and unsecured creditors under state law and federal bankruptcy law, and the corresponding rights of debtors. Subjects covered include methods of collecting judgments, fraudulent conveyances, general assignments, bankruptcy jurisdiction, powers of the trustee, the automatic stay, and reorganization under Chapter 11. Particular attention is paid to the policy considerations underlying the bankruptcy code, as well as its relationship to other facets of commercial law.

**LAW 241. Payment Systems. 3 Units.**

Negotiable instruments, letters of credit, checks, credit cards, electronic fund transfers, and cash. This course surveys the legal mechanisms by which funds can be transferred, including new mechanisms that have become more important as a result of (a) changes in electronic technology and (b) increased international trade. Designing a system for transferring funds is not easy -- as e-firms like PayPal have discovered -- and the law has had to deal with the difficulties of each new system in turn. The principal focus will be on articles 3, 4, 4A, and 5 of the Uniform Commercial Code, with occasional reference to other statutes and to international conventions and treaties.

**LAW 242. Corporations. 4 Units.**

This course is an introduction to the basic legal rules and principles governing the relations among managers, investors, and creditors in the business enterprise. The course is the foundation for advanced business courses. We focus on problems that arise because a firm's managers and owners have conflicting interests. We examine the costs associated with this conflict and how markets, legal rules and contracts might reduce them. Agency and partnership law are covered briefly, but we emphasize the financing, control, and conflicts of publicly held corporations. Special Instructions: Exposure to Quantitative Methods: Finance (Law 467) and Quantitative Methods: Statistical Inference (Law 468) will be helpful in this course and for a number of advanced courses in the law and business concentration and is strongly recommended.

**LAW 245. China Law and Business. 3 Units.**

This introductory course provides an overview of the Chinese legal system and business environment and examines Chinese legal rules and principles in selected business-related areas. These areas include intellectual property, dispute resolution, foreign investment, mergers and acquisitions, antimonopoly law, and environment. Through active class participation and analysis of business case studies, students will learn both the law in the books and the law in action in China, as well as strategies that businesses could use to overcome limitations in the Chinese legal system. Leaders from the legal and business communities will be invited to share their experiences and insights.

**LAW 248. Corporate Reorganization. 3 Units.**

This course examines the reorganization of a financially distressed company under chapter 11 of the Bankruptcy Code. Among other things, the course follows a fictitious company through several stages of a business turnaround and financial restructuring, including an out-of-court workout, a chapter 11 filing, selected chapter 11 operating issues, and the negotiation, formulation and confirmation of a plan of reorganization. In addition, the course follows current developments relating to bankruptcy, primarily through reports in the media. For example, in recent years the course has examined developments in actual chapter 11 cases (e.g., General Motors, Chrysler Corporation, and Lehman Brothers) and the effects of bankruptcy on specific industries (e.g., airlines, financial services and real estate).

**LAW 251. Conflict of Laws. 3 Units.**

Cross-border civil litigation (interstate as well as international) can give rise to three major issues, adjudicatory jurisdiction, choice-of-law and enforcement (recognition) of judgments. The course will consider these issues and explore the various theories that developed in respect of each.

**LAW 255. Constitutional Law: The Fourteenth Amendment. 3 Units.**

This course examines various aspects of the Fourteenth Amendment, with special attention paid to equal protection and substantive due process. Topics addressed will include equal protection in relation to race, gender, and sexual orientation, among others, and substantive due process in relation to procreation, sexuality, and relationships. The state action doctrine will also be covered.

**LAW 259. State-Building and the Rule of Law Workshop. 3 Units.**

The State-Building and Rule of Law Workshop is a law and development course centrally concerned with bridging theory and practice. The workshop introduces the key theories relevant to state-building generally and strengthening the rule of law in particular. And it critically examines efforts to promote state-building and the rule of law in countries at a state-building stage of development. The workshop situates rule of law programs conceptually and practically with the imperative to build durable formal and informal institutions, including legal institutions, which have legitimacy and capacity and can ensure security. The workshop also critically assesses case studies as well as project documents generated by the development industry on state-building. The theoretical and applied discussions lay the foundation for the third part of the workshop: a practicum unit where students present draft project proposals, project work products or analytical papers. In the practicum unit, one group will build on the on-going project on legal education in Afghanistan, another will pursue needs in the Bhutan negotiation and mediation project. Yet another group of students will develop rule of law projects for other countries within the scope of the workshop or write analytical problem oriented papers about the challenges to building the rule of law in one or more of these countries. The set of developing countries considered within the scope of this workshop is broad. It includes, among others, states engaged in post-conflict reconstruction, e.g., Cambodia, Timor Leste, Sierra Leone; states still in conflict, e.g., Afghanistan, Somalia; the poorest states of the world that may not fall neatly into the categories of conflict or post-conflict, e.g., Nepal, Haiti; and least developed states that are not marked by high levels of violent conflict at all, e.g., Bhutan.

**LAW 262. Corporate Finance I. 3 Units.**

There are many contexts in which lawyers need an understanding of finance. For example, many of the disputes that give rise to litigation center on the financial valuation of firms and the securities they issue. In addition, an understanding of firms' capital structures and the design of corporate securities is necessary in analyzing many legal issues, especially those arising in corporate transactions, executive compensation, and bankruptcy proceedings. This course is designed to provide students with a rigorous conceptual understanding of finance and to give students the analytical tools needed to make financial decisions and value financial securities. The course stresses problem solving and includes problem sets, cases, and a midterm and final examination. The course is designed to be accessible to students with a fairly limited mathematical background. In general we will not assume any knowledge of mathematics beyond high-school algebra. Special instructions: This course is not open to JD/MBA students or students with substantial prior background in finance.

**LAW 267. Law of Nonprofits. 3 Units.**

This course provides an overview of the rules governing the formation and operation of nonprofit organizations. The course will focus both on the state laws governing nonprofit corporations and on federal tax laws. Topics will include the fiduciary duties of nonprofit directors, obtaining and maintaining tax-exempt status, nonprofit lobbying and political activities, and nonprofit earned income strategies, including social enterprise.

**LAW 272A. Organizations and Transactions Clinic: Clinical Practice. 4 Units.**

The goal of the Organizations and Transactions Clinic ("O&T") is to introduce students to the materials, expectations, interactions, disciplines and vocabulary of corporate practice. We learn about corporate context, relationships and documents, and about the expectations for professional work-product and client communication. We emphasize methodical analysis, effective collaboration, efficient writing and crisp execution. As part of introduction to practice, we also want students to see how corporate lawyers can serve community as well as commercial organizations through pro bono, board service and other activities. O&T client work centers on representation of established Northern California nonprofit organizations. Clients vary by size, policy area and operating model; most have annual revenues between \$300,000 and \$7 million. The clinic targets organizations working in sustainable agriculture, food security and food system reform; core human services such as mental health care, shelter, and family support; and education and youth development. Our practice focuses on corporate governance, contract and risk management matters. We provide governance advice and documents, draft contract and management materials and analyze operating programs and contractual arrangements. We do all our client work in two-person teams. Students have primary responsibility for client work, acting the under the supervision of the clinic director and clinical teaching fellow. Students generally work with 3 - 4 clients during the quarter and typically interact with client CEOs, board members and general counsels.

**LAW 272B. Organizations and Transactions Clinic: Clinical Methods. 4 Units.**

The goal of the Organizations and Transactions Clinic ("O&T") is to introduce students to the materials, expectations, interactions, disciplines and vocabulary of corporate practice. We learn about corporate context, relationships and documents, and about the expectations for professional work-product and client communication. We emphasize methodical analysis, effective collaboration, efficient writing and crisp execution. As part of introduction to practice, we also want students to see how corporate lawyers can serve community as well as commercial organizations through pro bono, board service and other activities. O&T client work centers on representation of established Northern California nonprofit organizations. Clients vary by size, policy area and operating model; most have annual revenues between \$300,000 and \$7 million. The clinic targets organizations working in sustainable agriculture, food security and food system reform; core human services such as mental health care, shelter, and family support; and education and youth development. Our practice focuses on corporate governance, contract and risk management matters. We provide governance advice and documents, draft contract and management materials and analyze operating programs and contractual arrangements. We do all our client work in two-person teams. Students have primary responsibility for client work, acting the under the supervision of the clinic director and clinical teaching fellow. Students generally work with 3 - 4 clients during the quarter and typically interact with client CEOs, board members and general counsels.

**LAW 272C. Organizations and Transactions Clinic: Clinical Coursework. 4 Units.**

The goal of the Organizations and Transactions Clinic ("O&T") is to introduce students to the materials, expectations, interactions, disciplines and vocabulary of corporate practice. We learn about corporate context, relationships and documents, and about the expectations for professional work-product and client communication. We emphasize methodical analysis, effective collaboration, efficient writing and crisp execution. As part of introduction to practice, we also want students to see how corporate lawyers can serve community as well as commercial organizations through pro bono, board service and other activities. O&T client work centers on representation of established Northern California nonprofit organizations. Clients vary by size, policy area and operating model; most have annual revenues between \$300,000 and \$7 million. The clinic targets organizations working in sustainable agriculture, food security and food system reform; core human services such as mental health care, shelter, and family support; and education and youth development. Our practice focuses on corporate governance, contract and risk management matters. We provide governance advice and documents, draft contract and management materials and analyze operating programs and contractual arrangements. We do all our client work in two-person teams. Students have primary responsibility for client work, acting under the supervision of the clinic director and clinical teaching fellow. Students generally work with 3 - 4 clients during the quarter and typically interact with client CEOs, board members and general counsels.

**LAW 273. Deals I. 3 Units.**

This course applies economic concepts to the practice of structuring contracts. The course extends over two quarters, meeting three hours per week the first quarter and two hours per week the second quarter. Students enrolled in the course must take both quarters. All or most of the first quarter will be spent in a traditional classroom setting, discussing economics articles and case studies of actual contracts that illustrate the concepts described in the articles. Beginning either at the end of the first quarter or the beginning of the second quarter until the end of the course (the "deals" segment of the course), we will explore the connection between economic theory and contracting practice by studying specific current deals. Students, divided into groups, will study a deal beginning in the first quarter. Then, during the deals segment of the course, each group will give a presentation of its deal to the class. The following week, a lawyer or other participant in the deal will come to class and lead a discussion of the deal. When it works, the students' and the practitioners' analyses are mutually enlightening. We study new deals each year. Deals that we have studied over the years have included movie financings, biotech alliances, venture capital financings, cross-boarder joint ventures, private equity investments, and corporate reorganizations.

**LAW 274. Advanced Immigrants' Rights Clinic. 2-7 Units.**

The Immigrants' Rights Advanced Clinic offers the opportunity for students who have already successfully completed the Immigrants' Rights Clinic to pursue: a specific immigrants' rights advocacy project; advanced individual client representation; and/or working with the clinic director to provide direction/guidance to those enrolled in the Clinic for the first time. All advanced Clinic projects will be jointly designed by the director and the advanced student. Advanced students providing guidance/direction to first-time students will receive additional training on providing supervision.

**LAW 275. Deals II. 2 Units.**

This course applies economic concepts to the practice of structuring contracts. The course extends over two quarters, meeting three hours per week the first quarter and two hours per week the second quarter. Students enrolled in the course must take both quarters. All or most of the first quarter is spent in a traditional classroom setting, discussing economics articles and case studies of actual contracts that illustrate the concepts described in the articles. Beginning either at the end of the first quarter or the beginning of the second quarter until the end of the course (the "deals" segment of the course), the class explores the connection between economic theory and contracting practice by studying specific current deals. Students, divided into groups, study a deal beginning in the first quarter. Then, during the deals segment of the course, each group gives a presentation of its deal to the class. The following week, a lawyer or other participant in the deal will come to class and lead a discussion of the deal. When it works, the students' and the practitioners' analyses are mutually enlightening. The course examines new deals each year. Deals that studied over the years have included movie financings, biotech alliances, venture capital financings, cross-border joint ventures, private equity investments, and corporate reorganizations.

**LAW 280. Toxic Harms. 3 Units.**

This seminar will examine the concerns arising from exposure to toxic substances from a variety of perspectives. A principal focus will be tort liability, and a central theme in the course will be whether tort law is an effective method of compensating victims of toxic exposure and controlling the distribution and/or emission of toxic substances. In order to assess the efficacy of tort, it is essential to compare the liability system with alternatives such as restructured "public law" litigation, administrative compensation schemes, and regulatory control strategies. Moreover, it seems equally important that these options be grounded in a concrete understanding of the major current problem areas. To accomplish these aims, the course will focus on a number of specific present concerns, including tobacco, asbestos, anti-inflammatory drugs, and natural gas extraction (fracking). In each instance, we will look at the nature of the public health problem as well as ensuing tort litigation and regulatory activity. In addition to examining these distinctive problem areas, we will look at broader, cross-cutting institutional reform proposals that have received recent attention.

**LAW 281. Natural Resources Law and Policy. 3 Units.**

Natural resource management presents extremely difficult and contentious issues of law and public policy. Major debates continue to rage over issues such as the Endangered Species Act, whether the United States should permit drilling in the Arctic National Wildlife Refuge, and how to prevent the overfishing of the oceans. This course will focus on two major aspects of natural-resource management: biodiversity protection (including the Endangered Species Act, ocean fisheries management, and global protection of marine mammals) and public lands in the United States such as national parks and wilderness areas. The course also will examine the National Environmental Protection Act and the effectiveness of environmental impact assessments. Class sessions will include critical examinations of current law and policy and in-depth discussions of situational case studies that force you to consider how you would resolve real-life issues.

**LAW 283. Federal Courts. 5 Units.**

This course considers the role of the federal courts in the federal system. It is both an advanced course in constitutional law and a course on the institutional design of the federal courts. In the first aspect, it considers two great themes: the allocation of power between the states and the federal government -- federalism -- and the relationship between the federal courts and the political branches of the national government -- separation of powers. In the other aspect, it focuses on the structure of the judicial system, the scope and limits of federal judicial power, essential aspects of federal court procedure, and the evolving structural response of the federal courts to changes in technology, commerce, government, and a multitude of factors that affect the business of the federal courts and the role of federal judges. Topics include the original and appellate jurisdiction of the federal courts, Supreme Court review of state court judgments, federal common law including implied rights of action, Congressional power to limit the jurisdiction of the federal courts and to create adjudicative bodies within the federal government but outside the requirements of Article III, state sovereign immunity, litigating against the government and federal habeas corpus. This course is highly recommended for students planning to practice in the federal courts or to pursue a judicial clerkship. This course complements Constitutional Litigation (Law 641), and students who plan to clerk will benefit from taking both courses.

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**LAW 285. International Trade Law. 3 Units.**

Economic interdependence between countries and across production chains continues to grow. In this context, stable rules on international trade and investment are key. This course focuses on the rules established under the World Trade Organization (WTO) as well as selected regional trade agreements entered into by the United States. What are the benefits and risks of trade liberalization? How can trade liberalization go hand in hand with other public policy goals such as protecting the environment and human rights or promoting the economic development of poor countries? The course will offer an in-depth, practical knowledge of substantive WTO law drawing heavily on case law. It will address the basic principles of trade in goods and trade in services as well as more specialized WTO agreements on, for example, health measures, subsidies and intellectual property rights. From a more procedural side, the course will pay close attention to the unique WTO mechanism for the solution of trade disputes, with special reference to the recent trade tensions between the United States and emerging countries like Brazil, China and India. We will also focus, in particular, on disputes related to information technology, the internet and the movie industry.

**LAW 290. Evidence. 5 Units.**

Evidence rules constrain proof at criminal and civil trials. We will study the Federal Rules of Evidence, related case law, and those constitutional concepts that limit proof at criminal trials. Topics include relevance, unfair prejudice, character evidence, impeachment, the rape shield law, hearsay, the Confrontation Clause, and, if time permits, expert testimony. Please note that the California Bar Examiners have posted this announcement: Applicants should be prepared to answer questions that have issues concerning the Federal Rules of Evidence and the California Evidence Code. Applicants should be prepared to compare and contrast the differences between the Federal Rules and the California Evidence Code, especially where the California rules of evidence have no specific counterparts in the Federal Rules. This evidence course covers only the Federal Rules of Evidence and does not address the California Evidence Code. Although similar principles of law govern the California Code and Federal Rules, the two sets of rules are not identical. Students preparing for the California Bar Exam will have to learn some new material.

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**LAW 293. Family Law. 3 Units.**

Family law mediates and structures life's most intimate relationships. It establishes rules that order the relationships of members of family units and between families and society as a whole. The rules reflect many of society's most critical value premises--about gender roles, parent child relationships, sexual behavior, and how people should order and arrange their family lives. Social policy regarding families is a central focus of many disciplines, law being just one. This course examines the rules regarding the making and breaking of legally recognized relationships, especially those between marital partners and parents and children.

**LAW 297. Entertainment Law. 3 Units.**

Entertainment law is not, in and of itself, a separate legal discipline. Instead, the practice of entertainment law lies at the intersection of various traditional legal disciplines, such as contract, tort, copyright, trademark, antitrust, secured transactions, etc., and applies those disciplines to a unique business setting. This course is intended to approach the study of entertainment law from a practical perspective, applying the principles of traditional legal disciplines to avoid problems and find solutions in various facets of the entertainment industry. To accomplish the necessary background, it studies the entertainment industry from both a macro level (i.e., the organization of the motion picture, television and music business, including the function of studios, producers, networks, record companies, agencies, managers, lawyers and labor unions) and a micro level (i.e., examining actual agreements in order to understand the principal components of motion picture talent, production and distribution contracts, television series contracts, music and book publishing contracts). The course also examines key litigation issues that affect the industry, such as the interaction of the First Amendment and the right of publicity, the right of privacy and libel, the anti-SLAPP laws, the "final cut" and profit participation cases. The impact of the digital media (including the internet) are, of course, analyzed, along with the future of the entertainment industry, including convergence, holograms, syntho-thesians and the like. The class includes guest speakers from the entertainment industry to embody both business and legal considerations. The overall goals of this course are (1) to expose students to the unique and increasingly complex structure of the entertainment business; (2) to foster an understanding of the role the law and entertainment lawyers play in that unique business structure; (3) to strengthen students' ability to draft key documents and craft persuasive legal arguments to accomplish the goals they may seek to achieve as lawyers in the entertainment industry; and (4) to develop the analytical and problem-solving skills necessary to make them into effective entertainment lawyers.

**LAW 299. Derivatives. 2 Units.**

The course will examine the legal, regulatory, trading and risk management aspects of the \$600 trillion notional over-the-counter and exchange traded derivatives markets. Derivatives are not well-understood by regulators or the public, and have been blamed for causing or contributing to the economic crisis. This course will offer students the opportunity to understand how various derivative products are designed, traded and risk-managed and what role regulators play in the derivatives industry. In addition, students will focus on understanding key legal contracts that underpin the global derivatives industry, in particular focusing on the ISDA® Master Agreement and Credit Support Annex, as well as documentation supporting credit derivatives. Students will also consider the shifting regulatory landscape for financial institutions and hedge funds as it relates to the way in which these products are traded, with rates and credit products migrating to clearinghouses, as well as how conduct of business rules and disclosures may shift. The course will conclude with an examination of the economic crisis that erupted with Lehman Brothers' bankruptcy in September 2008 and the consequent policy reactions to that event from a derivatives and bankruptcy perspective.

**LAW 300. Securities Litigation. 3 Units.**

This course examines private enforcement of the securities laws through class action litigation. The course will analyze the elements of the key causes of action under the securities laws-materiality, causation, and damages-and the ways in which each is proven. A central element of proof in these cases is expert testimony based on an econometric technique called an "event study." An economist who specializes in this type of work teaches this methodology to the class. The course also covers procedural requirements that are unique to securities class actions, including class certification and pleading requirements. Finally, it covers the dynamics of settlement and the role of rules governing indemnification and insurance for defendants. The course concludes with an assessment of the public policy issues bearing on private securities litigation.

**LAW 302. Advanced Topics in Federalism. 2-3 Units.**

This seminar will deal with a variety of legal issues arising out of our federal system. The goal is to go beyond well-worn debates about Congress's enumerated powers and look at a series of more intricate legal problems. The first part of the course will examine several discrete issues about the relationship of states to federal institutions, such as whether states have any reserved rights under the Tenth Amendment, and what relationship states have to federal courts. The second part of the course will look at "horizontal" federalism--i.e., relations between the states themselves. The final part of the course will reflect on the bigger picture--what purposes, if any, is federalism supposed to serve, and which of these doctrines, if any, serve them well?.

**LAW 304. Law and the Rhetorical Tradition. 3 Units.**

(Same as PWR 194). This interdisciplinary seminar explores the rhetorical underpinnings of legal argument. The first half of the course acquaints students with relevant elements of the rhetorical tradition. The second half analyzes a variety of legal texts (both written and oral) with an eye to the use and function of rhetorical principles, as well as the ways form and content are mutually constitutive. This course aims both to increase students' understanding of rhetoric as readers and interpreters of legal texts and to develop students' skills as writers and speakers. Students are expected to participate in class discussion in addition to completing a series of writing assignments including the rhetorical analysis of legal and non-legal texts and the revision of students' legal writing.

**LAW 307. Gender, Law, and Public Policy. 3 Units.**

Topics in this course will include equal protection standards, employment, family, reproductive rights, sexual harassment, rape, domestic violence, pornography, sexual orientation, diversity in the profession, feminist legal theory, international human rights, and intersections with race, ethnicity, class, and sexual orientation. Materials will include cases, commentary, problems, and media portrayals.

**LAW 308. Cultural Heritage Law and Policy. 3 Units.**

This seminar explores the growing national and international attention to law and policy concerning cultural heritage (works of art, antiquities, architecture, monuments, archives, intangible cultural heritage, cultural diversity, etc.). Students will write and present research papers.

**LAW 310. Protecting Workers' Rights in Hard Times. 2-3 Units.**

Workplace law is at a difficult crossroads. With high unemployment, violations of labor laws widespread, and unionization at an all-time low, promoting workers' rights poses unprecedented challenges. This seminar will explore, in turn, a variety of pressing issues confronting worker advocates and policymakers. Through analysis of academic and non-academic readings, and candid conversations with attorneys and officials in the trenches, we will evaluate the contours of each problem and consider a variety of solutions that have been attempted or proposed. We will consider statutory and common-law reforms, as well as the quality of enforcement, new regulatory approaches, and private/nonprofit-sector initiatives. Among the topics to be explored are the "fissuring" of employment relationships through outsourcing, franchising, reliance on independent contractors, and the like; the prevalence of wage theft; the difficulties of redressing more subtle forms of workplace discrimination; the decline of private-sector unionization and the attack on public-sector unions; the precarious legal status of undocumented workers; the regulatory challenges involved in protecting workers' safety and health; and the proliferating contractual bans on workers' ability to pursue class actions and court adjudication. The course format will combine lecture, group discussions and guest presentations. Although there are no formal prerequisites, prior experience and/or coursework in at least one workplace-related field such as employment law, employment discrimination law, or labor law is recommended.

**LAW 311. Comparative Law. 2-3 Units.**

The big question in comparative law today—and one that is of key importance to anyone interested in international law—is whether we are currently witnessing a convergence of national legal systems. This course examines this question, as well as the related problem of American exceptionalism, by exploring key aspects of contemporary Western European legal systems. We will study a range of legal institutions and practices, including such topics as legal education, the role of judges and judging, the function and meaning of codes versus precedent, constitutional courts, judicial review, and criminal procedure and punishment. In contrast to the traditional comparative law course, we will also devote substantial time to such pressing public-law questions as racial equality and affirmative action, gender equality and sexual harassment, church and state, and the relationship between European institutions, on the one hand, and national legal systems, on the other.

**LAW 312. Criminal Procedure: Investigation. 4 Units.**

The law school offers two survey courses dealing with constitutional criminal procedure. "Criminal Adjudication" covers the formal pretrial and trial processes, including the right of counsel, prosecutorial charging criteria, grand juries, bail, speedy trial, discovery, plea bargaining, trial by jury, and double jeopardy. This course, "Criminal Investigation," covers police investigation in the form of searches and seizures, interrogations, lineups, and undercover operations, and hence examines the Fourth, Fifth, and Sixth Amendment rules regulating the police in these endeavors. It also incorporates some of the new statutory law of investigation under the USA Patriot Act and other laws relating to national security. Students may take both Criminal Investigation and Criminal Adjudication. (There is, of course, no requirement to do so.)

**LAW 315. Criminal Procedure: Adjudication. 4 Units.**

The Law School offers two survey courses dealing with constitutional criminal procedure. "Criminal Investigation" will consider questions that arise under the fourth, fifth, and sixth amendments regarding investigations, interrogations, and charging decisions. This course, "Criminal Adjudication," will look at the way the judicial system handles criminal cases. Topics will include the right to counsel (and the concomitant right to "effective assistance" of counsel), prosecutorial discretion and plea bargaining, joinder and severance, discovery, the right to jury trial, double jeopardy, sentencing, and appellate review. Students may take both Criminal Investigation and Criminal Adjudication. (There is, of course, no requirement to do so.)

**LAW 318. History of American Law. 3 Units.**

(Same as HISTORY 352B). This course examines the growth and development of American legal institutions with particular attention to crime and punishment, slavery, and race relations, the role of law in developing the economy, and the place of lawyers in American society, from colonial times to the present.

**LAW 321. Patent Prosecution. 2 Units.**

(Same as ME 238). The course follows the patent application process through the important stages: inventor interviews, patentability analysis, drafting claims, drafting a specification, filing a patent application, and responding to an office action. The subject matter and practical instruction relevant to each stage are addressed in the context of current rules and case law. The course includes four written assignments: an invention capture, a claim set, a full patent application, and an Office Action response. Prerequisites: Law 326 (IP:Patents), Law 409 (Intro to IP) or ME 208.

**LAW 322. Patent Litigation Workshop. 3 Units.**

This course simulates the strategy and pretrial preparation of a patent lawsuit. The course materials include information typical to a patent lawsuit: a patent, file history, prior art, and information regarding the accused product. Students will represent either the patentee or the accused infringer. Students will plan litigation strategy, meet with and advise a client, conduct written discovery, take and defend depositions, and brief and argue claim construction and motions for summary judgment. Some knowledge of patent law is presumed. IP: Patents (Law 326) is a prerequisite for this course, but can be taken coterminously.

**LAW 323. Cross Border Mergers and Acquisitions. 3 Units.**

This course will explore the complexities of cross-border mergers and acquisitions, with a particular focus on transatlantic and other international public M&A transactions. The subject-matter provides an opportunity to tie together different bodies of law relevant to M&A (corporate, contracts, securities, antitrust and other regulatory fields.) and to confront the US, European and other geographical and cultural legal and business environments in a deal-oriented context, including case studies of major transactions. We will go over the business and legal framework of cross-border M&A, transaction structures and key deal considerations, and explore the content of cross-border M&A agreements. Regulatory matters, deal risk management and hostile takeovers will also be addressed, as well as post-merger matters and broader policy and cross-cultural considerations. Guest speakers will be invited to share their experience. The course will aim to provide students with a broad understanding of the legal aspects of major cross-border M&A transactions. This is an interactive, primarily practice-oriented course requiring active student participation.

**LAW 324. Intellectual Property: Copyright. 3 Units.**

Copyright law protects the broad range of creative expression -- from literature, music, art, and film to computer software and video games. This course provides a strong foundation in the workings of the copyright system as well as the challenges posed by the digital age.

**LAW 325. The Role of the Modern General Counsel. 2 Units.**

(Same as GSBGEN 544) The news is filled with reports of one corporate crisis after another - names like BP, Goldman Sachs, Bank of America, AIG, Siemens, Toyota, and issues like backdating, bribery, antitrust violations, insider trading, procurement fraud, health and safety violations, consumer class actions and the like. And often the cry is heard - where are the lawyers? This course explores the evolution of the role of the general counsel in major American public companies and, more broadly, the expanding role of in-house counsel. These are the lawyers in the trenches, on the front lines of American businesses. Each week, we'll review another dimension of the general counsel's job. We'll consider how general counsel today play an important role on the executive team of major companies and explore the different ways in which general counsels manage large corporate legal departments and direct functional legal areas like litigation, IP, corporate and securities, M&A, environmental and employment law. We will also examine the professional responsibilities and legal obligations of the general counsel -- including the delicate and sometimes conflicting reporting relationships to the CEO and the board of directors -- and consider how an in-house legal department fits into a corporation's organizational structure and how it supports the company's operating units on a day-to-day basis. We will explore the general counsel's role in internal investigations, regulatory investigations and compliance programs, and governmental affairs. We will also consider current practices in how in-house lawyers select, collaborate with and evaluate outside counsel. The class will meet weekly and we will invite current and former general counsels to join us occasionally for our discussions. Each student will be expected to participate actively in class discussions, and will be required to complete two projects, each in collaboration with three other students and submitted as a team, presenting how the team would address a complex set of legal and business issues.

**LAW 326. Intellectual Property: Patents. 3 Units.**

This course is a comprehensive introduction to patent law, the patent system, and the way patents are deployed by businesses and other patent owners. We cover the core concepts of U.S. patent law, as they relate to (1) patent validity; (2) infringement; and (3) remedies. We draw on traditional case law under the 1952 Patent Act, as well as recent legislation (particularly the America Invents Act of 2011) and contemporary case law (both Federal Circuit and Supreme Court). We will emphasize two main themes: (a) practical aspects of the patent system, of interest to inventors, entrepreneurs and patent owners; and (b) issues that pose challenges to the patent system, such as the purchase and sale of patent portfolios and current trends in patent litigation.

**LAW 327. Introduction to Organizational Behavior. 3 Units.**

Why are some organizations more successful than others? Is it their emphasis on innovation and risk taking? Their founders; eccentric and visionary personalities? Or perhaps their bureaucratic discipline and effectiveness? We will explore these questions by reviewing existing theory and research on organizational problems in a number of areas including: individual motivation and behavior; decision making and leadership; interpersonal and intergroup communication, influence and conflict; organizational culture; and inter-organizational competition and cooperation. The course focuses on the reasons for organizational founding and failure, the variety of organizational forms and the ways in which organizations and their members affect one another. You will participate in a number of group exercises to illustrate the theoretical and practical implications of addressing organizational problems and increasing overall performance.

**LAW 328. Intellectual Property: Advanced Patents. 3 Units.**

This is an advanced seminar, open only to those who have taken patent law. We will discuss current cases, as well as some issues not covered in the basic class. We will also focus on current efforts to reform the patent system. Students will write and present a research paper on a patent law topic.

**LAW 329. Intellectual Property: International. 3 Units.**

Music, motion pictures, even books travel instantaneously around the globe. So do patented inventions; so do brands and trademarks. Copyright and trademark licenses increasingly take foreign exploitation into account. Litigation over an important patented invention often proceeds on several foreign fronts. No lawyer practicing intellectual property law today can afford to overlook the substantive and procedural differences that separate one country's law from another's. This course will focus on the counseling considerations that surround the exploitation of intellectual properties in domestic and foreign markets through licensing, litigation, or both. The course will survey the principal legal systems and international treaty arrangements for copyright, patent, trademark and neighboring rights, as well as questions of jurisdiction, territoriality, national treatment and choice of law.

**LAW 330. International Human Rights. 3 Units.**

This course will examine the developing law of international human rights, with an emphasis on international human rights treaties and agreements, international and regional human rights courts and tribunals, and international human rights organizations, both governmental and non-governmental. The course will examine the postwar emergence of civil and political human rights, the development of social and economic human rights, and the more recent articulation of collective and group human rights. It will also explore the normative justifications for enforcing human rights beyond the bounds of national sovereignty, and challenges to these justifications under the forces of globalization.

**LAW 331. Intellectual Property: Strategy for Technology Companies. 3 Units.**

This course focuses on the actual day-to-day intellectual property issues faced by a technology-based company. Each class will cover a different aspect of an intellectual property practice, covering such topics as the establishment of a patent program, trade secret management, intellectual property licensing, the intellectual property issues arising during M&A transactions and strategic alliances, patent litigation, and managing open source software. The emphasis in each class will be on case studies, guest speakers, and interactive exercises designed to simulate scenarios commonly faced by an intellectual property attorney, including the negotiation of patent cross licenses, the drafting of intellectual property representations and warranties, the generation of intellectual property disclosure and licensing policies, and the identification and prioritization of patentable inventions.

**LAW 333. Judgment and Decision-Making. 4 Units.**

(Same as PUBLPOL305A/IPS207A) This course explores theories and research on heuristics and biases in human inference, judgment, and decision making as well as experimental and theoretical work in prospect theory (particularly the phenomena of loss and risk aversion), support theory, and more generally the challenges that psychology offers to the rationalist expected utility model. In addition, it examines attempts to meet this challenge through integration with contributions of modern behavioral economics; decision-making biases and phenomena of special relevance to public policy, such as group polarization, "group think," the problem of collective action, and other influences on decision-making.

**LAW 335. Legal Ethics. 3 Units.**

A survey of the major legal and ethical issues presented in the practice of law. We will examine the concept of the lawyer endorsed by the rules of professional responsibility and assess the relationship between this concept and the personal, political, and economic constraints of law practice. To this end, emphasis will be given to the rules of professional responsibility and their elaboration in case law, but we will study modern practice from a range of interdisciplinary perspectives throughout the course. These include the philosophy of law, the history and sociology of the American legal profession, the philosophy of role morality, and theories of professional identity.

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**LAW 336. Real Estate Transactions. 3 Units.**

Real Estate Transactions will have a "real world" focus, helping students apply some of the substantive concepts covered in the first-year property course to actual commercial property transactions involving the transfer, leasing and financing of real property interests. Among the topics covered will be preparing the letter of intent, preparing and negotiating the purchase and sale contract, examining title and survey issues, reviewing leases, negotiating finance documents, and closing the transaction. The course will also explore various negotiation strategies. Emphasis will be on California law, with some discussion of how the laws of other states may affect how a transaction is structured. Tangential issues that may be covered include selecting the appropriate entity to be used in various real estate transactions, the role of the attorney v. the role of the businessperson on a transaction, and what actions should be taken when something goes wrong on a real estate transaction, including a discussion of applicable remedies. The course will be taught through a combination of lectures, reading assignments and drafting exercises. Time and size of class permitting, there may also be some practice negotiation exercises.

**LAW 337. Intellectual Property: Trademark and Unfair Competition Law. 3 Units.**

This course will focus on the exploitation of merchandising values (such as brand names), celebrity values (such as product endorsements) and competitive advantage (such as technical know-how) under federal and state trademark unfair competition, right of publicity and trade secret laws. An emphasis will be placed on business and litigation counseling considerations.

**LAW 339. Employment Law. 3 Units.**

Workplace issues have become one of the fastest-growing areas of state and federal law. Employment-related lawsuits filed in federal court have tripled in volume in the past decade, and now account for a tenth of all civil cases. Many state courts have experienced a similar burgeoning of their employment law caseloads. This course examines this diverse, rewarding, and rapidly evolving area of legal practice by considering the diverse array of laws and institutions that regulate the employment relationship. The focus of the course is on laws that affect employees in non-unionized settings, such as protections against dismissal without cause, wage and hour restrictions, workplace privacy, covenants not to compete, the Family and Medical Leave Act, and mandatory arbitration of employment disputes. The course does not cover either employment discrimination or labor law, both of which are offered as separate courses.

**LAW 340. Comparative Corporate Capitalism. 2 Units.**

Forms of corporate ownership and control vary widely from one country to another. The type of corporate capitalism based on widely distributed share ownership that is found in the United States, and that is the usual subject of law school corporate law and corporate governance courses, is in fact an outlier. For example, in most countries public corporations have a controlling shareholder. In this seminar we'll examine the organization of enterprise in a range of both developed and developing countries to the end of understanding their variety, including the influence of a country's political governance. As part of this exercise, we'll look at the ways in which organizations and organizational law have evolved in different countries, and we'll speculate on the directions in which they'll continue to evolve in the future. Finally, we'll address the relationship between forms of capitalism and economic development.

**LAW 341. How Biotechnology/Pharmaceutical Businesses Solve Legal Problems. 3 Units.**

The focus of this course is how legal problems are addressed and solved in the setting of a mature, public biotechnology company. Among the legal issues that will serve as examples of the kinds of legal problems such a company might face are contract issues, intellectual property issues, disclosure issues, product liability issues, etc. The course will explore how these issues relate to non-legal business issues that invariably arise from the same set of facts and how biotechnology/pharmaceutical businesses make decisions taking into account both the legal and non-legal business issues presented. Each issue will be presented in a case study-like format. There may be guest speakers for discussion of some of the issues.

**LAW 343. Intellectual Property: Scientific Evidence in Patent Litigation. 3 Units.**

(Same as GENE 243). This seminar will explore the role of scientific experts in patent infringement litigation. The class will have a mix of law students and doctoral candidates from the sciences and engineering. The law students must have some familiarity with United States patent law from classes or work experience. The graduate students must have completed their required coursework and have TGR status. In other areas of the law where scientific experts are used -- medical malpractice, environmental law, criminal law -- the science itself is often in dispute. In patent cases, however, the parties generally agree on the science. This affects the relationship between the lawyer and the expert and the substantive content of their interactions. Patent experts need to be able to explain science to the judge and jury, of course. But they also must help the litigators to choose which legal issues to press and which to concede, and to be aware of how the complications of the science might help, hurt, obscure or reveal how the law should be applied to the facts. Thus, both the lawyer and the scientist must educate the other about their specialties. For the first several weeks, the class will examine judicial decisions and trial documents involving scientific evidence in patent litigation. The rest of the quarter is largely devoted to work on the final projects: simulations of expert testimony in a patent case. Students will work together in teams and will meet regularly with the instructor in order to: select suitable patents; identify a balanced issue on either validity or infringement; prepare claim charts and materials for testimony; and give short, illustrated talks to inform their classmates about their projects. Finally, they will choose sides (patent owner or accused infringer) and finetune their presentations. The simulations will be performed at the end of the quarter before panels of practicing patent lawyers.

**LAW 344. Law and Economics Seminar I. 2-3 Units.**

(Same as ECON 354). This seminar examines current research by lawyers and economists on a variety of topics in law and economics. Several sessions of the seminar consist of an invited speaker, usually from another university, who discusses his or her current research. Representative of these sessions have been discussions of contribution among antitrust defendants, the philosophical foundations of the economic analysis of law, compensation for government regulations and takings, liability rules for controlling accidents, and the corporate tax treatment of nonprofit institutions. Adequate preparation consists of an introductory microeconomics course at the undergraduate level. Students may take both Law and Economics Seminar I and Law and Economics Seminar II in any order (neither is a prerequisite for the other); however, students may not take either course more than once.



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**LAW 345. Law and Culture in American Fiction. 3 Units.**

This seminar examines the way literary texts register changes in property law, the law of contracts, intellectual property and legal constructions of race, gender, and privacy, especially as they relate to the maintenance of personal identity, community stability, and linguistic meaning. The terms and stakes of these relationships inform our readings of the texts themselves, as well as our understanding of their representations of law. The writers whose work we consider include James Fenimore Cooper, Herman Melville, Henry James, Nella Larsen, Willa Cather, William Faulkner, and Sherman Alexie. Each week, a novel or story is paired with relevant legal and historical readings. We also consider the points of contact between literary narrative and narrative in law.

**LAW 347. Law and Culture in American Film. 3 Units.**

This course attends to representations of law in 20th century American film, particularly Westerns, gangster films, and courtroom dramas. The themes addressed include: the asymmetry of law and justice, the relationship between law and social change, the public and private identities of lawyers, anxiety that the rule of law fails individuals and minorities, and the disciplinary modes of both law and culture. It also attends to the convergence of narrative, visual, aural, and dramatic practices in legal proceedings and cinematic productions.

**LAW 348. Health Care Regulation, Finance and Policy. 3 Units.**

(SAME AS HRP391, PUBLPOL231, MGTECON331) This course provides the legal, institutional, and economic background necessary to understand the financing and production of health services in the US. Potential topics include: health reform, health insurance (Medicare and Medicaid, employer-sponsored insurance, the uninsured), medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons.

**LAW 349. Employment Discrimination. 3 Units.**

This course examines legal responses to the barriers to workplace equality that are faced by minority groups. The course surveys the relevant doctrine, focusing primarily on federal employment discrimination statutes but also addressing more expansive antidiscrimination protections under some state statutes and local ordinances. Covered topics include sexual and racial harassment, sexual orientation discrimination, and affirmative interventions aimed at increasing the minority group and/or female representation in certain job categories or segments of the labor market. In addition to surveying the doctrine as it stands and as it has developed over time the class also explores the doctrinal and conceptual difficulties inherent in identifying invidious discrimination and in devising appropriate remedies.

**LAW 351. Corporate Income Taxation. 3 Units.**

Overview of federal taxation of corporate entities. Course will address choice of entity (corporate or non-corporate), formation issues, and taxation of income and dividends. Approximately half of the class will be devoted to taxable and non-taxable acquisitions and reorganizations.

**LAW 352. International Tax. 2 Units.**

This course examines the United States federal income taxation of international operations and transactions, including international joint ventures and M&A transactions. Income source, foreign tax credits and Subpart F are important. International transfer pricing rules also will be addressed.

**LAW 353. Corporate Acquisitions. 4 Units.**

This course examines the phenomenon of corporate acquisitions from financial and transactional perspectives. It begins with a review of the various explanations offered for why acquisitions take place -- for example, tax incentives, displacement of inefficient management, synergy. Each explanation is then evaluated for its consistency both with capital market theory and with a growing body of empirical evidence concerning return to the shareholders of both acquiring and target companies as a result of acquisitions. The course then shifts to a transactional perspective and considers the alternative acquisition techniques which corporate law affords and the planning considerations that bear on the choice among those techniques. The final portion of the course tries to mesh financial and transactional perspectives in examining the structure of a typical acquisition agreement.

**LAW 355. Taxation I. 4 Units.**

This course provides an overview of the federal income tax.

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**LAW 358. Advanced Antitrust: Litigating an Antitrust Case. 3 Units.**

We will examine in depth four pivotal antitrust cases: Polygram Holdings, Microsoft, Leegin and Oracle. We will study the record created in the lower courts and then analyze how the court came to the conclusions it did. Students will write an amicus brief and argue a motion for preliminary injunction or an appeal.

**LAW 359. Tax Policy. 2 Units.**

This course will explore various tax policy issues. In past years, the issues we've explored have included the carbon tax, health care, social security, consumption tax, tax compliance, tax shelters and school financing.

**LAW 360. Advanced Empirical Methods. 3 Units.**

This course will examine topics in the empirical evaluation of law and policy for those who have already been exposed to basic statistics and regression. The course will begin with a discussion of problems of causal inference that have plagued some traditional statistical approaches and then examine the virtues and limitations associated with some more advanced techniques, such as regression discontinuity analyses and instrumental variables estimation. The course is designed to move students towards a publishable empirical research project. Given the constraints of the quarter system, the product is more likely to end with a detailed project design rather than a fully implemented study. Successful completion of the course requires regular attendance, and: (1) careful reading of the course assignments coupled with frequent one page written assignments on the reading; and (2) a PowerPoint presentation to the class discussing a major paper. (3) A detailed project design using one of the empirical approaches discussed in the class.

**LAW 368. Law and Biosciences: Neuroscience. 3 Units.**

(Same as HRP211) This seminar examines legal, social, and ethical issues arising from advances in the biosciences. This year it will focus exclusively on neuroscience. It will examine how neuroscience will affect the law, and society, through improvements in predicting illnesses and behaviors, in "reading minds" through neuroimaging, in understanding responsibility and consciousness, in "treating" criminal behavior, and in cognitive enhancement. Students who have taken the Law and the Biosciences seminar in past years may receive additional credit for taking this year's class.

**LAW 372. Legal History Workshop. 2-3 Units.**

(Same as HISTORY 307A). The Legal History Workshop is designed as a forum in which faculty and students from both the Law School and the History Department can discuss some of the best work now being done in the field of legal history. Every other week, an invited speaker presents his or her current research for discussion. Speakers are chosen not only for the quality of their work, but also with the aim of exposing students to a broad array of topics and methodologies within legal history. In the week prior to a given speaker's presentation, the class meets as a group to discuss secondary literature relevant to understanding and critiquing the speaker's research. Students then read the speaker's paper in advance of the following week's workshop presentation.

**LAW 373. Protection of Personality. 3 Units.**

This course will examine the theoretical foundations and common law development of the range of tort remedies designed to afford protection to the interests in personality. Defamation, the right of privacy, and claims of emotional distress and harassment will receive particular attention, along with the constitutional defenses to these claims, based on the First Amendment, which have arisen since the mid-1960's.

**LAW 378. Regulation of Financial Institutions. 3 Units.**

This course will cover the regulatory system governing financial institutions, with an emphasis on banks. It will do so in the context of current and past financial crises and the ongoing effort to reform financial regulation. Questions addressed will include: Why do we regulate financial institutions? What dangers do we want to avoid? How well does the current regulatory system achieve what we want to achieve?.

**LAW 386. Health Law and Policy: Public Health and Bioethics. 3 Units.**

This course will focus on the physician/patient relationship, medical ethics, and public health law.

**LAW 387. Internet Torts and Crimes. 2 Units.**

The purpose of this course is to cover the highlights of torts and crimes on the Internet. Topics include cybercrimes (spam, fraud, cyberbullying), privacy, and First Amendment issues (defamation, threats, and indecent speech). The perspective will be from that of a practitioner faced with various fact patterns and known case law who has to advise his/her client on the best course of action. (Think stud poker as applied to the practice of law.).

**LAW 388. Technological, Economic and Business Forces Transforming the Private Practice of Law. 2 Units.**

The private commercial practice of law is undergoing fundamental change. Modern technological, economic and business forces are placing extreme pressure on the traditional private attorney law firm model. These forces will transform, eliminate or replace virtually every aspect of legal services provided by attorneys. Traditional foundations of the large law firm model such as "billable" hours, summer associate programs, large staffs (e.g., paralegals and secretaries) and high associate-to-partner ratios are becoming (or have already become) relics of a bygone era. Today, the business need for clients to select a one-stop, full-service law firm for their important legal work has, in a variety of circumstances, disappeared. Sophisticated clients are utilizing a wide range of legal services firms and companies for their legal work. As a result, the diversity of legal business models and manner of providing legal services has greatly expanded. Often individual lawyers (or very small firms) can provide high-level legal services by assembling "virtual" teams in which each team member handles a different constituent part of the representation. "In-sourcing," "out-sourcing" and the transferring of large portions of work to non-lawyer legal support vendors are all becoming fixtures of the legal economy. This rapid increase in diversity on both the supply and demand side of the legal economy will greatly alter the skills and prerequisites required for the successful private practice of law. The course is composed of two parts. In part one, the technological, economic and business practices transforming the legal profession are identified and their impact on the traditional approaches to private practice law firms will be examined. In part two, the course focuses on how individual lawyers can adapt to or embrace the forces transforming law to improve their practice and succeed in the new environment. Part two of the course will additionally focus on how specific skills such as project management, social networking and information management will be crucial to a successful legal career. Part two of the course will also discuss how the changing legal environment creates new ethical and professional challenges for attorneys.

**LAW 393. Remedies. 3 Units.**

The remedy is arguably the most important part of any lawsuit, and often the most neglected. This course considers the question of what plaintiffs are entitled to when they win a case and why. It will cover damages, punitive damages, restitution, unjust enrichment, and injunctive relief. While we will consider public remedies in constitutional cases, the majority of the course will focus on remedies in private law civil actions.

**LAW 394. Criminal Law and Policy: Research Workshop. 3 Units.**

This course is designed for students who are actively engaged in empirical research in crime and public policy and wish to turn their research projects into an academic publication.

**LAW 397. Law and Economics of Death Penalty. 2-3 Units.**

This course will explore three primary issues: 1) the Supreme Court's forty-year effort to define what cases can permissibly receive the death penalty and the procedures under which it must be imposed; 2) the arguments for and against the death penalty, with a major focus on whether the death penalty deters, is administered in a racially biased way, or is otherwise implemented in an arbitrary and capricious manner; and 3) what the US and international status of the death penalty is today and what the prospects are for the future. The readings on deterrence and racial discrimination will entail some substantial statistical analysis, although a background in statistics, though helpful, will not be required.

**LAW 400. Directed Research. 1-4 Units.**

Directed Research is an extraordinary opportunity for students beyond the first-year to research problems in any field of law. The final product must be embodied in a paper or other form of written work involving a substantial independent effort on the part of the student. A student must submit a detailed petition of at least 250 words, approved by the sponsoring faculty member, outlining his or her proposed project and demonstrating that the research is likely to result in a significant scholarly contribution. Sample petitions are available in the Registrar's Office. A petition will not be approved for work assigned or performed in a course, clinic, or externship for which the student has or will receive credit. A petition must indicate whether the product is intended for publication in a law review or elsewhere. A student may petition for "Directed Research: Curricular Development" when the work involves assisting a Law School faculty member in developing concepts or materials for new and innovative law school courses. Both the supervising faculty member and the Associate Dean for Curriculum must approve petition for "Directed Research: Curricular Development." Students must meet with the instructor frequently for the purposes of report and guidance. Unit credit is by arrangement. Students whose projects warrant more than four units should consider a Senior Thesis or the Research Track. See SLS Student Handbook for requirements and limitations.

**LAW 401. Venture Capital II. 3 Units.**

This class will focus on the legal and non-legal tactical details of entrepreneurial endeavors. The legal specifics of corporate formation, tax, and contracts are well covered by a variety of other courses at the Law School and will only be reviewed briefly in this course. Instead, the course will examine the life stages (formation, financing, execution, and exit) of a venture-backed company from the entrepreneur's perspective. Students who are interested in either starting companies or working with startup founders as their legal counsel will solidify their foundations in this course. There will be no textbook - course materials will include PowerPoint slides, readings from various entrepreneur and venture capital blogs, sample business plans, and other sources.

**LAW 402. Moot Court. 2 Units.**

The major moot court activity at Stanford Law School is the Marion Rice Kirkwood Memorial Competition, which takes place each year during the Autumn and Winter terms. Autumn term will be dedicated to brief writing and completion of the written portion of the Competition; the oral portion of the Competition will be conducted during the first four weeks (approx.) of Winter term. Students on externship and in clinics may enroll if permitted by their respective programs as class attendance is not required Autumn term and students must only participate in scheduled oral arguments Winter term. Prior to the Competition itself, materials and lectures are provided on research, brief writing, and oral advocacy techniques. Registration for the Kirkwood Competition is by team. Each team is required to submit an appellate brief of substantial length and quality, and to complete at least two oral arguments, one on each side of an actual case. The first draft of the brief is reviewed and critiqued by the course instructors. The final draft of the brief is scored by the course instructors and members of the Moot Court Board. The course also offers videotaping and critiques of practice oral arguments. Panels of local attorneys and judges serve as judges who score the oral argument portion of the Competition. Teams are selected for the quarterfinal, semifinal and final round of the Competition based on their brief score and oral advocacy score. The final round of the Competition is held before a panel of distinguished judges and the entire Law School community is invited to attend. Enrollment in both the Autumn and Winter terms is required. The final grade for both the Autumn and Winter terms, and the Writing and Professional Skills credit will be awarded upon the completion of the course in the Winter Term.

**LAW 402. Moot Court. 2 Units.**

The major moot court activity at Stanford Law School is the Marion Rice Kirkwood Memorial Competition, which takes place each year during the Autumn and Winter terms. Autumn term will be dedicated to brief writing and completion of the written portion of the Competition; the oral portion of the Competition will be conducted during the first four weeks (approx.) of Winter term. Students on externship and in clinics may enroll if permitted by their respective programs as class attendance is not required Autumn term and students must only participate in scheduled oral arguments Winter term. Prior to the Competition itself, materials and lectures are provided on research, brief writing, and oral advocacy techniques. Registration for the Kirkwood Competition is by team. Each team is required to submit an appellate brief of substantial length and quality, and to complete at least two oral arguments, one on each side of an actual case. The first draft of the brief is reviewed and critiqued by the course instructors. The final draft of the brief is scored by the course instructors and members of the Moot Court Board. The course also offers videotaping and critiques of practice oral arguments. Panels of local attorneys and judges serve as judges who score the oral argument portion of the Competition. Teams are selected for the quarterfinal, semifinal and final round of the Competition based on their brief score and oral advocacy score. The final round of the Competition is held before a panel of distinguished judges and the entire Law School community is invited to attend. Enrollment in both the Autumn and Winter terms is required. The final grade for both the Autumn and Winter terms, and the Writing and Professional Skills credit will be awarded upon the completion of the course in the Winter Term.

**LAW 403. Senior Thesis. 5-8 Units.**

An opportunity for third-year students to engage in original research and to prepare a substantial written-work product on the scale of a law review article. The thesis topic should be chosen no later than two weeks after the beginning of the seventh term of law study and may be chosen during the sixth term. The topic is subject to the approval of the thesis supervisor, who may be any member of the Law School faculty under whose direction the student wishes to write the thesis and who is willing to assume the responsibility therefor. An oral defense of the thesis before members of the faculty, including the thesis supervisor, will be conducted late in the student's ninth academic term. Acceptance of the thesis for credit requires the approval of the thesis supervisor and one or more other members of the faculty who will be selected by the supervisor. Satisfactory completion of the senior thesis will satisfy graduation requirements to the extent of (a) 5 - 8 units of credit and (b) two research courses. See SLS Student Handbook for requirements and limitations.

**LAW 404B. Foreign Legal Study: Bucerius Law School. 9-14 Units.**

This course is for J.D. students who have been approved by the Law School to study at Bucerius Law School (Hamburg, Germany), European University Institute (Florence, Italy), Waseda University Law School (Tokyo, Japan), CIDE - Centro de Investigación y Docencia Económicas (Mexico City, Mexico), Peking University Law School (Beijing, China), or the National University of Singapore (Singapore). See SLS Foreign Legal Study Exchange Program at [http://www.law.stanford.edu/program/centers/spil/foreign\\_study/](http://www.law.stanford.edu/program/centers/spil/foreign_study/) for details.

**LAW 404C. Foreign Legal Study: Centro de Investigación y Docencia Económicas. 9-14 Units.**

This course is for J.D. students who have been approved by the Law School to study at Bucerius Law School (Hamburg, Germany), European University Institute (Florence, Italy), Waseda University Law School (Tokyo, Japan), CIDE - Centro de Investigación y Docencia Económicas (Mexico City, Mexico), Peking University Law School (Beijing, China), or the National University of Singapore (Singapore). See SLS Foreign Legal Study Exchange Program at [http://www.law.stanford.edu/program/centers/spil/foreign\\_study/](http://www.law.stanford.edu/program/centers/spil/foreign_study/) for details.

**LAW 404E. Foreign Legal Study: European University Institute. 9-14 Units.**

This course is for J.D. students who have been approved by the Law School to study at Bucerius Law School (Hamburg, Germany), European University Institute (Florence, Italy), Waseda University Law School (Tokyo, Japan), CIDE - Centro de Investigación y Docencia Económicas (Mexico City, Mexico), Peking University Law School (Beijing, China), or the National University of Singapore (Singapore). See SLS Foreign Legal Study Exchange Program at [http://www.law.stanford.edu/program/centers/spil/foreign\\_study/](http://www.law.stanford.edu/program/centers/spil/foreign_study/) for details.

**LAW 404P. Foreign Legal Study: Peking University Law School. 9-14 Units.**

This course is for J.D. students who have been approved by the Law School to study at Bucerius Law School (Hamburg, Germany), European University Institute (Florence, Italy), Waseda University Law School (Tokyo, Japan), CIDE - Centro de Investigación y Docencia Económicas (Mexico City, Mexico), Peking University Law School (Beijing, China), or the National University of Singapore (Singapore). See SLS Foreign Legal Study Exchange Program at [http://www.law.stanford.edu/program/centers/spil/foreign\\_study/](http://www.law.stanford.edu/program/centers/spil/foreign_study/) for details.

**LAW 404S. Foreign Legal Study: National University of Singapore. 9-14 Units.**

This course is for J.D. students who have been approved by the Law School to study at Bucerius Law School (Hamburg, Germany), European University Institute (Florence, Italy), Waseda University Law School (Tokyo, Japan), CIDE - Centro de Investigación y Docencia Económicas (Mexico City, Mexico), Peking University Law School (Beijing, China), or the National University of Singapore (Singapore). See SLS Foreign Legal Study Exchange Program at [http://www.law.stanford.edu/program/centers/spil/foreign\\_study/](http://www.law.stanford.edu/program/centers/spil/foreign_study/) for details.

**LAW 404W. Foreign Legal Study: Waseda University. 9-14 Units.**

This course is for J.D. students who have been approved by the Law School to study at Bucerius Law School (Hamburg, Germany), European University Institute (Florence, Italy), Waseda University Law School (Tokyo, Japan), CIDE - Centro de Investigación y Docencia Económicas (Mexico City, Mexico), Peking University Law School (Beijing, China), or the National University of Singapore (Singapore). See SLS Foreign Legal Study Exchange Program at [http://www.law.stanford.edu/program/centers/spil/foreign\\_study/](http://www.law.stanford.edu/program/centers/spil/foreign_study/) for details.

**LAW 406. Research Track. 9-12 Units.**

The Research Track is for students who wish to carry out a research project of a scope larger than that contemplated for a Senior Thesis. Research Track projects are to be supervised by two or more professors, at least one of whom must be a member of the Law School faculty. At least one faculty member in addition to the supervisors must read the written product of the research, and the student must defend the written work orally before the readers. Students will be admitted to Research Track only if they have a demonstrated capability for substantial independent research, and propose a significant and well-formulated project at the time of application.

**LAW 407. International Deal Making. 2 Units.**

This course is specifically focused on the application of legal and business knowledge to real world transactions in the international context. This is a practical course for students who are interested in applying their knowledge to deal structuring, identifying and resolving legal and business concerns, negotiations, documentation and deal closing. The caselets (short-form cases), developed by the instructor (JD/MBA/CPA) from his 25 years' experience in deal-making in China and Asia, raising \$9 billion in equity and debt, often place the student inside the negotiating room and challenge the student to strike deals with senior private and public officials. This course is structured as an intense large seminar with a maximum of 30 law and 10 business students, mixed into groups for class work and presentations. Course objectives: (1) To give the law student a deeper understanding of the legal issues that arise in cross-border transactions, and a broader understanding of the business context in which legal advice is asked for and given; (2) to give the business student an appreciation of the importance of reading the legal documents which purport to describe his/her business transaction, and an understanding of the role the legal advisor can and should play in deal structuring, negotiating and documenting aspects; and (3) for both sets of students, there will be the opportunity to strategize, structure and be the principal negotiator in real world, substantive, international business deals. Following the outcomes decided in class, the actual outcomes and subsequent events will be shared.

**LAW 408A. Criminal Defense Clinic: Clinical Practice. 4 Units.**

Students in the Criminal Defense Clinic will represent indigent criminal defendants in a wide range of misdemeanor cases in Santa Clara and San Mateo counties. Students will be California Bar Certified and thus will be bound by the rules and ethics of the profession, notably zealous advocacy on behalf of clients. Students will take the lead role in all aspects of case development, including interviewing clients and witnesses, investigating facts, developing case strategy, negotiating with the prosecutor, drafting and arguing motions, and trying cases before judges and juries. Common charges include drug possession, public order offenses, assault, theft, and weapons possession. While students will have primary responsibility for all aspects of their cases, all trial work will be closely supervised. In addition to casework, there will be weekly seminar sessions. The classes will focus both on case-rounds and on broader systemic issues. The goal of the clinic is to train students how to try a criminal case from beginning to end while engaging in thoughtful reflection on the role of the criminal defense attorney in the criminal justice system. While the work is often challenging and sometimes heartbreaking, it offers students a unique opportunity to put their skills, intellect and compassion to use by serving people in a moment of great need. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 408B. Criminal Defense Clinic: Clinical Methods. 4 Units.**

Students in the Criminal Defense Clinic will represent indigent criminal defendants in a wide range of misdemeanor cases in Santa Clara and San Mateo counties. Students will be California Bar Certified and thus will be bound by the rules and ethics of the profession, notably zealous advocacy on behalf of clients. Students will take the lead role in all aspects of case development, including interviewing clients and witnesses, investigating facts, developing case strategy, negotiating with the prosecutor, drafting and arguing motions, and trying cases before judges and juries. Common charges include drug possession, public order offenses, assault, theft, and weapons possession. While students will have primary responsibility for all aspects of their cases, all trial work will be closely supervised. In addition to casework, there will be weekly seminar sessions. The classes will focus both on case-rounds and on broader systemic issues. The goal of the clinic is to train students how to try a criminal case from beginning to end while engaging in thoughtful reflection on the role of the criminal defense attorney in the criminal justice system. While the work is often challenging and sometimes heartbreaking, it offers students a unique opportunity to put their skills, intellect and compassion to use by serving people in a moment of great need. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 408C. Criminal Defense Clinic: Clinical Coursework. 4 Units.**

Students in the Criminal Defense Clinic will represent indigent criminal defendants in a wide range of misdemeanor cases in Santa Clara and San Mateo counties. Students will be California Bar Certified and thus will be bound by the rules and ethics of the profession, notably zealous advocacy on behalf of clients. Students will take the lead role in all aspects of case development, including interviewing clients and witnesses, investigating facts, developing case strategy, negotiating with the prosecutor, drafting and arguing motions, and trying cases before judges and juries. Common charges include drug possession, public order offenses, assault, theft, and weapons possession. While students will have primary responsibility for all aspects of their cases, all trial work will be closely supervised. In addition to casework, there will be weekly seminar sessions. The classes will focus both on case-rounds and on broader systemic issues. The goal of the clinic is to train students how to try a criminal case from beginning to end while engaging in thoughtful reflection on the role of the criminal defense attorney in the criminal justice system. While the work is often challenging and sometimes heartbreaking, it offers students a unique opportunity to put their skills, intellect and compassion to use by serving people in a moment of great need. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 409. Introduction to Intellectual Property. 4 Units.**

This is an overview course covering the basics of intellectual property law -- trade secrets, patents, copyrights, and trademarks, as well as selected other state intellectual property rights. This course is designed both for those who are interested in pursuing IP as a career, and those who are looking only for a basic knowledge of the subject. There are no prerequisites, and a scientific background is not required.

**LAW 417. Advanced Criminal Law and Public Policy: A Research Practicum. 3 Units.**

This course will provide students with a rare opportunity to engage in real-world crime policy analysis, both as a way to use some of the skills they have learned in previous SLS courses, as well as to help them learn about the political and practical issues involved in constructing public policies. Students will work with a "client" agency or organization in the crime policy sector to carry out a policy-related research and analysis project. We will organize ourselves as a provisional policy think-tank or, if you prefer, a makeshift policy institute or short-term consulting group. As such, this practice-oriented course has both learning and real-world policy reform goals, which makes this course unique within SLS and, I hope, refreshing and compelling. Students will learn how to: Identify and analyze empirical data for policy purposes; develop evidence-based policy proposals; interact with high-level policymakers around politically sensitive issues; and effectively prepare a policy brief and deliver a formal presentation to high-level government officials.

**LAW 418. Advanced Criminal Defense Clinic. 2-7 Units.**

Advanced clinic allows students who have taken the Criminal Defense Clinic to continue working on cases. Participation in case rounds is required. Advanced students may arrange with the instructor to receive between two and seven units. No student may receive more than 27 overall clinical credits, however, during the course of the student's law school career.

**LAW 419. Three Strikes Project: Criminal Justice Reform & Post-conviction Litigation. 3 Units.**

This November, voters in California will go to the polls and vote on whether to reform California's "Three Strikes and You're Out" criminal sentencing law. The reform is intended to ameliorate the harshest and largely unintended aspects of the Three Strikes law, which is widely recognized as the strictest sentencing law in the county. The initiative was inspired and drafted in part by Stanford law students who, over the past six years, have represented individuals sentenced to life under the Three Strikes law for very minor crimes. This seminar will study criminal justice reform in real time. Students will read and discuss a variety of cases and articles, examining the history of the Three Strikes law as a case study in the history, politics, practicalities and legal regulation of sentencing in the United States. This is an experiential seminar, meaning that students will have an opportunity to work on the initiative campaign, which is a collaboration between the Three Strikes Project and the NAACP Legal Defense Fund. Students will also be involved in the actual representation in state and/or federal court of an inmate who is currently serving a life term under the Three Strikes law for a minor crime. Students will visit clients in prison, conduct factual investigation in the field, write legal briefs, and argue cases in open court.

**LAW 423. Advanced Supreme Court Litigation Clinic. 2-7 Units.**

The Advanced Supreme Court Litigation Clinic provides an opportunity for students who have already successfully completed the Supreme Court Litigation to continue their work in the Clinic. Work includes research and drafting petitions for certiorari and oppositions, merits briefs, and amicus briefs, compiling joint appendices, and preparing advocates for oral argument, as well as commenting on drafts of briefs being filed by lawyers in other cases. Advanced students also continue to participate in the Clinic's discussion of cases during case rounds.

**LAW 424. Secured Credit. 3 Units.**

This course surveys the law of raising funds by granting security interests in personal property. Security interests affect the creditor's rights if the debtor is unable to repay the loan; as a result, they significantly affect the terms on which capital can be raised. They affect industries ranging from traditional manufacturing to high tech start-ups; they also play a role in consumer loans (and help explain the movie "Repo Man"). The course focuses primarily on Article 9 of the Uniform Commercial Code, but also considers the federal Bankruptcy Code, the federal intellectual property statutes, and other state and federal laws. This is the second of three courses (the other two are Bankruptcy and Payment Systems) dealing with the financing of commercial ventures through means other than the sale of corporate stock. These courses may be taken in any order: neither presupposes any knowledge of the others. Students who cannot take all three should probably prioritize them in the order they are listed—that is, Bankruptcy is the single most important course to take, then Secured Credit, then Payment Systems. Please note that Payment Systems is not offered every year.

**LAW 425. Statutory Interpretation. 3 Units.**

Statutory law is the dominant source of contemporary law, and it is the form of law that lawyers are likely to confront most often in almost any area of practice. It is also an area of vibrant intellectual debate, as scholars, Supreme Court justices, and others debate the methods and aims of statutory interpretation. This course will stress both the practical and theoretical dimensions of interpretation. Students will learn and apply the methods of statutory interpretation. We will also spend considerable time on contemporary controversies, such as debates about textualist, purposive and dynamic interpretation; about the use of legislative history and canons of construction; about the special interpretive problems that arise in the context of direct democracy; and about the democratic and constitutional foundations of statutory interpretation itself. Readings will draw from political science as well as law.

**LAW 427. Local Government Law. 3 Units.**

Local governments exert tremendous influence over socioeconomic, race relations, environmental health, political power, and housing and real estate. This public law course will investigate the law of these governments (including cities, counties, and special districts) from four vantage points: (1) local governments within the federalist system, including the balance of power between local, state, and federal governments; (2) horizontal questions of power, including hierarchy and specialization among local governments; interlocal cooperation and competition; and the creation, expansion, and dissolution of local entities; (3) innovative uses and delegations of local authority to achieve state or local public policy goals; and (4) the nature of local democracy and local finance, including citizen influence of local lawmaking through initiatives and referenda, alternative voting schemes, and responses to fiscal distress. Discussions and in-class projects in the course will be situated in locations ranging from rural towns to major metropolises across the country.

**LAW 430. Trusts and Estates. 2 Units.**

This survey course covers issues related to: intestacy; will execution and revocation; will provisions and interpretations; restrictions on the right to devise; probate; creation of trusts; revocable and irrevocable trusts; trust provisions; charitable trusts; trust administration; and substitutes and conservatorships.

**LAW 432. Natural Resource Law and Policy Workshop. 2-3 Units.**

This workshop seminar will provide students with the opportunity to examine and critique cutting-edge research and work in the field of environment, energy, and natural resources. Although it is open to all students, the seminar is designed especially for those with an interest in the field who wish to stay abreast of current issues, work, and ideas. In each class, an academic expert, policy maker, or practitioner will present their current research or work and engage in a robust discussion.

**LAW 436A. Supreme Court Litigation Clinic: Clinical Practice. 4 Units.**

The Supreme Court Litigation Clinic will expose students to the joys and frustrations of litigation before the Supreme Court of the United States. The bulk of the clinic will be run as a small law firm working on live cases before the Court. Students will participate in drafting petitions for certiorari and oppositions, merits briefs, and amicus briefs, compiling joint appendices, and preparing advocates for oral argument, as well as commenting (the technical term is "kibbitzing") on drafts of briefs being filed by lawyers in other cases. The precise nature of the cases will depend on the Court's docket, but in recent Terms, the clinic's cases have involved federal criminal law and procedure, habeas corpus, constitutional and statutory antidiscrimination and employment law, bankruptcy law, and the First Amendment. Our aim is to involve students as fully as possible in this type of litigation. The Clinic begins with an intensive introduction to the distinctive nature of Supreme Court practice, including the key differences between merits arguments and the certiorari process, the role of amicus briefs, and the Supreme Court Rules. After that, seminar meetings will be devoted primarily to collaborative work on the cases the clinic is handling. While students will be primarily responsible for working in teams on one case at a time, they will also be expected to acquire familiarity with the issues raised in other students' cases and will both edit each others' substantive work and assist each other and the instructors with the technical production work attendant on filing briefs with the Supreme Court. The course will involve substantial amounts of legal research. The Supreme Court operates on a tight, and unyielding deadline, and students must be prepared both to complete their own work in a timely fashion and to assist one another and the instructors on other cases. The instructors will not ask students to do any kind of "grunt work" that they themselves will not also be handling, but grunt work there will be: proofreading, cite-checking, dealing with the joint appendix, and the like. The nature of the work product means that while students will average thirty hours per week on their case-related work, that work will surely be distributed unevenly across the quarter. Unlike most other courts, the Supreme Court has no student practice rules. Thus, students will not be able to argue cases before the Court. But they will participate in moot courts on their cases, as both advocates and Justices. Each student will also have the opportunity to travel to Washington to see the Court in session, preferably with respect to a case on which the student has worked. Ideally students will already have experience with persuasive doctrinal writing, through a course like Federal Pretrial Litigation or through intensive supervision during their summer jobs or other clinics. Admission to the Clinic is by consent of the instructors. Students will need to submit a writing sample that reflects their facility with doctrinal legal arguments and the name of at least one reference who can comment on their legal analytic ability.

**LAW 436B. Supreme Court Litigation Clinic: Clinical Methods. 4 Units.**

The Supreme Court Litigation Clinic will expose students to the joys and frustrations of litigation before the Supreme Court of the United States. The bulk of the clinic will be run as a small law firm working on live cases before the Court. Students will participate in drafting petitions for certiorari and oppositions, merits briefs, and amicus briefs, compiling joint appendices, and preparing advocates for oral argument, as well as commenting (the technical term is "kibbitzing") on drafts of briefs being filed by lawyers in other cases. The precise nature of the cases will depend on the Court's docket, but in recent Terms, the clinic's cases have involved federal criminal law and procedure, habeas corpus, constitutional and statutory antidiscrimination and employment law, bankruptcy law, and the First Amendment. Our aim is to involve students as fully as possible in this type of litigation. The Clinic begins with an intensive introduction to the distinctive nature of Supreme Court practice, including the key differences between merits arguments and the certiorari process, the role of amicus briefs, and the Supreme Court Rules. After that, seminar meetings will be devoted primarily to collaborative work on the cases the clinic is handling. While students will be primarily responsible for working in teams on one case at a time, they will also be expected to acquire familiarity with the issues raised in other students' cases and will both edit each others' substantive work and assist each other and the instructors with the technical production work attendant on filing briefs with the Supreme Court. The course will involve substantial amounts of legal research. The Supreme Court operates on a tight, and unyielding deadline, and students must be prepared both to complete their own work in a timely fashion and to assist one another and the instructors on other cases. The instructors will not ask students to do any kind of "grunt work" that they themselves will not also be handling, but grunt work there will be: proofreading, cite-checking, dealing with the joint appendix, and the like. The nature of the work product means that while students will average thirty hours per week on their case-related work, that work will surely be distributed unevenly across the quarter. Unlike most other courts, the Supreme Court has no student practice rules. Thus, students will not be able to argue cases before the Court. But they will participate in moot courts on their cases, as both advocates and Justices. Each student will also have the opportunity to travel to Washington to see the Court in session, preferably with respect to a case on which the student has worked. Ideally students will already have experience with persuasive doctrinal writing, through a course like Federal Pretrial Litigation or through intensive supervision during their summer jobs or other clinics. Admission to the Clinic is by consent of the instructors. Students will need to submit a writing sample that reflects their facility with doctrinal legal arguments and the name of at least one reference who can comment on their legal analytic ability.

**LAW 436C. Supreme Court Litigation Clinic: Clinical Coursework. 4 Units.**

The Supreme Court Litigation Clinic will expose students to the joys and frustrations of litigation before the Supreme Court of the United States. The bulk of the clinic will be run as a small law firm working on live cases before the Court. Students will participate in drafting petitions for certiorari and oppositions, merits briefs, and amicus briefs, compiling joint appendices, and preparing advocates for oral argument, as well as commenting (the technical term is "kibbitzing") on drafts of briefs being filed by lawyers in other cases. The precise nature of the cases will depend on the Court's docket, but in recent Terms, the clinic's cases have involved federal criminal law and procedure, habeas corpus, constitutional and statutory antidiscrimination and employment law, bankruptcy law, and the First Amendment. Our aim is to involve students as fully as possible in this type of litigation. The Clinic begins with an intensive introduction to the distinctive nature of Supreme Court practice, including the key differences between merits arguments and the certiorari process, the role of amicus briefs, and the Supreme Court Rules. After that, seminar meetings will be devoted primarily to collaborative work on the cases the clinic is handling. While students will be primarily responsible for working in teams on one case at a time, they will also be expected to acquire familiarity with the issues raised in other students' cases and will both edit each others' substantive work and assist each other and the instructors with the technical production work attendant on filing briefs with the Supreme Court. The course will involve substantial amounts of legal research. The Supreme Court operates on a tight, and unyielding deadline, and students must be prepared both to complete their own work in a timely fashion and to assist one another and the instructors on other cases. The instructors will not ask students to do any kind of "grunt work" that they themselves will not also be handling, but grunt work there will be: proofreading, cite-checking, dealing with the joint appendix, and the like. The nature of the work product means that while students will average thirty hours per week on their case-related work, that work will surely be distributed unevenly across the quarter. Unlike most other courts, the Supreme Court has no student practice rules. Thus, students will not be able to argue cases before the Court. But they will participate in moot courts on their cases, as both advocates and Justices. Each student will also have the opportunity to travel to Washington to see the Court in session, preferably with respect to a case on which the student has worked. Ideally students will already have experience with persuasive doctrinal writing, through a course like Federal Pretrial Litigation or through intensive supervision during their summer jobs or other clinics. Admission to the Clinic is by consent of the instructors. Students will need to submit a writing sample that reflects their facility with doctrinal legal arguments and the name of at least one reference who can comment on their legal analytic ability.

**LAW 448. Contemporary Issues in Constitutional Law. 2 Units.**

This is an advanced constitutional law seminar for students who have already taken the introductory Constitutional Law course. The seminar will provide an opportunity for in-depth discussion of competing theories of constitutional interpretation, the role of the Supreme Court in our political system, and analysis of judicial behavior. Each week, these themes will be examined through the lens of a current "hot topic" in constitutional law - for example, the Affordable Care Act, affirmative action, the Second Amendment, the death penalty, executive power in the war on terrorism, campaign finance, immigration, same-sex marriage, and other topics. This is not a "spectator" class; all students will be expected to participate actively in class discussion each week. This is a good seminar for students interested in clerking or pursuing academia.

**LAW 451. European Union Law. 2-3 Units.**

The U.S. and the European Union (which comprises 27 European states and 500 million people) have the largest bilateral trade relationship in the world. About 60% of the world's GDP is generated on the Transatlantic Marketplace. In recent years, this has tremendously heightened the need for a sound understanding of the legal system of the EU, especially for business and technology lawyers. Responding to this need, this course, first, examines the internationally unique legal system of the EU as such, as it is applicable to any field of substantive and procedural EU law. Thus, it looks at the legal nature and the different sources of EU law and its relationship with the national law of the EU Member States. The course covers the relevant EU law enforcement actions including state liability issues as well as the jurisdiction of both European Courts and relevant remedies in national courts. Secondly, it explores the legal framework of doing business in the EU, from the perspective of a business entity as an internationally operating actor in a European business environment. In this context, the class focuses on the most essential fields of EU business law, i.e., (a) the four fundamental economic freedoms of the European Single Market for goods, services, capital and persons, (b) EU competition/antitrust law, as well as (c) EU e-commerce law. There is special emphasis on how EU business law can be used efficiently from private actors such as companies established outside the EU for their own advantage.

**LAW 453A. State-Building and the Rule of Law Workshop: Advanced. 3 Units.**

The Advanced Workshop on State-Building and the Rule of Law builds on the State-Building and Rule of Law Seminar offered in the fall quarter. Those students who were enrolled in the winter quarter section of this course are not permitted to enroll in the spring. Enrollment is by consent and limited to three groups of students who began their work in the fall quarter, on the Afghanistan Legal Education Project (ALEP), or the Bhutan Law and Policy Project (BLPP), the Timor Leste Legal Education Project (TLLEP), or the Iraq Legal Education Initiative (ILEI). The Afghanistan group will write textbooks and create other written products, to build out the curriculum for a full Bachelor of Laws program at the American University of Afghanistan. The Bhutan group will write legal textbooks to be used by the Royal Law Project, to train Bhutanese lawyers on the laws of their home country. The Timor Leste group will write textbooks at the request for use at the National Law School of Timor Leste and the judicial training center. The Iraq group will write textbooks and materials to begin the process of building out a law program at the American University of Iraq, Sulaimani. Same as: ALEP.

**LAW 453B. State-Building and the Rule of Law Workshop: Advanced. 3 Units.**

The Advanced Workshop on State-Building and the Rule of Law builds on the State-Building and Rule of Law Seminar offered in the fall quarter. Those students who were enrolled in the winter quarter section of this course are not permitted to enroll in the spring. Enrollment is by consent and limited to three groups of students who began their work in the fall quarter, on the Afghanistan Legal Education Project (ALEP), or the Bhutan Law and Policy Project (BLPP), the Timor Leste Legal Education Project (TLLEP), or the Iraq Legal Education Initiative (ILEI). The Afghanistan group will write textbooks and create other written products, to build out the curriculum for a full Bachelor of Laws program at the American University of Afghanistan. The Bhutan group will write legal textbooks to be used by the Royal Law Project, to train Bhutanese lawyers on the laws of their home country. The Timor Leste group will write textbooks at the request for use at the National Law School of Timor Leste and the judicial training center. The Iraq group will write textbooks and materials to begin the process of building out a law program at the American University of Iraq, Sulaimani. Same as: BLPP.

**LAW 453C. State-Building and the Rule of Law Workshop: Advanced. 3 Units.**

The Advanced Workshop on State-Building and the Rule of Law builds on the State-Building and Rule of Law Seminar offered in the fall quarter. Those students who were enrolled in the winter quarter section of this course are not permitted to enroll in the spring. Enrollment is by consent and limited to three groups of students who began their work in the fall quarter, on the Afghanistan Legal Education Project (ALEP), or the Bhutan Law and Policy Project (BLPP), the Timor Leste Legal Education Project (TLLEP), or the Iraq Legal Education Initiative (ILEI). The Afghanistan group will write textbooks and create other written products, to build out the curriculum for a full Bachelor of Laws program at the American University of Afghanistan. The Bhutan group will write legal textbooks to be used by the Royal Law Project, to train Bhutanese lawyers on the laws of their home country. The Timor Leste group will write textbooks at the request for use at the National Law School of Timor Leste and the judicial training center. The Iraq group will write textbooks and materials to begin the process of building out a law program at the American University of Iraq, Sulaimani. Same as: TLLEP.

**LAW 453D. State-Building and the Rule of Law Workshop: Advanced. 3 Units.**

The Advanced Workshop on State-Building and the Rule of Law builds on the State-Building and Rule of Law Seminar offered in the fall quarter. Those students who were enrolled in the winter quarter section of this course are not permitted to enroll in the spring. Enrollment is by consent and limited to three groups of students who began their work in the fall quarter, on the Afghanistan Legal Education Project (ALEP), or the Bhutan Law and Policy Project (BLPP), the Timor Leste Legal Education Project (TLLEP), or the Iraq Legal Education Initiative (ILEI). The Afghanistan group will write textbooks and create other written products, to build out the curriculum for a full Bachelor of Laws program at the American University of Afghanistan. The Bhutan group will write legal textbooks to be used by the Royal Law Project, to train Bhutanese lawyers on the laws of their home country. The Timor Leste group will write textbooks at the request for use at the National Law School of Timor Leste and the judicial training center. The Iraq group will write textbooks and materials to begin the process of building out a law program at the American University of Iraq, Sulaimani. Same as: ILEI.

**LAW 455. Energy Law. 3 Units.**

The supply of a reliable, low-cost, clean energy supply for the United States is a key determinant of current and future prosperity. Perhaps as a result, electricity suppliers are among the most heavily regulated of large firms. In this course, students will acquire a basic understanding of the electricity supply system, of rate based regulation of electric utilities, and of deregulated wholesale electricity markets. We will also interrogate the role of siting and cost recovery in development of a workable transmission grid. The course will then focus on various attempts at reform of both rate-regulated and wholesale market-based structures. In particular, we will examine various attempts to strengthen incentives for utility investment in energy efficiency. Finally, students will be familiarized with various approaches to subsidization of renewable energy. Throughout, the course will focus on the sometime cooperative, sometimes competing, but ever evolving federal and state roles in regulating the supply of electricity.

**LAW 458. Food and Drug Administration. 3 Units.**

(Same as HRP 208). This course will examine the Food and Drug Administration. It will focus largely on the FDA's regulation of drugs and biologics, but will also cover its regulation of medical devices, nutritional supplements, and, to some extent, its jurisdiction over food, legal, social, and ethical issues arising from advances in the biosciences. The class is open to all law or medical students. Graduate students may be admitted from other parts of the University by consent of the instructor. Substantial class attendance is required; in addition, the quality of class participation will play a small role in grading.



**LAW 465. Venture Capital I. 3 Units.**

This course introduces the operation of the venture capital industry from both a theoretical and practical perspective. The course follows the start-up process from initial formation of a new High-Tech venture through its private capitalization, the navigation of typical operational or strategic hurdles/milestones, and potential exit through merger or initial public offering. It analyzes each step in the process from perspective of the entity, of the founder-employees, and of the venture backers. It also considers the incentive mechanisms and control structures used at each step of the transaction (and alternatives to these structures), with a focus on both the underlying economic and financial theory, as well as on pragmatic considerations in structuring the transactions. Students are required to complete a term sheet negotiation exercise, offer a written analysis (in short pieces) related to speaker perspectives concerning the venture capital process, and sit for an examination. Speakers include visitors from practice with extensive experience in the VC, M&A, and the business formation process. QM: Finance (Law 467) (or a modest background in financial analysis) is a prerequisite for this class.

**LAW 467. Quantitative Methods: Finance. 2 Units.**

This course covers some of the central ideas in modern finance with a particular focus on the time value of money. Topics include present value and future value analysis, discounting, net present value, "IRR", bond valuations, and a critique of other project valuation methods. Along with a brief overview of "market fundamentals" and an introduction to the vocabulary of modern "popular finance" (as found in such publications as the Wall Street Journal), additional topics include diversification, the risk-return trade-off, portfolio performance measurement, and market efficiency. Issues of arbitrage and tax considerations are considered as time allows. Each topic is introduced with an emphasis on applications in legal settings. The course is intended to provide students with very little or no background in finance with the essential vocabulary, tools, and insights to spot "finance related issues" in various legal practice areas. The problem sets, class discussions, and applied hypotheticals should allow students to develop the skills necessary to ask the right questions when confronted with problems that involve elements of modern finance. Special Instructions: You are expected to have little or no background in finance or related areas prior to taking this course. Required math skills are very modest (low-level high school algebra, at most) and students will rely mainly on the use of Excel and/or financial calculators for simple calculations.

**LAW 468. Statistical Inference in Law. 3 Units.**

Drawing an inference from quantitative evidence lies at the heart of many legal and policy decisions. This course provides the tools, concepts, and framework for lawyers to become sophisticated consumers of quantitative evidence and social science. Unlike traditional statistics courses, it is taught using substantive case law as a springboard for considering quantitative evidence. No background, beyond high school algebra, is assumed.

**LAW 471. Constitutional Law: Freedom of Speech. 3 Units.**

A survey of First Amendment law, including a close study of text, the drafting and ratification process, and the development of modern First Amendment theory. The course will explore the multiple participants in the speech process, including the speaker, hearer, publisher, target and regulator, and ask why the law favors certain participants over others. The evolution of Supreme Court case law will be analyzed historically, with special emphasis on the relationship between free speech and democracy.

**LAW 472. Externship Companion Seminar. 2 Units.**

The practice of public interest law - whether in the criminal or civil context or a government or non-profit setting - requires an attorney to consider a host of issues distinct from one in private practice. How should decisions be made about priorities with limited resources? Where an organization has a broad social justice mission, where does litigation on behalf of individual clients or a group of clients fit in? Prior to initiating litigation or advancing a defense, what quantum of evidence should an attorney require? What role, if any, should an attorney's personal beliefs play in a course of representation? Through directed supervision of their externships in prosecutors', public defenders' or civil non-profit and government offices, as well as participation in weekly seminars, students will evaluate such questions in the context of their practical experience. For a complete description, students should read the Externship Handbook, which is available from the Levin Center for Public Service and Public Interest Law or online at: <http://www.law.stanford.edu/program/centers/pip/externship/>.

**LAW 473. Externship, Special Circumstances. 12 Units.**

The Special Circumstances Externship Program (SCEP) allows second and third year students to work for credit for one quarter in nonprofit, public interest, public policy, and government agencies outside of the Bay Area. (See Law 474 and Law 475). Standards for approval of a SCEP placement are similar to those for Directed Research proposals, but are higher. Because there is a preference for local civil and criminal SEP placements, your SCEP proposal must explain (a) how it meets the goals of the externship program; and (b) why a similar project cannot be accomplished in one of the placements offered in the Bay Area. SCEP placements outside the Bay Area must be full-time. Students wishing to undertake a SCEP placement must obtain the supervision of a faculty member who will oversee their externship and an accompanying tutorial. For a complete description of the SCEP, students should read the Externship Handbook, which is available from the Levin Center for Public Service and Public Interest Law or online at: <http://www.law.stanford.edu/program/centers/pip/externship/>.

**LAW 473X. "U.S. SEC Law Student Observer Program and Securities Regulation Seminar". 3 Units.**

The U.S. SEC, Law Student Observer Program, is a one-semester volunteer/for-credit externship position offered to current law students selected by representatives of the SEC. The program provides exposure to the workings of the SEC and to the regulation of securities markets. Students are assigned to work with SEC staff members on a broad range of projects, including the investigation of industry and issuer practices, litigation of civil enforcement actions, and the drafting of proposed statutes and rules. In addition to working 40-hour weeks, students attend a weekly securities regulation seminar that includes lectures by SEC Commissioners and senior staff, and prominent members of the private bar. The topics for discussion at this seminar are chosen to complement the materials covered in basic securities regulation courses offered at the participating law schools.

**LAW 474. Externship, Civil Law. 5-12 Units.**

The Civil Standard Externship Program (SEP) allows second and third-year students to work for credit in select non-profit public interest, public policy, and government agencies in the Bay Area for one quarter. The Civil SEP allows students to (a) gain experience in a field where a clinical course is not offered, or (b) pursue advanced work in an area of prior clinical practice. Placements can be either full time (40 hours per week) or part time, but no fewer than 16 hours per week. Because of other Law School requirements, students in their final quarter are limited to part-time externships of no more than 16 hours per week. Students participating in the Civil SEP must also enroll in Externship Companion Seminar during the same term. In some cases where other seminars would be more appropriate companion courses for a student's placement, the student can request to substitute the seminar for the standard course. For a complete description of the Civil SEP, students should read the Externship Handbook, which is available from the Levin Center for Public Service and Public Interest Law or online at: <http://www.law.stanford.edu/program/centers/pip/externship/>.

**LAW 475. Externship, Criminal Law. 5-12 Units.**

The Criminal Standard Externship Program (SEP) allows second and third-year students to work for credit in criminal prosecutors' and defenders' offices in the Bay Area for one quarter. Placements can be either full time (40 hours per week) or part-time, but no fewer than 16 hours per week. Because of other Law School requirements, students in their final quarter are limited to part-time externships of no more than 16 hours per week. Students participating in the Criminal SEP must also enroll in the Externship Companion Seminar during the same term. In some cases, where other seminars would be more appropriate companion courses for a student's placement, the student can request to substitute the seminar for the standard course in the application process. For a complete description of the Criminal SEP, students should read the Externship Handbook, which is available from the Levin Center for Public Service and Public Interest Law or online at: <http://www.law.stanford.edu/program/centers/pip/externship/>.

**LAW 476. Advanced Criminal Practice. 3 Units.**

In this seminar, we will discuss the most pressing current issues and cases across the criminal justice spectrum, from arrest through appeal and collateral attack. Our focus will be on the practice of criminal law -- how prosecutors and defense lawyers actually develop and use the latest cases and arguments. The subjects that we will take up will include, for example, ineffective assistance and the death penalty, sentencing, the "drug court" development, public prosecution and white collar crime. Each student will choose a case from the Supreme Court's current criminal docket and write about the issues that either arose or should have arisen during any of the stages of the case. Understanding these issues will require a careful investigation of the case history and the way it is developed for the Supreme Court. Particular attention will be paid to the ethical issues that arise in practice. Our text for the course will be pre-assigned cases from the current Criminal Law Reporter, along with articles and litigation materials in connection with a particular topic. Students should use the class to develop the habit of keeping up with the constantly evolving law in the specialized fields of criminal law and criminal procedure.

**LAW 478. IP Advanced Topics: The Future of Online Music and Online Video. 3 Units.**

The online music and online video industries are undergoing profound changes. In online video, the rise of Netflix and Hulu are just two examples of this trend. This class will explore how the different technical, economic or regulatory decisions we make today will interact to shape the future of these industries, and what the different options under consideration will mean for specific companies in this space. Class sessions will consist of a mix of guest lectures by industry leaders and class discussions of the assigned readings. Throughout the class, the students will work in interdisciplinary groups on problems facing specific companies in the online and online video industry today. For the final project, the groups will address specific policy problems from the perspective of a specific company, with different groups representing companies on different sides of an issue.

**LAW 479. International Law. 4 Units.**

This course examines what diplomats and scholars once referred to as the "law of nations," as it has matured and evolved to adapt to today's complex and interdependent world. It begins by considering fundamental questions about the nature of international law the sources of international law (including treaties), the subjects of international law, origins of international law in the sovereign equality of states, and the absence of mechanisms for the authoritative interpretation or enforcement of international law. It explores core international law concepts and issues such as state responsibility and the bases upon which states may exercise jurisdiction. It considers the operation of international law in the U.S. legal system. It then looks at a series of international law topics and issues, including some of particular interest today, such as mechanisms for the settlement of international disputes, the law governing coercion and the use of armed force, the development of international human rights, the law of armed conflict, and the emergence of a body of international criminal law and international criminal tribunals for its enforcement. Throughout, the class considers current issues and problems arising in the international arena and the extent to which international law actually affects the behavior of states. This course provides a general grounding in public international law and a foundation for more advanced or specialized international law courses.

**LAW 481. Communications Law: Internet and Telephony. 3 Units.**

New developments in Internet and other technology enable new forms of innovation, content production and political participation that have the potential to significantly transform our economy, society and democratic system. This transformation will not happen automatically. Technical, legal and economic choices will affect whether the Internet can realize its potential or not. Communications law - the law that governs both the physical infrastructures for communications services such as cable and telephone networks as well as the communication services which are provided over these infrastructures - has become one of the most important arenas in which choices affecting the future of the information society are made. The debates over network neutrality (whether network providers should be able to restrict the applications and content that their Internet service customers can access over the network) or the right ways to foster broadband deployment are examples of this trend. At the same time, the Internet's ability to support a variety of different communications services such as telephony, information services or video over the same physical network infrastructure challenges the existing communications law, which is based on the assumption that different physical infrastructures offer different communications services. What are the features of the Internet that are at the core of its economic, social, cultural and political potential? What can regulators and legislators do to allow the Internet to realize this potential? And how can they allow applications like Internet telephony and traditional telephony to coexist without giving one an unfair advantage over the other? The course will address how current law deals with these questions, but also explore what regulators and legislators may do to better deal with the challenges posed by the Internet. The course is mostly focused on the US, but highlights developments elsewhere where appropriate. Students may take Communications Law: Internet and Telephony and Communications Law: Broadcast and Cable Television in any order (neither is a prerequisite for the other). There are no prerequisites for this course. No technical background is required.

**LAW 483. Deal Litigation Seminar. 2-3 Units.**

This seminar is designed as an introduction to mergers and acquisitions litigation. The course aims to provide both a practical and doctrinal perspective on M&A-related litigation and relies heavily on readings and issues derived from practice in the Delaware courts where much contemporary deal litigation occurs. Students will apply cases and legal principles in various practical situations that may arise in a transactional litigation practice. Familiarity with basic corporate law principles is assumed.

**LAW 487. The Financial Crisis. 3 Units.**

(Same as MGTECON 343). This class will focus on the evolution of the financial crisis and the implications for the future of financial markets and the economy. Part of the course will concern the history of the financial crisis, from 2008-12, including policy responses. The rest will focus on current events. There will be a number of guest speakers, either live or by Skype. Last year's list included Tanya Beder, John Geanakoplos, Bob Joss, Tom Kempner, Ken Rogoff, Larry Summers, Kevin Warsh, and Nancy Zimmerman. Myron Scholes participated in about half the classes. I assume that this year there will be a similar but not identical list.

**LAW 488. Legal Aspects of Autonomous Driving. 2-3 Units.**

Self-driving cars and trucks are rapidly entering the mainstream. They raise key legal and policy questions, which this seminar explores through source materials (from case law to treaties), academic scholarship, and industry speakers. Topics include state and federal regulation, public and private standards, liability and insurance, privacy and security, and social norms. Because the course is intended to meaningfully advance—rather than to merely present—legal analysis of this emerging technology.

**LAW 490. Reproductive Justice: Law, Policy and Advocacy. 2 Units.**

This course offers an opportunity to explore constitutional doctrines on childbearing and to consider contemporary strategies for advancing reproductive justice. We will examine federal court decisions defining reproductive rights, including cases involving conflicts between reproductive freedom, religious liberty and freedom of speech. We will consider the limits of federal constitutional protection for vulnerable women's reproductive choices (prisoners, teenagers, women who need public assistance and soldiers). In light of those limitations, we will consider alternative strategies to strengthen reproductive freedom: state constitutional litigation, legislation, administrative advocacy, communications, organizing and initiative campaigns. Each of these will be paired with a current reproductive rights controversy, such as the federal ban on abortion in military facilities, insurance coverage of contraception, teenagers access to confidential reproductive health care, shackling of pregnant inmates and abstinence-only sex education. Reproductive justice advocates, including litigators, communications experts and empirical health researchers will make guest appearances. The success of this course depends on lively class participation. Students will write a short piece on each week's topic using a different advocacy style (such as a legislative fact sheet, blog post, initiative ballot argument, op-ed article) and will make oral presentations in class.

**LAW 491. Myth, Law, and Practice. 2 Units.**

Collective myths from a variety of traditions and cultures capture enduring psychological truths about human choices and the human condition. Lawyers at various stages in their careers have their own personal myths, sometimes conscious and sometimes not. These personal myths embody key tendencies that determine or heavily influence each lawyer's personal and professional path. This course examines both collective myths that capture relevant archetypal human tendencies and the personal myths along with the associated histories of individual lawyers. It offers a space and time for each student to consider his or her own personal and professional direction through the course materials, class interactions, and a series of reflection papers. The course benefits from the collaboration of Michael Guasparini, a Ph.D. mythologist and lawyer whose primary vocation is working intimately with lawyers and firms during periods of personal and institutional transition. Mr. Guasparini has deep experience with the personal lives of hundreds of lawyers at various ages and levels of professional development.

**LAW 492. Civil Procedure II: Multi-Party Litigation. 3 Units.**

This introduction to aggregative public or private litigation will cover joinder of claims and parties, class actions, multidistrict litigation, and other forms of aggregative litigation, as well as related topics such as preclusion and brief coverage of remedies and choice of law. The focus will be both doctrinal and practice-oriented, and will consider broader questions of how the civil justice system should respond to mass harms as well as proposals for reform. This course is strongly recommended for students planning a practice in private or public civil litigation, managing or supervising litigation, or a judicial clerkship. It provides a basis for advanced courses such as complex litigation.

**LAW 493. Entrepreneurship, Leadership and the Law Practicum. 2 Units.**

Starting or advising a growing social enterprise requires on-the-ground experience. This class brings theory and case studies examined in Entrepreneurship, Leadership and Law in Social Enterprise to use through placements as consultants with local social enterprises. Students will make connections in the community; learn creative and hands-on problem solving skills; teamwork and communication skills; and be inspired to innovate and break away from the traditional lawyer path.

**LAW 496. Legal Studies Workshop. 1 Units.**

The Legal Studies Workshop is designed to support students working on a piece legal scholarship with an eye to publication. The course will meet every other week for all three quarters. Students may sign up for one, two or three quarters, and will receive one credit for each quarter they are enrolled. Each session will be devoted to presentations of one or two student works-in-progress. Every student is expected to present his or her own work at least once, and to provide constructive oral feedback on others'. Attendance is mandatory (except of course for extenuating circumstances). Other faculty will participate on an informal basis when their expertise will be helpful for a particular paper. There are no written requirements for the course, and no requirement that the work presented be original to the Workshop. Students may wish to use the Workshop as an opportunity to expand on seminar papers or pursue independent research projects for which they are getting separate credit through one of the research tracks (e.g., directed research, dissertation). Whether students are working on a new project or revising an old, the expectation is that students will develop their topics independent of the course.

**LAW 498. Designing Liberation Technologies. 4 Units.**

(Same as CS 379L and POLISCI 337T). Small project teams will work with selected NGOs to design new technologies for promoting development and democracy. They will conduct observations to identify needs, generate concepts, create prototypes, and test their appropriateness. Some projects may continue past the quarter towards full-scale implementation. Taught through the Hasso Plattner Institute of Design at Stanford ([d.school.stanford.edu](http://d.school.stanford.edu)). Enrollment limited, by consent of instructors (applications will be required).

**LAW 500. Modern American Legal Thought. 3 Units.**

The course is a survey of the theories of law and adjudication that have been most important in this country since the Civil War, concluding with an introduction to presently significant schools of legal thought. The past schools of thought covered are Formalist Legal Science, Sociological Jurisprudence, American Legal Realism, and Legal Process. The more recent and still active movements include Law and Moral Philosophy, Law and Economics, Critical Legal Studies, Feminist Jurisprudence, Public Choice Theory, and Neo-formalism. The readings are drawn primarily from primary materials & the important contemporary manifestos and critiques of the schools of thought studied, along with writings that involve their application or reveal their influence. Among the recurring issues treated are: How political is law? How objective? How much do and should courts legislate? Is law mostly rules? Principles? Policies? Decisions? How much should law be bound up with other intellectual disciplines? What should legal education be like?.

**LAW 504. International Business Negotiation. 3 Units.**

This course is structured around a semester-long, simulated negotiation exercise which is intended to provide an in-depth study of the structuring and negotiating of an international business transaction. This class will be taught in counterpart with a class at Northwestern Law School. Students in this class (which will include both JD and MBA students) will represent a US pharmaceutical company, and the students in the class at Northwestern will represent an African agricultural production company. The two companies are interested in working together to exploit a new technology developed by the pharmaceutical company that uses the cassava produced by the African agricultural production company. The form of their collaboration could be a joint venture, a licensing agreement or a long term supply contract. The negotiations between the two classes will take place through written exchanges and through real-time negotiation via state of the art "Telepresence" videoconferences. The course provides students with an opportunity to gain insight into the dynamics of negotiating and structuring international business transactions, to learn about the role that lawyers, law and business play in these negotiations, and to develop experience in drafting communications and actual negotiations. Students will also learn about the legal and business issues that may arise in joint ventures, supply agreements and licensing agreements.

**LAW 508. Law, Social Entrepreneurship, and Social Change. 3 Units.**

This course will examine the use of law as a vehicle for social change. The course will be open to law and graduate students. It will be co-taught by Deborah Rhode, a legal scholar with experience teaching issues of leadership, gender equality and public interest law, and Kavita Ramdas, former President and CEO of the Global Fund for Women, and current Executive Director of Ripples to Waves, a program on Social Entrepreneurship housed in the Center on Democracy, Development, and the Rule of Law at the Freedman Spogli Institute for International Studies. Participants in the course will include four Social Entrepreneurs in Residence at Stanford (SEERs), who are part of the Ripples to Waves program and who will have been selected for their experience in using legal frameworks to further social justice in various parts of the world, including the United States. Materials for the course will draw on theoretical and empirical research concerning leadership, social entrepreneurship, human rights, public interest law, social movements, and case studies by SEERs fellows.

**LAW 509. Lawyer as Facilitator. 2 Units.**

This course is designed to help students develop an understanding of the practice of facilitation in the legal context and to develop skills as facilitators. As the practice of law becomes more complex, it includes more and more situations where groups of people need to work together. Common examples include: planning complex legal strategies, developing firm policies, coordinating work among attorneys and staff, working with corporations or other multi-person clients, shareholder meetings, public commissions and councils, corporate and non-profit Board of Directors meetings. Countless hours are spent in meetings; a typical lawyer in the United States can expect to spend at least 10,000 hours in meetings during his or her working life. This course will help students improve the quality of both the processes and products of meetings, as a facilitator, leader or meeting participant.

**LAW 511. Legal Cultures and Legal Professionals in Latin America and Latin Europe. 2 Units.**

The Latin countries of Europe and Latin America are the most direct inheritors of Roman language and law. They have made very important contributions to the history of law and mankind. They have not only an important legal tradition; the civil law tradition- but also some countries of the area among the fast growing economies of the world and are undergoing quick social change. This course proposes to give a broad picture of the transformation of law and legal thinking, and the relation between law and society in this important part of the world.

**LAW 512. Intellectual Property: Licensing. 2 Units.**

In this course we cover the major aspects of intellectual property licenses. We will cover patent, copyright, trademark and trade secret licenses in a variety of industries. We will focus on agreements governed by US federal and state law, but will cover select issues in cross border transactions. Topics include: grant language, upstream and downstream immunities, change of control events, indemnities, and insolvency. Using a case law-based approach, we will examine the interrelationship between contract language and background law. Introduction to Intellectual Property or consent of the instructor is a prerequisite for this course.

**LAW 514. California Coast: Science, Policy and Law. 4 Units.**

(Same as CEE 175A/275A, EARTHSYS 175/275). This interdisciplinary course integrates the legal, science, and policy dimensions of characterizing and managing our coastal resources in California. Our focus is on the land-sea interface as we explore contemporary coastal land use and marine resource decision-making. Among the focal issues we will examine are: coastal pollution, public health, ecosystem management; public access; private development; local community and state infrastructure; natural systems and significant threats; resource extraction; and conservation, mitigation and restoration. Students will learn the fundamental physics, chemistry, and biology of the coastal zone, tools for exploring data collected in the coastal ocean (time series analysis), as well as the institutional framework that shapes public and private decision-making affecting coastal resources. This course will take a "place-based" approach.

**LAW 515. Clean Tech: Business Fundamentals and Public Policy. 2 Units.**

(Same as GSBGEN 532) The course materials include case studies, book chapters, reports, homework exercises, videos, guests, and the presentation of final course projects. COURSE OBJECTIVES: Examine developments in the cleantech sector related to energy and carbon emissions. Provide a framework for comparing the cost competitiveness of alternative energy solutions. Examine current trends in public policy and regulatory initiatives related to carbon emissions and clean energy standards. Understand challenges for the commercialization of new energy technologies. Examine strategies for avoiding the "Valley of Death."

**LAW 517. Why Intellectual Property?: Rationales and Critiques of IP Law. 2 Units.**

Why do societies decide to grant special legal protection to various types of creative works? A number of answers have been given over the years. Some are utilitarian: we grant these rights because doing so maximizes social welfare. Some are deontological: we grant rights because this is morally required in a just society. We will examine these various justifications, as well as variants on them. We will also ask how a society, having decided to grant some version of IP rights, ought best structure them. Should they be true property rights, with all or most of the powers this implies (creator control over uses, right to compensation from exploitation, etc.), or something else? Would a state-backed reward system work better, so that compensation is divorced from individual control? Should compensation for successful creators be limited or capped, as part of a wider attempt to moderate the distributional impacts of granting individual property rights; or must we tolerate "big winners" as an inducement or symbolic reward for other creators? We will address these and related questions by reading two sets of materials: (1) classic treatments of property rights (Locke, Kant, etc.) and social justice (Rawls); and (2) material from the contemporary literature on IP theory. We may also host some of the most interesting scholars working in the field of IP theory today, to come and explain their thinking and their work.

**LAW 518. International Public Interest Lawyering Colloquium. 2-3 Units.**

Over the past two decades, the establishment of international criminal courts and the expansion of regional human rights tribunals have significantly improved the enforceability of international human rights law in many regions of the world. Within a similar timeframe, building the rule of law, especially in transitional societies, has found an increasingly important place on the development agenda of international organizations, governmental development agencies and private foundations. One issue that remains unclear is the impact of human rights enforceability on the reform of domestic justice systems. This colloquium will examine the relationship between international human rights and domestic rule of law in transitional societies from the perspective of public interest attorneys who are seeking to achieve justice for clients who are low-income and marginalized. During the first half of the course, students will read and discuss articles that provide an overall framework for understanding the field of international human rights and the field of rule of law, including the most common critiques of both fields as they are currently practiced. In the latter half of the course, students will hear perspectives from leading public interest attorneys about how they are deploying human rights mechanisms and engaging with the process of legal reform in their respective countries. There will be a focus on gender equality and protecting the human rights of women as a case study. The attorneys will offer on-the-ground observations of both the complex relationship between human rights and rule of law, and the potential and limitations of both approaches. Students will be required to participate in a symposium of leading international practitioners that addresses the same topic, and to synthesize lessons learned from the symposium as their final writing assignment.

**LAW 519. 21st Century Professional Skills and Practice Management. 2 Units.**

This course will help the entrepreneur-minded student to create a comprehensive, personal plan for developing the substantive knowledge, professional skills and business focus to create a fulfilling law practice. Assignments and simulations will be from case studies describing the challenges faced by attorneys and clients today. The course will focus on the economics of law practice, including forecasting demand for legal services and project management; team dynamics and leadership; effectively communicating with clients, colleagues, other parties and tribunals; client development and service; and managing expectations and unexpected adversity. Guest presenters will demonstrate and model various skills and then provide real-time feedback to students on class simulations or exercises. The course is not limited to any particular type of civil practice (size or substantive area).

**LAW 522. Private Equity Investing. 3 Units.**

This course will concern itself with the central issues related to private equity investing. Topics to be covered include the following: the structure and governance of pe funds; valuation, pricing and structuring of investments (particularly leveraged buyouts and other transactions involving multitiered capital structures); the due diligence process; conceptual issues (such as option theory, agency costs and asymmetric information) which influence activity in this domain; and private equity as a distinct asset class. Students will learn some of the skills and tools used in the private equity arena. The aspiration is to have the course be multidisciplinary (drawing upon the fields of finance, economics, law, organizations and strategy) and practical (how are deals done? how do capital and ideas come together in this milieu? who are the players?).

**LAW 527. Juvenile Crime, Juvenile Justice, and Social Policy. 3 Units.**

Juveniles are accorded special status under the American legal system. This introductory course will examine the historical precedents and philosophical reasons for treating juveniles differently from adults, and review empirical evidence about child development that can illuminate the reasons for their special status within the court system. Students will learn about the distribution of juvenile delinquency and the impact of significant social and institutional influences on delinquency: family, school, peers, and drugs. The course will also provide a detailed overview of the juvenile system, from its beginning to the current state of the institution, which will include a review of police work with juveniles, pretrial procedures, the juvenile court system and the juvenile corrections system. Major court rulings that have shaped contemporary juvenile justice will be presented. Finally, the course will consider dispositional options available to courts and will explore which are most effective in reducing delinquency. By the conclusion of this course, students should have an understanding of the juvenile justice system and how it compares with the adult justice system, what programs work to reduce recidivism, and be cognizant of some of the major legal and policy issues confronting that system today.

**LAW 528. Economic Analysis of Law. 4 Units.**

(Same as PubPol 302B). This course will provide a broad overview of the scholarly field known as "law and economics." The focus will be on how legal rules and institutions can correct market failures. We will discuss the economic function of contracts and, when contracts fail or are not feasible, the role of legal remedies to resolve disputes. We will also discuss at some length the choice between encouraging private parties to initiate legal actions to correct externalities and governmental actors, such as regulatory authorities. Extensive attention will be given to the economics of litigation, and to how private incentives to bring lawsuits differs from the social value of litigation. The economic motive to commit crimes, and the optimal governmental response to crime, will be studied in depth. Specific topics within the preceding broad themes include: the Coase Theorem; the tradeoff between the certainty and severity of punishment; the choice between ex ante and ex post sanctions; negligence versus strict liability; property rules; remedies for breach of contract; and the American rule versus the English rule for allocating litigation costs. There is no formal economics prerequisite to take this course, though some prior training in economics will be helpful.

**LAW 531. Wine and the Law. 2-3 Units.**

The wine industry is the subject of intense activity in many legal subject areas, including constitutional law, intellectual property, environmental and land use regulation, trade protectionism, and internet commerce. This seminar surveys the legal landscape of this multibillion dollar industry, focusing on contemporary debates and developments in judicial, legislative, and administrative arenas. Course materials will consist of a blend of judicial opinions, governmental materials, and secondary sources. The instructor specializes in litigation concerning the California wine industry, and the course will feature several guest speakers addressing the economic, political, and legal aspects of the subject in its state, national, and international dimensions. A paper will be required of all students on some topic of their choosing concerning the course subject matter.

**LAW 537. The United States Senate as a Legal Institution. 3 Units.**

This course will familiarize students with major, and/or emerging legal and constitutional issues concerning the U.S. Senate. In so doing, it will examine: 1) the Senate's nature as a complex legal institution, and 2) the issue of the Senate's legitimacy in the context of the current and largely unprecedented criticism of the Senate from all parts of the political spectrum. This first portion of the course will consider institutional-legitimacy issues facing the Senate, including the appointment of senators to fill vacancies as well as disputes concerning Senate rules and procedures such as the filibuster and holds. The second part of the course will explore how the Senate interfaces with the Constitution and the Supreme Court. It will examine how senators should regard the issue of constitutionality in voting on legislation, be it campaign-finance reform, internet decency, or health care. This part of the course will also consider how senators should approach proposed constitutional amendments. The final portion of the course will review the wide range of issues that have emerged in recent years regarding the constitutional relationship between the Senate and the Executive Branch, including the increasingly acrimonious issue of the standard to apply to executive appointments under the advice and consent power. Particular emphasis on this part of the course will be given to issues that have gained greater prominence since 9/11, including the relationship between enacted, constitutional legislation and the presidential assertion of Article II powers, as well as the Senate's abdication of its Article I war-declaration power.

**LAW 541. Legal Profession Workshop: Deconstructing Big Law. 3 Units.**

Wondering what life in a large law firm will be like in this age of radical change in the delivery of legal services? How the new economics are shaping the structure and management of large law firms? How law firms are re-thinking professional development and advancement within firms? What the globalization of legal services portends for your future? The goal of the workshop is to bring research and practical experience to bear on helping you think about how to build a professional career in an era of professional change.

**LAW 543. Entrepreneurship, Leadership and Law in Social Enterprises. 2 Units.**

Many believe that society's greatest challenges have already been solved by social entrepreneurs and the challenge is how to take their ideas to scale. However, it has become increasingly difficult to start and sustain social ventures. The lines between the public and private sectors have become increasingly blurry as best practices in the social sector now include innovation, strategy and accountability. This course will expose students to the work of social entrepreneurs in social enterprises - focusing primarily on domestic non-profit organizations. Using the "case study method" typically used in MBA programs, students will examine the challenges of starting, counseling, serving, funding and scaling social ventures through the eyes of the entrepreneur, investor, attorney and community leader. The course will explore the intricacies of remaining mission driven, talent, board relations, managing and sustaining growth, the changing role of corporate governance, and leveraging private sector partnerships and resources. Students will also explore innovative public / private sector partnerships and the challenges and opportunities of engaging diverse partners with differing agendas. The course will include guest speakers from the fields of law, business and the social sector. Throughout, students will explore the valuable roles that attorneys can and have played in such ventures.

**LAW 545. Alternate Dispute Resolution: Law, Practice, and Policy. 3 Units.**

Lawyers' representation of their clients increasingly calls for skills within a broad range of alternative dispute resolution processes. In this course, you will learn about the variety of dispute resolution procedures that operate under the ADR umbrella, within and outside of the court system (including mediation and arbitration). The goal is for students to understand the law and policy behind these alternatives relative to court adjudication, to be able to select the appropriate process for a client, and to effectively represent that client in the selected process. Guests include third party neutrals and advocates from a range of contexts, including federal court, private mediation, private and public arbitration, and corporate legal counsel.

**LAW 546. Alternate Dispute Resolution: Practicum. 2 Units.**

Effective client representation increasingly calls for lawyers with skills within a broad range of alternative dispute resolution processes. In this course, you will have the opportunity to observe 2-3 ADR processes being handled by Bay Area third-party neutral practitioners. Students in the class will meet periodically to review relevant law and policy, and to discuss observed cases.

**LAW 554. International Commercial Arbitration. 2 Units.**

This course is designed to provide students with an introduction to the theory and practice of international commercial arbitration, the preferred method of dispute resolution in international trade and commerce. It will familiarize students with the framework of international treaties and federal and state laws that undergird the international arbitral system and explore U.S. jurisprudence on the respective roles of courts and arbitral tribunals in resolving disputes subject to international arbitration. In addition the course will analyze alternatives in drafting international arbitration clauses, including the applicable arbitration rules, the significance of the agreed-upon place of arbitration, the number of arbitrators, and the method of their selection. The course will also impart a practical, in-depth understanding of each of the principal stages of arbitration, including the enforcement of the arbitration agreement; initiation of the arbitral proceedings; the availability of provisional remedies; the conduct of the arbitration from the pleading stage through discovery and briefing to the hearing; the arbitral tribunal's preparation of the award; and the judicial enforcement proceedings that conclude the process. Although the course will focus on the practice of international arbitration from the U.S. perspective, it will also introduce students to perspectives from other leading civil and common law jurisdictions.

**LAW 556. Counterterrorism and the Law. 3 Units.**

This seminar will explore legal and policy questions related to the investigation, detention, and prosecution of terrorism suspects under U.S. law. Moving beyond Supreme Court detainee decisions, the course will address a range of equally riveting controversies implicating national security oversight, civil liberties concerns, and effective counterterrorism policy. Topics addressed will include domestic intelligence-gathering and investigations (including FISA surveillance, informants and entrapment, and racial/religious profiling); preventive detention today (material witness warrants, the use of pretextual immigration/criminal charges, and military detention); and the prosecution of terrorism suspects (material support laws, secrecy concerns in Article III courts, the use of military commissions). One core theme will be the extent to which both lawmaking and oversight in the national security context occur outside the courts - often through legal counsel opinions, agency guidelines, internal watchdogs, and other lesser-known institutions and sources of law.

**LAW 557. Direct Democracy. 2-3 Units.**

In recent years, the use of ballot measures has sharply risen, and initiatives and referenda have featured prominently in contested debates over immigration, affirmative action, abortion, same sex marriage and term limits. This seminar will focus on direct democracy as a method of lawmaking. Our principal focus will be on initiatives and referenda, but we will allocate some time to the recall, as well. We will consider the history, practice, theoretical justifications, and constitutional dimensions of direct democracy, as well as how direct democracy interacts with representative democracy. We will also explore many legal questions that have arisen in as ballot measures have been used as instruments of governance and policy. Topics will include whether direct democracy comports with the federal constitution; judicial review and interpretation of ballot measures; minority rights under direct democracy; election rules relating to signature gathering, qualifying ballot measures, and campaign finance; and the role of interest groups. I anticipate one or more guest lecturers.

**LAW 558. Workshop on International Security, Law, and Social Science. 1 Unitss.**

Societies throughout the world face pressing security and international cooperation problems involving insurgency, transnational crime, risk regulation, migration, arms control, and related areas. This seminar, based at Stanford's university-wide Center for International Security and Cooperation covers a variety of issues of interest for a multi-disciplinary audience of social scientists, lawyers and legal scholars, and natural scientists, among others. Issues include nuclear weapons proliferation and arms control, war and civil conflict, international and transnational organizations, governance, counter-terrorism, biosecurity and global public health, and migration.

**LAW 560. Mental Health Law: Forensics. 3 Units.**

It is estimated that nearly one-third of Americans experience a diagnosable mental disorder each year. This course is designed to provide law students with a working knowledge of the major areas of mental health and illness; as well as a basic understanding of legal issues affecting the practice of psychology and psychiatry. Basic concepts of clinical psychiatry and psychopathology will be highlighted throughout the course. We will also address legal issues that pertain to the needs and rights of individuals with a mental disorder and explore the delivery of mental health services, the regulation of mental health professionals, and the relationship between society and individuals with a mental disability. Whenever appropriate, landmark cases will be discussed and their impact in the practice of mental health delivery (i.e., psychiatry and psychology) and on the practice of law, will be discussed. This course is intended to be interactive and while the core of the course is pre-determined some of the content will be tailored to address interests and needs of participants. The structure of most sessions will begin with case presentations highlighting the day's topic, followed by a didactic portion from the instructor, ending with an interactive discussion between class members and invited panelists.

**LAW 564. Policy & Strategy Issues in Financial Engineering. 3 Units.**

(Same as ECON152/252, PUBLPOL364,STATS238) This is a non-technical course that will focus on a series of case studies each designed to illuminate a serious public policy issue raised by the evolution of modern financial engineering. These will include discussions of Freddie Mac, Fannie Mae, sub-prime and Alt-A mortgages and the flaws of AAA CDOs; the spectacular losses by Orange County and the Florida Local Government Investment Pool and the challenges posed by unregulated investment pools; how credit default swaps are likely to change with central clearing using the PIIGS (Portugal/ Ireland/ Iceland/ Greece/ Spain), the monolines, AIG, Lehman and MF Global as examples; views of rogue trading using the similarities and disparities of Askin, Madoff, Barings, Soc Gen and UBS for discussion; and Risk Management 101 : the why/ how/ where/ when firms went wrong plus what to keep and what to throw out in the next phase of risk programs among other case studies. The subject matter, by necessity, is multi-disciplinary and so the course is particularly suited to those students having an interest in public policy and the evolution of modern financial markets. This includes students from the law or business schools, or the public policy, economics, EES, political science, or financial math and engineering programs among others. Several themes will tie the case studies, reading and discussions together:- Is this an example of an innovation that got too far ahead of existing operations, risk management, legal, accounting, regulatory or supervisory oversight?-How might temporary infrastructure be implemented without stifling innovation or growth?-How might losses be avoided by requiring permanent infrastructure sooner? Will Dodd-Frank, Basel III, etc., help to prevent such problems? What are the potential unintended consequences?- Is this an example of improperly viewing exposures that are subject to uncertainty or incorrectly modeling risk or both? Guest speakers will be invited to share their experiences. This course will aim to provide a practitioner(s) view of financial engineering over the past 3 ½ decades as well as a broad understanding of what went right and what went wrong plus cutting edge views of the future of financial engineering.

**LAW 565. Immigration Law, Policy and Constitutional Rights. 3 Units.**

This survey course will provide a foundation in immigration law, the system of admission and removal, and the constitutional principles governing the regulation of non-citizens. The course will also explore some selected topics concerning immigrants' rights and the normative values informing contemporary policies by drawing on the instructor's extensive experience litigating constitutional and civil rights issues on behalf of non-citizens throughout the country. After surveying the immigration system and constitutional principles, we will examine such topics as detention of immigrants; state and local immigration regulation; constitutional prohibitions on 'alienage' discrimination; access to the courts and habeas corpus for non-citizens; rights of undocumented workers; extraterritorial application of the Constitution; and Fourth Amendment issues arising in federal immigration enforcement. No prior course or background in immigration law is expected.

**LAW 572. Social Justice Impact Litigation: Issues and Strategies. 2 Units.**

This seminar will explore strategic and legal issues related to litigation against the government as a tool for advancing constitutional and civil rights. The course will be informed by the instructor's thirty years' experience litigating class action and appellate cases at all levels of the federal judiciary on behalf of immigrants and civil rights plaintiffs to explore strategic use of law reform and social justice litigation. We will consider both legal doctrine and practical problems. Among the issues that may be included are: selecting and using test cases; strategic pleading; class action problems; the role of amicus briefs; suits for damages versus injunctive relief; standing, mootness and organizational plaintiffs; settlement strategies and issues; coalition litigation; use of public advocacy and media; the effect of lawsuits on policymakers and government officials; and litigation to achieve legislative change.

**LAW 577. Regulation of the Political Process. 4 Units.**

This course considers regulation of political process. It begins with an overview of the restrictions on the franchise. We then turn to constitutional and statutory constraints on apportionment under the equal protection clause (one person, one vote and political gerrymandering in particular) and the Voting Rights Act, before looking at judicial remedies for elections gone bad. If time permits, we may also consider regulation of political parties and the use of direct democracy.

**LAW 588. Sports Law. 2 Units.**

This seminar will examine the legal dimensions of the business of professional sports. Topics covered will include the history and evolution of sports leagues, the application of antitrust and labor law, drugs and sports, the rules governing sports leagues, and the relationships between owners, players, fans and the media. Labor Law (Law 301) is a prerequisite for this course.

**LAW 590. Modern Capital Markets and the Financial Crisis. 4 Units.**

Money: Shadow Banking, Dark Financial Matter and the Future of Finance. This course introduces law students to the structure of the shadow banking system and related financial markets. Emphasis is placed on the securitization process, the swaps markets (including credit default swaps, total returns swaps, interest rate, and currency swaps), repo agreements, forwards, futures, and related institutions such as clearing houses and exchanges. The course will consider the role that these markets played in the recent and ongoing financial crisis, their potential implications for future crises, and several of the regulatory initiatives proposed by the Dodd Frank Act. Much of the course will operate through the lens of a series of case studies including the Greek debt crisis, Harvard's loss of \$500 million in the swaps market, the AIG bailout, and JPMorgan's loss of \$2 billion in its hedge book.

**LAW 591. Securities Regulation: Mandatory Disclosure, Capital Formation, and the IPO Process. 4 Units.**

Capital Formation and Securities Regulation. This course analyzes the regulations governing the capital formation process in the United States. The course explains the process by which companies register securities with the SEC in order to go public, and the reporting obligations that arise once companies are publicly traded. The course also analyzes the process by which companies raise capital through private placements (the dominant capital formation process in Silicon Valley), restrictions on the resale of privately placed securities, and the securities law liabilities that arise in these transactions. The course also addresses the processes by which foreign issuers commonly raise many billions of dollars in the US markets without registering their offerings with the SEC, Chinese reverse mergers which have led to a spate of litigation, and recent legislation allowing "crowdfunding" of certain enterprises. Much of the course will operate through the analysis of case studies, in particular, a close analysis of the Facebook and Google IPOs, and private placement and secondary market transaction histories preceding those public offerings. Time permitting, we will also analyze the Foreign Corrupt Practices Act (which, among other matters, requires that publicly traded firms properly account for and disclose bribes paid to foreign government officials), and disclosures related to the use of conflict minerals and to contracts with foreign governments in the extractive industries, i.e., oil and gas drilling.

**LAW 593. Terrorism and the Courts. 3 Units.**

The emergence of international terrorism and governments' responses to it have led to novel questions for courts at the intersection of constitutional, criminal, international, and procedural law. This seminar will consider a series of interrelated problems that have arisen in federal courts over the treatment and punishment of suspected terrorists and compensation for victims. Topics will include habeas litigation by detainees; the creation and use of non-Article III courts such as military commissions as alternatives to criminal prosecution; congressional attempts to withdraw jurisdiction from federal courts over litigation involving terrorism; separation of powers issues involving the roles of the President, Congress, and the courts in the treatment and punishment of suspected terrorists; compensation claims by victims of terrorism (through statutory compensation funds, litigation against foreign states under the Foreign Sovereign Immunities Act, and tort litigation against individuals and entities); techniques for handling complex litigation involving terrorism; the Alien Tort Statute; and civil litigation by detainees over their treatment.

**LAW 602. Religion and the First Amendment. 3 Units.**

This course covers the major doctrines and decisions interpreting the provisions of the First Amendment affecting religion, especially the free exercise and establishment clauses. Special emphasis is placed on the historical, philosophical, and theological roots of first amendment principles, and it also studies the briefs and arguments in a case currently in litigation.

**LAW 603. Environmental Law and Policy. 3 Units.**

This course serves as an introduction to federal environmental law, regulation, and policy in the United States. The course begins with a discussion of the property law roots of environmental law and the risk assessments and regulatory frameworks essential to understanding the current US approach to environmental problems. Next, the course focuses on federal statutes including the Toxic Substances Control Act, the Clean Air Act, the Clean Water Act, the Endangered Species Act, and the National Environmental Policy Act. The course concludes with a discussion of current EPA efforts to address emissions of greenhouse gases.



**LAW 606. Supreme Court Simulation Seminar. 3 Units.**

This seminar provides students with the opportunity to analyze, argue, hear oral arguments and draft opinions in cases that are currently pending before the Supreme Court of the United States. Professor Larry Marshall will serve as the instructor in the seminar, but many of the Law School's esteemed group of Supreme Court litigators will be participating in one or more of the sessions. The 18 students in the seminar will be divided into two courts. One of these courts will sit five times and the other will sit four times. During each sitting, the court will hear arguments in a case currently pending before the Supreme Court. The cases chosen will provide a mix of constitutional and statutory issues, as well as a mix between criminal and civil cases. Each student will be assigned the role of a particular Justice for the entire quarter. Each student's task while sitting on cases is to do his or her best to understand that particular justice, based on that justice's prior opinions and judicial philosophy. In this sense, the seminar is intended to help promote insight into the role of judicial personality and philosophy within the decisional process. The weekly seminars will proceed as follows: In preparation for each week's session, all students (whether they are the two students arguing that week, the nine students judging that week, or the seven students observing that week) will read the lower courts' decisions, the briefs (the party briefs and selected amicus briefs) and the major precedents implicated. During the first portion of each week's session (approximately one hour), two of the students (who are members of the Court that is not sitting that week) will present oral arguments to the nine "justices" sitting that week. The arguments will be based on the briefs that were actually filed in the case. During the second segment of each week's session (approximately 45 minutes), the "justices" who are sitting that week will "conference" the case while the other non-sitting students, students who argued, instructors and guests will observe. Again, each student will be in the role of a particular justice. At the end of the "conference," the opinion-writing will be assigned to one "justice" in the majority and one "justice" in the dissent. During the final portion of each session (approximately one hour), the instructors, guests and students will engage in a broad discussion of what they just observed. This may include analysis of the briefing, discussion about the oral argument, reflections on the "conference," and, more generally, a discussion about the case and its significance. After each class, the student assigned to draft the majority opinion will have two weeks to circulate a draft to the "Court." The student writing the dissent will then have two weeks to circulate his or her opinion. The other sitting "justices" can join one of these opinions, request some changes as a condition of joining, or decide to write separately. Over the course of the Quarter, then, each student will argue one case, sit on four or five cases, and draft at least one opinion.

**LAW 610. Trial Advocacy Workshop. 4 Units.**

This lawyering skills course gives students an orientation to and constant practice in most basic pretrial and trial advocacy skills areas. Topics include: taking and defending depositions, motion practice, trial evidence, including admission of trial exhibits in evidence and use of prior witness statements to refresh and impeach a witness, jury selection and voir dire, opening statements, examination of witnesses (direct and cross-examination), and closing arguments. Students will try a full jury case through to verdict with use of jurors and before a real judge in the Superior Court in Palo Alto at the end of the course. Students will also have a chance to watch the jurors deliberate and talk with them after their verdict. The course takes place during eight weeks of the Autumn Quarter with two classes (one lecture and one workshop) per week on most weeks from 4:15-9:00 (these can occur on either M, T, W, or Th), plus one Saturday workshop and the final weekend of jury trials, in late November. The format for each topic begins with a lecture/discussion featuring video vignettes of various techniques and a live demonstration by an expert trial lawyer. Following the discussion portion of each topic are small group sessions during which each student practices the skills involved. Constructive feedback is given after each exercise by two of our faculty of very experienced Bay Area litigators and judges. Most exercises are also videotaped for further one-on-one critique by another faculty member. The course ends with full jury trials. The central philosophy of the workshop is that skills are best acquired in an experiential manner by seeing and doing. Frequent short, well-defined exercises followed by immediate constructive feedback in a non-competitive, non-threatening atmosphere provide the core of the program.

**LAW 613. Dispute Systems Design. 3 Units.**

Lawyers are often called upon to help design systems for managing and resolving conflicts that support or supplant existing legal structures. The crisis of September 11 led Congress to pass a law creating the September 11 Fund; a California Supreme Court challenge to its method of resolving health care disputes led Kaiser Permanente to reform its arbitration system; years of atrocities committed against the people of South Africa, Guatemala and many other countries led to the formation of truth commissions. Lawyers helped to structure these and many other conflict resolution systems. We'll use a case study model to survey different kinds of conflict prevention, management and resolution systems, and examine different factors in their design.

**LAW 615. Negotiation. 3 Units.**

As a lawyer, you will probably negotiate more than you do anything else. You will negotiate not just over cases, but any time that you need or want something that you cannot get alone. You will negotiate with your boss, your clients, your colleagues, and all of their counterparts (plus the lawyers) on the other side. You will negotiate with "the system" -- whether it is the courts, agencies, other governmental bodies, and the structures of society. You will also continue to negotiate with your family, your friends, even yourself. This course is designed to: (1) develop your understanding of negotiation, and your awareness of yourself as a negotiator; (2) give you some tools and concepts for analyzing, preparing for and conducting negotiations; (3) enhance your negotiating skills through frequent role plays, reflection, and feedback; and (4) teach you how to keep learning from your own negotiation experience. In addition to negotiation skills and theory, you will be introduced to issues of representation, ethics, and the place of negotiation in our legal system. The Negotiation Seminar is an intense, interactive course. We will meet for approximately three hours each week, and will require weekly preparation of readings, simulations, and written assignments. Basically, you will learn by reading about specific research and doing simulated negotiations -- figuring out with the rest of the class what works and what does not, writing about what you're learning, and trying again. Because participation in the simulations is central to the course, attendance at all classes is required.

**LAW 616. Legal Strategies: Complex and Aggregate Litigation. 3 Units.**

This course will explore legal strategies with an emphasis on complex and aggregate litigation, including class actions, multi-district litigation, pretrial procedure, case management, problems associated with absent and future claimants, evidentiary issues, settlement, alternative dispute resolution techniques. Students will be expected to assume roles in the litigation process and to analyze problems in a wide variety of substantive areas of the law, but from a process and tactical point of view.

**LAW 617. Public Interest Law and Practice. 2-3 Units.**

This course will examine the history, theoretical frameworks, strategies and political position of public interest law practice and attorneys in the United States. We will consider the role of lawyers and the legal system in advancing reforms; different models of lawyering; ethical issues related to working as a lawyer within a social movement; the personal impacts of this type of career choice; and strategies employed by lawyering in differing settings, from issue-based non-profits to government agencies, and private public interest law firms or legal services groups. Readings will include law review articles, legal pleadings and case studies that allow analysis and exploration of the tensions and challenges that exist within the legal system for public interest practitioners. We will also consider how lawyers interact and collaborate with other participants in social justice movement.

**LAW 620A. Criminal Prosecution Clinic: Clinical Practice. 4 Units.**

Prosecution Clinic students prosecute cases at the San Jose Superior Court under the guidance of Santa Clara County prosecutors and a faculty supervisor. They formulate case strategy, identify and interview witnesses, and advocate before the court at evidentiary motions and preliminary hearings. The cases, almost all felonies, include drug offenses, thefts, burglaries, assaults, and a range of less common crimes. Police witnesses are most common, though students sometimes offer testimony from crime victims. When defendants testify or offer other witnesses, they face cross-examination by clinic students. Students spend three full days a week in the D.A.'s office. All six students must spend all day Tuesdays and Fridays on site. Each student must also choose a third on-site day, when the student will work closely with the student's on-site supervisor. The six students need not all choose the same third day, but each student must pick a day that stays constant through the term. There generally will be two class sessions each week: a three-hour on-campus class and a lunchtime seminar in the D.A.'s office. At the beginning of the term classes focus on skills training, including direct and cross-examination, admission of physical evidence, and argument. Toward the end of the term the focus shifts to an examination and critique of the local mechanisms of criminal justice. Topics include the impact of race, gender, and class on the quality of justice; the institutional strengths and weaknesses of the actors in the system; and the ethical issues that confront prosecutors and defense lawyers. Students typically tour the Santa Clara County jail and crime lab, San Quentin Prison, and the Chaderjian Youth Correctional Facility in Stockton and have the option to spend an evening on a police ride-along. Students must submit regular written reflections on their experiences in and observations of the local justice system. Their assigned cases often will demand written court filings. Evidence is a prerequisite. In rare cases a concurrent clinic module in evidence can fulfill this requirement. Courses in criminal procedure (investigation) and trial advocacy are strongly encouraged. Class attendance is mandatory, and class participation will be considered in grading. Students will be asked to commit to the course in the summer of 2012; dropping the course after committing will not be permitted. Special Instructions: General Structure of Clinical Courses The Law School's clinical courses are offered fulltime for twelve credits. Clinic students may not enroll in any other classes, seminars, directed research, or other credit-yielding activities within the Law School or University during the clinical quarter. Nor may they serve as teaching assistants expected to attend classes regularly. There is a limited exception for joint-degree students required to take specific courses each quarter, who would be foreclosed from taking a clinic unless allowed to co-register. Students are expected to be available by e-mail or cell phone during workday hours Monday through Friday. The clinical quarter begins the first day of classes and runs through the final day of exam period. Students should not plan personal travel during the Monday-to-Friday workweek without the authorization of their on-site and faculty supervisors. Students are expected to devote at least thirty-five hours per week on average to various facets of this work. In some weeks longer hours may be required depending on casework demands. Students will be awarded three separate grades for their clinical quarter, each reflecting four credits. The three grades are broken into the following categories: clinical practice; clinical methods; and clinical coursework. Grading is on the H/P system. Students may not enroll in any clinic (basic or advanced) that would result in their earning more than 27 clinical credits during their law school career.

**LAW 620B. Criminal Prosecution Clinic: Clinical Methods. 4 Units.** Prosecution Clinic students prosecute cases at the San Jose Superior Court under the guidance of Santa Clara County prosecutors and a faculty supervisor. They formulate case strategy, identify and interview witnesses, and advocate before the court at evidentiary motions and preliminary hearings. The cases, almost all felonies, include drug offenses, thefts, burglaries, assaults, and a range of less common crimes. Police witnesses are most common, though students sometimes offer testimony from crime victims. When defendants testify or offer other witnesses, they face cross-examination by clinic students. Students spend three full days a week in the D.A.'s office. All six students must spend all day Tuesdays and Fridays on site. Each student must also choose a third on-site day, when the student will work closely with the student's on-site supervisor. The six students need not all choose the same third day, but each student must pick a day that stays constant through the term. There generally will be two class sessions each week a three-hour on-campus class and a lunchtime seminar in the D.A.'s office. At the beginning of the term classes focus on skills training, including direct and cross-examination, admission of physical evidence, and argument. Toward the end of the term the focus shifts to an examination and critique of the local mechanisms of criminal justice. Topics include the impact of race, gender, and class on the quality of justice; the institutional strengths and weaknesses of the actors in the system; and the ethical issues that confront prosecutors and defense lawyers. Students typically tour the Santa Clara County jail and crime lab, San Quentin Prison, and the Chaderjian Youth Correctional Facility in Stockton and have the option to spend an evening on a police ride-along. Students must submit regular written reflections on their experiences in and observations of the local justice system. Their assigned cases often will demand written court filings. Evidence is a prerequisite. In rare cases a concurrent clinic module in evidence can fulfill this requirement. Courses in criminal procedure (investigation) and trial advocacy are strongly encouraged. Class attendance is mandatory, and class participation will be considered in grading. Students will be asked to commit to the course in the summer of 2012; dropping the course after committing will not be permitted. Special Instructions: General Structure of Clinical Courses The Law School's clinical courses are offered fulltime for twelve credits. Clinic students may not enroll in any other classes, seminars, directed research, or other credit-yielding activities within the Law School or University during the clinical quarter. Nor may they serve as teaching assistants expected to attend classes regularly. There is a limited exception for joint-degree students required to take specific courses each quarter, who would be foreclosed from taking a clinic unless allowed to co-register. Students are expected to be available by e-mail or cell phone during workday hours Monday through Friday. The clinical quarter begins the first day of classes and runs through the final day of exam period. Students should not plan personal travel during the Monday-to-Friday workweek without the authorization of their on-site and faculty supervisors. Students are expected to devote at least thirty-five hours per week on average to various facets of this work. In some weeks longer hours may be required depending on casework demands. Students will be awarded three separate grades for their clinical quarter, each reflecting four credits. The three grades are broken into the following categories: clinical practice; clinical methods; and clinical coursework. Grading is on the H/P system. Students may not enroll in any clinic (basic or advanced) that would result in their earning more than 27 clinical credits during their law school career.

**LAW 620C. Criminal Prosecution Clinic: Clinical Coursework. 4 Units.** Prosecution Clinic students prosecute cases at the San Jose Superior Court under the guidance of Santa Clara County prosecutors and a faculty supervisor. They formulate case strategy, identify and interview witnesses, and advocate before the court at evidentiary motions and preliminary hearings. The cases, almost all felonies, include drug offenses, thefts, burglaries, assaults, and a range of less common crimes. Police witnesses are most common, though students sometimes offer testimony from crime victims. When defendants testify or offer other witnesses, they face cross-examination by clinic students. Students spend three full days a week in the D.A.'s office. All six students must spend all day Tuesdays and Fridays on site. Each student must also choose a third on-site day, when the student will work closely with the student's on-site supervisor. The six students need not all choose the same third day, but each student must pick a day that stays constant through the term. There generally will be two class sessions each week a three-hour on-campus class and a lunchtime seminar in the D.A.'s office. At the beginning of the term classes focus on skills training, including direct and cross-examination, admission of physical evidence, and argument. Toward the end of the term the focus shifts to an examination and critique of the local mechanisms of criminal justice. Topics include the impact of race, gender, and class on the quality of justice; the institutional strengths and weaknesses of the actors in the system; and the ethical issues that confront prosecutors and defense lawyers. Students typically tour the Santa Clara County jail and crime lab, San Quentin Prison, and the Chaderjian Youth Correctional Facility in Stockton and have the option to spend an evening on a police ride-along. Students must submit regular written reflections on their experiences in and observations of the local justice system. Their assigned cases often will demand written court filings. Evidence is a prerequisite. In rare cases a concurrent clinic module in evidence can fulfill this requirement. Courses in criminal procedure (investigation) and trial advocacy are strongly encouraged. Class attendance is mandatory, and class participation will be considered in grading. Students will be asked to commit to the course in the summer of 2012; dropping the course after committing will not be permitted. Special Instructions: General Structure of Clinical Courses The Law School's clinical courses are offered fulltime for twelve credits. Clinic students may not enroll in any other classes, seminars, directed research, or other credit-yielding activities within the Law School or University during the clinical quarter. Nor may they serve as teaching assistants expected to attend classes regularly. There is a limited exception for joint-degree students required to take specific courses each quarter, who would be foreclosed from taking a clinic unless allowed to co-register. Students are expected to be available by e-mail or cell phone during workday hours Monday through Friday. The clinical quarter begins the first day of classes and runs through the final day of exam period. Students should not plan personal travel during the Monday-to-Friday workweek without the authorization of their on-site and faculty supervisors. Students are expected to devote at least thirty-five hours per week on average to various facets of this work. In some weeks longer hours may be required depending on casework demands. Students will be awarded three separate grades for their clinical quarter, each reflecting four credits. The three grades are broken into the following categories: clinical practice; clinical methods; and clinical coursework. Grading is on the H/P system. Students may not enroll in any clinic (basic or advanced) that would result in their earning more than 27 clinical credits during their law school career.

**LAW 622A. Environmental Law Clinic: Clinical Practice. 4 Units.**

Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop expert testimony; draft comment letters, petitions, pleading or briefs; and/or attend and participate in administrative and court hearings. In regular one-on-one meetings with supervising faculty, there is a heavy emphasis on polishing persuasive writing and oral advocacy skills. In addition, students participate in a weekly seminar where we examine strategic, ethical and substantive issues arising out of the Clinic's work. No prior substantive experience or background in the environmental/natural resource field is necessary, but an interest in learning about these areas of the law is important. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 622B. Environmental Law Clinic: Clinical Methods. 4 Units.**

Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop expert testimony; draft comment letters, petitions, pleading or briefs; and/or attend and participate in administrative and court hearings. In regular one-on-one meetings with supervising faculty, there is a heavy emphasis on polishing persuasive writing and oral advocacy skills. In addition, students participate in a weekly seminar where we examine strategic, ethical and substantive issues arising out of the Clinic's work. No prior substantive experience or background in the environmental/natural resource field is necessary, but an interest in learning about these areas of the law is important. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 622C. Environmental Law Clinic: Clinical Coursework. 4 Units.**

Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop expert testimony; draft comment letters, petitions, pleading or briefs; and/or attend and participate in administrative and court hearings. In regular one-on-one meetings with supervising faculty, there is a heavy emphasis on polishing persuasive writing and oral advocacy skills. In addition, students participate in a weekly seminar where we examine strategic, ethical and substantive issues arising out of the Clinic's work. No prior substantive experience or background in the environmental/natural resource field is necessary, but an interest in learning about these areas of the law is important. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 622D. Environmental Law Clinic: Clinical Practice. 3-4 Units.**

This section of the Clinic is open only to Law students who are also pursuing graduate degrees in schools other than the School of Law. Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop expert testimony; draft comment letters, petitions, pleading or briefs; and/or attend and participate in administrative and court hearings. In regular one-on-one meetings with supervising faculty, there is a heavy emphasis on polishing persuasive writing and oral advocacy skills. In addition, students participate in a weekly seminar where we examine strategic, ethical and substantive issues arising out of the Clinic's work. The Law School's clinical courses are offered for 9- 12 credits, as agreed upon with the instructor. Students may not enroll in any clinic (basic or advanced) that would result in their earning more than 27 clinical credits during their law school career.

**LAW 622E. Environmental Law Clinic: Clinical Methods. 3-4 Units.**

This section of the Clinic is open only to Law students who are also pursuing graduate degrees in schools other than the School of Law. Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop expert testimony; draft comment letters, petitions, pleading or briefs; and/or attend and participate in administrative and court hearings. In regular one-on-one meetings with supervising faculty, there is a heavy emphasis on polishing persuasive writing and oral advocacy skills. In addition, students participate in a weekly seminar where we examine strategic, ethical and substantive issues arising out of the Clinic's work. The Law School's clinical courses are offered for 9- 12 credits, as agreed upon with the instructor. Students may not enroll in any clinic (basic or advanced) that would result in their earning more than 27 clinical credits during their law school career.

**LAW 622F. Environmental Law Clinic: Clinical Coursework. 3-4 Units.**

This section of the Clinic is open only to Law students who are also pursuing graduate degrees in schools other than the School of Law. Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop expert testimony; draft comment letters, petitions, pleading or briefs; and/or attend and participate in administrative and court hearings. In regular one-on-one meetings with supervising faculty, there is a heavy emphasis on polishing persuasive writing and oral advocacy skills. In addition, students participate in a weekly seminar where we examine strategic, ethical and substantive issues arising out of the Clinic's work. The Law School's clinical courses are offered for 9- 12 credits, as agreed upon with the instructor. Students may not enroll in any clinic (basic or advanced) that would result in their earning more than 27 clinical credits during their law school career.

**LAW 623. Advanced Environmental Law Clinic. 2-7 Units.**

The Advanced Environmental Law Clinic provides an opportunity for students who have already taken the Environmental Law Clinic to continue intense individual project work on cases or matters in which they have previously been involved. Advanced students will work closely with the supervising clinic attorney on their designated projects and are expected to take increasing responsibility for managing the necessary work and representation of clients. In addition, advanced students are expected to serve as mentors to less experienced clinic students enrolled in the basic Environmental Law Clinic course and will thereby receive additional training in basic team building and supervision skills.

**LAW 626. Legislative Simulation: The Federal Budget. 3 Units.**

How does a bill really become a law? This course is about the formal and informal American legislative and budget process. The course is part lecture, part simulation. You will learn the formal processes that govern legislating and White House policymaking, including: how a President decides what policy to propose; Congressional committee markups; House and Senate floor debate, rules, and the amendment process; conference committees; and Presidential signatures and vetoes. You will then learn how legislative coalitions are built and broken, how and why bargaining occurs, the roles of interest groups and lobbyists, how an Executive Branch tries to influence Congress, how political parties and elections influence legislative behavior, and how the press and personalities influence all of the above. While this is primarily a class about policymaking process, we will learn enough about federal budget policy to make your participation in budget legislative simulations more effective. Can your class solve America's long-term budget problems when your counterparts in Washington have so far been ineffective at doing so?.

**LAW 628A. Oral Argument Workshop. 2 Units.**

Building on the skills developed in Federal Litigation, this simulation course will give students the unique opportunity to argue and judge pretrial motions from actual federal court cases. The instructor will provide the written briefs, and each week half the class will argue and half the class will judge a motion. Preparation will require reading the cases cited in the briefs and coming to class ready either to present an argument (attorneys) or interrogate counsel (judges). Students will critique each other both orally and in writing, and the instructor will provide oral critiques of all arguments. The goals of this class are: to train students to argue in court; to provide them with a chance to polish their public speaking skills and practice thinking on their feet; to prepare students to engage in challenging dialogue with both colleagues and future clients; and to improve self-confidence. Thus, while the context of the course is litigation, the objectives are much broader than the mastery of litigation technique. Special Instructions: Students registered in this course have the option to register for one additional unit with the consent of the instructor. Students electing this option will be registered in Law 628-B-01 (1 unit) in addition to Law 628-A-01 (2 units). The focus of the additional one-unit component will be on oral presentation skills. See Law 628-B-01 course descriptions for details. Students must be registered in Law 628-A-01 to register in Law 628-B-01. Students must elect (or drop) the one-unit option by the final study list deadline. This course is not open to first year Law School students. Priority will be given to those students who commit to taking the class if given consent to enroll. Please indicate your commitment on the consent form.

**LAW 628B. Oral Argument Workshop. 1 Unitss.**

This course is offered in conjunction with "OAP" (Law 628-A-01). All students registered in Law 628-A-01 have the option to take an additional unit. The focus of this component will be on oral presentation skills and will consist primarily of interactive exercises designed to enhance voice and body control, increase poise, reduce anxiety, and improve overall effectiveness in public speaking. Doree Allen, the Director of the Oral Communication Program at Stanford's Center for Teaching and Learning, along with guest lecturers from throughout the university, will lead these classes with the goal of giving students an opportunity to improve their oral presentation skills in a supportive and fun environment.

**LAW 629. Spanish For Lawyers. 3 Units.**

The Spanish and Cultural Competency for Lawyers course offers an opportunity for students to enhance their existing Spanish communication skills in legal practice. The course will cover specific Spanish vocabulary necessary to communicate in a variety of legal settings from direct client representation in administrative and judicial proceedings to community education and policy reform efforts. The course will also provide exposure to the linguistic and cultural diversity of Latino communities and improve cultural competency for client interaction and communication. The course will emphasize speaking and listening skills, however, students will also be responsible for reading and writing assignments. Student Eligibility: Students must already have basic proficiency in Spanish. The goal of the class is to strengthen existing Spanish language skills. The class is aimed at learning Spanish legal vocabulary and developing culturally competent communication skills. To verify basic Spanish proficiency, the instructor may seek to speak with students by phone prior to admitting them.

**LAW 632A. Religious Liberty Clinic: Practice. 4 Units.**

The Religious Liberty Clinic will offer participating students a dynamic, real-world experience representing a diverse group of clients in disputes arising from a wide range of religious beliefs, practices, and customs in a variety of circumstances. Students will learn in class and apply in practice the laws affecting religious liberty, whether statutory or constitutional, and will be expected to counsel individual or institutional clients and litigate on their behalf with technical excellence, professionalism, and maturity. During the term, students can expect to handle a discrete accommodation project e.g., represent a prisoner, student, or employee facing obstacles in the exercise of his or her faith and likely also participate in a longer-term project involving religion in the public square e.g., represent a small church, synagogue, or mosque with zoning issues, or a faith-based group seeking access to public facilities. Opportunities to draft amicus briefs may also arise. The clinic will involve administrative, trial, and appellate practice though time constraints may not permit each student to work in all areas united under the theme of "religious liberty for all." Students may also help in marketing and outreach efforts to the religious and wider communities. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 632B. Religious Liberty Clinic: Clinical Methods. 4 Units.**

The Religious Liberty Clinic will offer participating students a dynamic, real-world experience representing a diverse group of clients in disputes arising from a wide range of religious beliefs, practices, and customs in a variety of circumstances. Students will learn in class and apply in practice the laws affecting religious liberty, whether statutory or constitutional, and will be expected to counsel individual or institutional clients and litigate on their behalf with technical excellence, professionalism, and maturity. During the term, students can expect to handle a discrete accommodation project e.g., represent a prisoner, student, or employee facing obstacles in the exercise of his or her faith and likely also participate in a longer-term project involving religion in the public square e.g., represent a small church, synagogue, or mosque with zoning issues, or a faith-based group seeking access to public facilities. Opportunities to draft amicus briefs may also arise. The clinic will involve administrative, trial, and appellate practice though time constraints may not permit each student to work in all areas united under the theme of "religious liberty for all." Students may also help in marketing and outreach efforts to the religious and wider communities. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 632C. Religious Liberty Clinic: Clinical Coursework. 4 Units.**

The Religious Liberty Clinic will offer participating students a dynamic, real-world experience representing a diverse group of clients in disputes arising from a wide range of religious beliefs, practices, and customs in a variety of circumstances. Students will learn in class and apply in practice the laws affecting religious liberty, whether statutory or constitutional, and will be expected to counsel individual or institutional clients and litigate on their behalf with technical excellence, professionalism, and maturity. During the term, students can expect to handle a discrete accommodation project e.g., represent a prisoner, student, or employee facing obstacles in the exercise of his or her faith and likely also participate in a longer-term project involving religion in the public square e.g., represent a small church, synagogue, or mosque with zoning issues, or a faith-based group seeking access to public facilities. Opportunities to draft amicus briefs may also arise. The clinic will involve administrative, trial, and appellate practice though time constraints may not permit each student to work in all areas united under the theme of "religious liberty for all." Students may also help in marketing and outreach efforts to the religious and wider communities. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 638. Mediation. 3 Units.**

In recent years, individuals and their lawyers have increasingly turned to mediation to resolve disputes. In mediation, the parties to the dispute, who may be represented by lawyers, are in charge of the outcome. With the assistance of a mediator they may be able to reach agreements at any stage in a dispute, in some cases avoiding litigation altogether, in other cases agreeing when the case is on appeal. This course will introduce you to the theory and practice of mediation. You will learn about the mediation process primarily by experiencing it in roleplay and hands-on exercises. The course also includes readings and discussions, brief lectures, demonstrations, student presentations, and videotapes. You will mediate disputes based on actual cases, and be coached in small groups by Bay Area mediators. The course goals are to understand the nature of conflict and principles of conflict management, to develop the communication skills essential to effective mediation, to evaluate various mediation models and mediator styles, to consider the policy and ethical implications of the expanding use of mediation, and to develop the skills necessary to represent clients in mediation.

**LAW 640A. Community Law Clinic: Clinical Practice. 4 Units.**

The CLC is the closest thing to a general legal services office among Stanford's clinical offerings. Based in East Palo Alto, the CLC provides students with the opportunity to provide direct legal services to low-income residents, while thinking critically about the role of lawyers and lawyering in solving the problems of America's so-called "working poor." The Clinic's practice is in three areas: (1) housing (eviction defense and Section 8 termination), (2) wage and hour and related workers' rights, and (3) criminal record expungement. These practice areas lie at the intersection where the community's unmet legal needs and students' learning needs correspond; the cases enable students to engage in a wide-range of conventional lawyering activities (interviewing, counseling, negotiation, fact investigation, legal research), while also working on the very pressing problems of Stanford's low-income neighbors. Students are responsible for their cases from intake through disposition, which can be reached through negotiation or adversarial proceeding at an administrative agency or in court. Students also have the chance to participate in outreach or policy-level projects, such as representing the clinic on a state or regional committee on a substantive issue, doing community education workshops at sites around the Peninsula, and/or legislative research and advocacy. In the clinic seminar and in regular supervision, students are encouraged to interrogate the effectiveness of the legal system at delivering "justice" for their clients and to explore creative ways that legal knowledge can be deployed to attack the social problems attendant to low wages, substandard and unstable housing, and other features of low-income life in Silicon Valley. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 640B. Community Law Clinic: Clinical Methods. 4 Units.**

The CLC is the closest thing to a general legal services office among Stanford's clinical offerings. Based in East Palo Alto, the CLC provides students with the opportunity to provide direct legal services to low-income residents, while thinking critically about the role of lawyers and lawyering in solving the problems of America's so-called "working poor." The Clinic's practice is in three areas: (1) housing (eviction defense and Section 8 termination), (2) wage and hour and related workers' rights, and (3) criminal record expungement. These practice areas lie at the intersection where the community's unmet legal needs and students' learning needs correspond; the cases enable students to engage in a wide-range of conventional lawyering activities (interviewing, counseling, negotiation, fact investigation, legal research), while also working on the very pressing problems of Stanford's low-income neighbors. Students are responsible for their cases from intake through disposition, which can be reached through negotiation or adversarial proceeding at an administrative agency or in court. Students also have the chance to participate in outreach or policy-level projects, such as representing the clinic on a state or regional committee on a substantive issue, doing community education workshops at sites around the Peninsula, and/or legislative research and advocacy. In the clinic seminar and in regular supervision, students are encouraged to interrogate the effectiveness of the legal system at delivering "justice" for their clients and to explore creative ways that legal knowledge can be deployed to attack the social problems attendant to low wages, substandard and unstable housing, and other features of low-income life in Silicon Valley. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 640C. Community Law Clinic: Clinical Coursework. 4 Units.**

The CLC is the closest thing to a general legal services office among Stanford's clinical offerings. Based in East Palo Alto, the CLC provides students with the opportunity to provide direct legal services to low-income residents, while thinking critically about the role of lawyers and lawyering in solving the problems of America's so-called "working poor." The Clinic's practice is in three areas: (1) housing (eviction defense and Section 8 termination), (2) wage and hour and related workers' rights, and (3) criminal record expungement. These practice areas lie at the intersection where the community's unmet legal needs and students' learning needs correspond; the cases enable students to engage in a wide-range of conventional lawyering activities (interviewing, counseling, negotiation, fact investigation, legal research), while also working on the very pressing problems of Stanford's low-income neighbors. Students are responsible for their cases from intake through disposition, which can be reached through negotiation or adversarial proceeding at an administrative agency or in court. Students also have the chance to participate in outreach or policy-level projects, such as representing the clinic on a state or regional committee on a substantive issue, doing community education workshops at sites around the Peninsula, and/or legislative research and advocacy. In the clinic seminar and in regular supervision, students are encouraged to interrogate the effectiveness of the legal system at delivering "justice" for their clients and to explore creative ways that legal knowledge can be deployed to attack the social problems attendant to low wages, substandard and unstable housing, and other features of low-income life in Silicon Valley. The Law School's clinical courses is being offered on a full-time basis for 12 credits. Students enrolled in a clinic are not permitted to enroll in any other classes, seminars, directed research or other credit-yielding activities during the quarter in which they are enrolled in a clinic. Students may not enroll in any clinic (basic or advanced) which would result in them earning more than 27 clinical credits during their law school career.

**LAW 642. Advanced Community Law Clinic. 2-7 Units.**

The Advanced Community Law Clinic offers law students who already have some significant civil clinical experience the opportunity to work under supervision on more advanced projects and cases being handled by the Stanford Community Law Clinic, including litigation and other matters. Advanced Clinic students will also work with Clinical Supervising Attorneys to provide direction and guidance to those enrolled in the Community Law Clinic for the first time, in areas in which Advanced Clinic students have already acquired some expertise. In addition, Advanced Clinic students may function as team leaders on larger projects in which the Clinic is engaged.

**LAW 643. Medical-Legal Issues in Children's Health. 4 Units.**

(Same as PEDS211) This service-learning seminar is open to law and medical students interested in exploring the link between poverty and children's health, and how the professions can work together to improve health outcomes for low-income children. The course consists of four components: (1) weekly class meetings in which we will discuss a series of medical-legal issues (e.g., asthma, immigration, health insurance, etc.) with guest lecturers from the medical and legal fields, selected for their expertise on each topic.; (2) intake interviews with patient families at Lucile Packard Children's Hospital or the Ravenswood Family Health Center in East Palo Alto, and an analysis of their medical-legal issues; (3) a group project focused on a local or state-level medical-legal policy issue (e.g., obesity prevention); and (4) a final paper that law and medical students will co-write in pairs. The course is linked to the Peninsula Family Advocacy Program. You can learn more about it at [www.peninsulafap.org](http://www.peninsulafap.org).

**LAW 644. Disability Rights. 3 Units.**

This is a survey course of disability rights law, with an emphasis on landmark federal and state legislation and jurisprudence in the areas of employment, government services, public accommodations, education, housing and personal autonomy. It includes a review of such statutes as the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act, Individuals with Disabilities Education Act (IDEA), fair Housing Act Amendments and the California Developmental Services ("Lanterman") Act. The course has a "cross-disability" orientation insofar as it addresses the rights and treatment of persons with mobility and communication impairments, as well as developmental and psychiatric disabilities. The course looks at disability from a civil and human rights perspective-- rather than a medical or welfare viewpoint. Some of the issues to be covered are: institutional mistreatment, de-institutionalization, social integration, educational equity, international customary disability law, peer advocacy and self-determination, the right to refuse treatment and assisted suicide. There will be frequent guest speakers and legal skills in-class simulation exercises.

**LAW 649A. Cyberlaw/Fair Use Clinic: Advanced. 4 Units.**

This is a hands-on, project-oriented seminar, in which students work on a wide range of cyberlaw projects with lawyers from the Center for Internet and Society's Fair Use Project and with lawyers from the Electronic Frontier Foundation. There are significant faculty-student interactions through meetings to discuss the projects and an associated bi-monthly discussion seminar covering advanced cyberlaw topics. This clinical program provides law students with the opportunity to represent clients in cutting-edge issues of intellectual property and technology law, in the public interest. Through the hands-on experience of representing clients (under the supervision of the faculty) in various fora, students learn professional responsibility and advocacy skills, substantive law and procedural rules related to their projects, and examine the concept of the public interest in intellectual property and technology law. Clients vary widely, and may be individual artists; technologists; non-profit institutions; coalitions; etc. In the past, students have drafted amicus briefs, counseled nonprofits on public-interest initiatives, created a patent licensing scheme, represented independent and documentary filmmakers who are pursuing legislation in Congress, and counseled artists developing new technology-based art forms, among other projects. Thus, the skills each student learns also vary according to project. The classroom component explores public interest practice in tech law in various fora, and spends significant time on student projects.

**LAW 649B. Cyberlaw/Fair Use Clinic: Advanced. 3 Units.**

This is a hands-on, project-oriented seminar, in which students work on a wide range of cyberlaw projects with lawyers from the Center for Internet and Society's Fair Use Project and with lawyers from the Electronic Frontier Foundation. There are significant faculty-student interactions through meetings to discuss the projects and an associated bi-monthly discussion seminar covering advanced cyberlaw topics. This clinical program provides law students with the opportunity to represent clients in cutting-edge issues of intellectual property and technology law, in the public interest. Through the hands-on experience of representing clients (under the supervision of the faculty) in various fora, students learn professional responsibility and advocacy skills, substantive law and procedural rules related to their projects, and examine the concept of the public interest in intellectual property and technology law. Clients vary widely, and may be individual artists; technologists; non-profit institutions; coalitions; etc. In the past, students have drafted amicus briefs, counseled nonprofits on public-interest initiatives, created a patent licensing scheme, represented independent and documentary filmmakers who are pursuing legislation in Congress, and counseled artists developing new technology-based art forms, among other projects. Thus, the skills each student learns also vary according to project. The classroom component explores public interest practice in tech law in various fora, and spends significant time on student projects. After completing the initial 7-unit Cyberlaw/Fair Use Clinic: Advanced course, students may enroll again for either 3 or 4 credits by consent of the instructor.

**LAW 650. Advanced Negotiation: Public Policy. 3 Units.**

Complex and multi-party negotiations permeate law practice and life. Advanced Negotiation is designed to take students beyond the two-party, lawyer-client negotiations that were the focus of the Negotiation Seminar, to examine many facets of negotiation complexity, both in terms of the participants and topics. This section of Advanced Negotiation focuses on more complex negotiations as well as multi-party negotiations, working in teams, and negotiating on behalf of complex organizations on diverse environmental policy issues, including: environment and health issues. The goals of the class are twofold, for students (1) to acquire an added theoretical base beyond what was covered in the Negotiation Seminar through which to analyze and prepare for negotiations, and (2) to expand their skills through deeper examination of various actual negotiation cases and complex simulations. Prerequisite: Negotiation Seminar (Law 615) or its substantial equivalent. Same as: Environment.

**LAW 653. Corporate Law: Theory and Practice. 2 Units.**

This class will bring leading academics and members of the corporate bar, business and investment communities, judges and regulators to the law school to discuss new research, as well as new practice and regulatory issues. The idea is to engage students in the theoretical and policy debates and to understand how these concerns affect business and the practice of law.

**LAW 654. Law and Biosciences Workshop. 2-3 Units.**

This workshop seminar will provide students with the opportunity to examine and critique cutting-edge research and work in the field of law and the biosciences. Although it is open to all students, the seminar is designed especially for those with an interest in the field who wish to stay abreast of current issues, work, and ideas. In each class, an academic expert, policy maker, or practitioner will present his or her current research or work and engage in a robust discussion.



**LAW 656. International Conflict Resolution. 3 Units.**

(Same as IPS 250 and PSYCH 383). This seminar examines the challenges of managing and resolving violent inter-group and international conflicts. Employing an interdisciplinary approach drawing on social psychology, political science, game theory, and international law, the course identifies various tactical, psychological, and structural barriers that can impede the achievement of efficient solutions to conflicts. We will explore a conceptual framework for conflict management and resolution that draws not only on theoretical insights, but also builds on historical examples and practical experience in the realm of conflict resolution. This approach focuses on the following questions: (1) how can the parties to conflict develop a vision of a mutually bearable shared future; (2) how can parties develop trust in the enemy; (3) how can each side be persuaded, as part of a negotiated settlement, to accept losses that it will find very painful; and (4) how do we overcome the perceptions of injustice that each side are likely to have towards any compromise solution? Among the conceptual issues we will examine include the problem of spoilers who seek to sabotage agreements, the role of mediators, the role international legal rules can play in facilitating or impeding conflict resolution, and the advantages and disadvantages of unilateral versus and reciprocal measures in advancing conflict resolution efforts. Particular conflicts we will explore include the Northern Ireland conflict, the Israeli-Palestinian conflict, and the U.S.-Soviet Cold War rivalry.

**LAW 658A. International Human Rights and Conflict Resolution Clinic: Clinical Practice. 4 Units.**

In the past half-century, human rights advocates have transformed a marginal utopian ideal into a central element of global discourse, if not practice. This course examines the actors and organizations behind this remarkable development as well as the vast challenges faced by advocates in the recent past and today. Increasingly, human rights as a framework has become essential to a broad range of situations of tension and conflict. This course interrogates the nature of engagement by human rights practitioners, as well as approaches adopted by those focused on the management of violent conflict. What are the origins of the human rights movement and where is it headed? What does it mean to be a human rights activist? What are the main challenges and dilemmas facing those engaged in rights promotion and defense? How is conflict resolution consistent with human rights advocacy? When and where are these approaches in tension? The course also develops advocacy skills through in-class sessions, role play exercises and engagement in, and critical assessment of clinical projects in human rights. Class sessions introduce students to human rights advocacy and conflict management techniques through discussion of the readings and related issues, as well as through student presentations critiquing their participation in supervised clinical projects. The readings and seminar sessions expose students to some of the practical manifestations of the main debates and dilemmas within the human rights and conflict resolution movement(s). These include several of the ethical and strategic issues that arise in the course of doing fact-finding and advocacy and balancing the often differing agendas of western international nongovernmental organizations (INGOs) and their counterparts in the (frequently non-western) developing world. The readings also consider tensions within the field of conflict resolution, as well as between conflict resolution and human rights. Several class sessions will focus on fact-finding and advocacy skills. One or more of these sessions will be full-day, role play exercises. In these full-day sessions, students will engage in human rights research, documentation, negotiation and dispute management exercises, and advocacy role-playing. In some sessions, part of the class will be devoted to presentations by students and clinical 'rounds'. These presentations will consider one or more issues that arise in the course of students' own engagement in advocacy projects through the International Human Rights and Conflict Resolution Clinic. During the course of the semester, students will also be required to draft several brief fact-finding/advocacy pieces (these will be explained in class), and write short, critical reflection papers (2-4 pages, double-spaced, or 500-1,000 words, thought pieces) on the readings. Prerequisite-registration and admission to the International Conflict Resolution Seminar.

**LAW 658B. International Human Rights and Conflict Resolution Clinic: Clinical Methods. 4 Units.**

In the past half-century, human rights advocates have transformed a marginal utopian ideal into a central element of global discourse, if not practice. This course examines the actors and organizations behind this remarkable development as well as the vast challenges faced by advocates in the recent past and today. Increasingly, human rights as a framework has become essential to a broad range of situations of tension and conflict. This course interrogates the nature of engagement by human rights practitioners, as well as approaches adopted by those focused on the management of violent conflict. What are the origins of the human rights movement and where is it headed? What does it mean to be a human rights activist? What are the main challenges and dilemmas facing those engaged in rights promotion and defense? How is conflict resolution consistent with human rights advocacy? When and where are these approaches in tension? The course also develops advocacy skills through in-class sessions, role play exercises and engagement in, and critical assessment of clinical projects in human rights. Class sessions introduce students to human rights advocacy and conflict management techniques through discussion of the readings and related issues, as well as through student presentations critiquing their participation in supervised clinical projects. The readings and seminar sessions expose students to some of the practical manifestations of the main debates and dilemmas within the human rights and conflict resolution movement(s). These include several of the ethical and strategic issues that arise in the course of doing fact-finding and advocacy and balancing the often differing agendas of western international nongovernmental organizations (INGOs) and their counterparts in the (frequently non-western) developing world. The readings also consider tensions within the field of conflict resolution, as well as between conflict resolution and human rights. Several class sessions will focus on fact-finding and advocacy skills. One or more of these sessions will be full-day, role play exercises. In these full-day sessions, students will engage in human rights research, documentation, negotiation and dispute management exercises, and advocacy role-playing. In some sessions, part of the class will be devoted to presentations by students and clinical 'rounds'. These presentations will consider one or more issues that arise in the course of students' own engagement in advocacy projects through the International Human Rights and Conflict Resolution Clinic. During the course of the semester, students will also be required to draft several brief fact-finding/advocacy pieces (these will be explained in class), and write short, critical reflection papers (2-4 pages, double-spaced, or 500-1,000 words, thought pieces) on the readings. Prerequisite-registration and admission to the International Conflict Resolution Seminar.

**LAW 658C. International Human Rights and Conflict Resolution Clinic: Clinical Coursework. 4 Units.**

In the past half-century, human rights advocates have transformed a marginal utopian ideal into a central element of global discourse, if not practice. This course examines the actors and organizations behind this remarkable development as well as the vast challenges faced by advocates in the recent past and today. Increasingly, human rights as a framework has become essential to a broad range of situations of tension and conflict. This course interrogates the nature of engagement by human rights practitioners, as well as approaches adopted by those focused on the management of violent conflict. What are the origins of the human rights movement and where is it headed? What does it mean to be a human rights activist? What are the main challenges and dilemmas facing those engaged in rights promotion and defense? How is conflict resolution consistent with human rights advocacy? When and where are these approaches in tension? The course also develops advocacy skills through in-class sessions, role play exercises and engagement in, and critical assessment of clinical projects in human rights. Class sessions introduce students to human rights advocacy and conflict management techniques through discussion of the readings and related issues, as well as through student presentations critiquing their participation in supervised clinical projects. The readings and seminar sessions expose students to some of the practical manifestations of the main debates and dilemmas within the human rights and conflict resolution movement(s). These include several of the ethical and strategic issues that arise in the course of doing fact-finding and advocacy and balancing the often differing agendas of western international nongovernmental organizations (INGOs) and their counterparts in the (frequently non-western) developing world. The readings also consider tensions within the field of conflict resolution, as well as between conflict resolution and human rights. Several class sessions will focus on fact-finding and advocacy skills. One or more of these sessions will be full-day, role play exercises. In these full-day sessions, students will engage in human rights research, documentation, negotiation and dispute management exercises, and advocacy role-playing. In some sessions, part of the class will be devoted to presentations by students and clinical 'rounds'. These presentations will consider one or more issues that arise in the course of students' own engagement in advocacy projects through the International Human Rights and Conflict Resolution Clinic. During the course of the semester, students will also be required to draft several brief fact-finding/advocacy pieces (these will be explained in class), and write short, critical reflection papers (2-4 pages, double-spaced, or 500-1,000 words, thought pieces) on the readings. Prerequisite-registration and admission to the International Conflict Resolution Seminar.

**LAW 659. Advanced Negotiation: Transactions. 3 Units.**

Complex and multi-party negotiations permeate law practice and life. Advanced Negotiation is designed to take students beyond the two-party, lawyer-client negotiations that were the focus of the Negotiation Seminar, to examine many facets of negotiation complexity, both in terms of the participants and topics. Advanced Negotiation (Transactions) focuses on more complex negotiations as well as multi-party negotiations, working in teams, and negotiating on behalf of complex organizations (e.g., governments, corporations, unions) on diverse issues, including: intellectual property; cross-border and public-private transactions; restructuring agreements. The goals of the class are twofold, for students (1) to acquire an added theoretical base beyond what was covered in the Negotiation Seminar through which to analyze and prepare for negotiations, and (2) to expand their skills through deeper examination of various actual negotiation cases and complex simulations. Attendance at and participation in the simulations is required. Prerequisite: Negotiation Seminar (Law 615) or its substantial equivalent.

**LAW 660A. Youth and Education Advocacy Clinic: Clinical Practice. 4 Units.**

(Same as EDUC 334A/B/C). The Youth and Education Law Project offers students the opportunity to participate in a wide variety of educational rights and reform work, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. All students have an opportunity to represent elementary and high school students with disabilities in special education proceedings, to represent students in school discipline proceedings, or to work with community groups in advocating for the provision of better and more equitable educational opportunities to their children. In addition, the clinic may pursue a specific policy research and advocacy project that will result in a written policy brief and policy proposal. Students working on special education matters have the opportunity to handle all aspects of their clients' cases. Students working in this area interview and counsel clients, investigate and develop facts, work with medical and mental health professionals and experts, conduct legal and educational research, create case plans, and represent clients at individual education program (IEP) team meetings, mediation or special education due process hearings. This work offers students a chance to study the relationship between individual special education advocacy and system-wide reform efforts such as impact litigation. Students working on school discipline matters interview and counsel clients, investigate and develop facts, interview witnesses, conduct legal and educational research, create case plan, and represent clients at school discipline hearings such as expulsion hearings. Such hearings provide the opportunity to present oral and written argument, examine witnesses, and present evidence before a hearing officer. If appropriate and necessary, such proceedings also present the opportunity to represent students on appeal before the school district board of trustees or the county board of education. The education clinic includes two or three mandatory training sessions to be held at the beginning of the term, a weekly seminar that focuses on legal skills and issues in law and education policy, regular case review, and a one hour weekly meeting with the clinic instructor. Admission is by consent of instructor. The Law School's clinical courses are offered on a full-time basis for 12 credits.

**LAW 660B. Youth and Education Law Project: Clinical Methods. 4 Units.**

The Youth and Education Law Project offers students the opportunity to participate in a wide variety of educational rights and reform work, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. All students have an opportunity to represent elementary and high school students with disabilities in special education proceedings, to represent students in school discipline proceedings, or to work with community groups in advocating for the provision of better and more equitable educational opportunities to their children. In addition, the clinic may pursue a specific policy research and advocacy project that will result in a written policy brief and policy proposal. Students working on special education matters have the opportunity to handle all aspects of their clients' cases. Students working in this area interview and counsel clients, investigate and develop facts, work with medical and mental health professionals and experts, conduct legal and educational research, create case plans, and represent clients at individual education program (IEP) team meetings, mediation or special education due process hearings. This work offers students a chance to study the relationship between individual special education advocacy and system-wide reform efforts such as impact litigation. Students working on school discipline matters interview and counsel clients, investigate and develop facts, interview witnesses, conduct legal and educational research, create case plan, and represent clients at school discipline hearings such as expulsion hearings. Such hearings provide the opportunity to present oral and written argument, examine witnesses, and present evidence before a hearing officer. If appropriate and necessary, such proceedings also present the opportunity to represent students on appeal before the school district board of trustees or the county board of education. The education clinic includes two or three mandatory training sessions to be held at the beginning of the term, a weekly seminar that focuses on legal skills and issues in law and education policy, regular case review, and a one hour weekly meeting with the clinic instructor. Admission is by consent of instructor. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 660C. Youth and Education Law Project: Clinical Coursework. 4 Units.**

The Youth and Education Law Project offers students the opportunity to participate in a wide variety of educational rights and reform work, including direct representation of youth and families in special education and school discipline matters, community outreach and education, school reform litigation, and/or policy research and advocacy. All students have an opportunity to represent elementary and high school students with disabilities in special education proceedings, to represent students in school discipline proceedings, or to work with community groups in advocating for the provision of better and more equitable educational opportunities to their children. In addition, the clinic may pursue a specific policy research and advocacy project that will result in a written policy brief and policy proposal. Students working on special education matters have the opportunity to handle all aspects of their clients' cases. Students working in this area interview and counsel clients, investigate and develop facts, work with medical and mental health professionals and experts, conduct legal and educational research, create case plans, and represent clients at individual education program (IEP) team meetings, mediation or special education due process hearings. This work offers students a chance to study the relationship between individual special education advocacy and system-wide reform efforts such as impact litigation. Students working on school discipline matters interview and counsel clients, investigate and develop facts, interview witnesses, conduct legal and educational research, create case plan, and represent clients at school discipline hearings such as expulsion hearings. Such hearings provide the opportunity to present oral and written argument, examine witnesses, and present evidence before a hearing officer. If appropriate and necessary, such proceedings also present the opportunity to represent students on appeal before the school district board of trustees or the county board of education. The education clinic includes two or three mandatory training sessions to be held at the beginning of the term, a weekly seminar that focuses on legal skills and issues in law and education policy, regular case review, and a one hour weekly meeting with the clinic instructor. Admission is by consent of instructor. Beginning with the 2009-2010 academic year, each of the Law School's clinical courses is being offered on a full-time basis for 12 credits.

**LAW 661. Advanced Negotiation: International. 3 Units.**

Building on skills developed, tools acquired and theory learned in the Gould Center's basic negotiation course, this advanced seminar explores how lawyers, diplomats, NGOs and citizen advocates can successfully negotiate bilateral agreements and multilateral agreements in the international field. We will study the unique process dynamics of international treaty-making, cross-border agreement negotiations, and multi-party consensus building processes. We will explore the role of power, culture, agency, and strategy in international negotiation, and we will analyze the design and conduct of effective negotiation campaigns. We will examine negotiation processes in the context of geopolitical relations, nuclear arms control, US-Mexico border management, environmental regimes, foreign investment, natural resource development, human rights, commercial disputes, and corporate social responsibility. Our approach will involve analysis of in-depth case studies and participation in complex role-playing exercises (including at one intensive simulation to be negotiated out of class over several weeks). These cases and exercises involve negotiations between state parties as well as negotiations, although our study will also include some attention to negotiations involving non-state actors, including business corporations, NGOs, and indigenous communities. A number of class sessions will include interaction with guest participants including international lawyers, scholarly experts, diplomats, senior corporate officers and NGO leaders. Prerequisite: Negotiation Seminar (LAW 615), its substantial academic equivalent, or substantial experience in the field.

**LAW 662. Advanced Youth and Education Advocacy Clinic. 2-7 Units.**

The Youth and Education Law Project: Advanced provides an opportunity for students who have already successfully completed the Youth and Education Law Project to continue their advocacy work and/or to pursue a discrete project related to educational equity advocacy. Examples of projects include policy research on specific topics (e.g., the provision of mental health services to youth with disabilities in the schools, the impact of school discipline policies on youth of color, or equal educational opportunities for English Language Learners); investigation and preparation for impact litigation; and community education and outreach on a specific education-related issue. All projects will be jointly designed by the instructor and the advanced student. Advanced students also continue to participate in the Clinic's discussion of cases during case rounds.

**LAW 663. Advanced International Human Rights and Conflict Resolution Clinic. 2-7 Units.**

The International Human Rights and Conflict Resolution Advanced Clinic offers the opportunity for students who have already successfully completed an International Human Rights and Development Clinic to pursue one or more specific projects in conjunction with the Clinic, either independently or in collaboration with colleague(s) enrolled in the regular clinic. Any travel will be strictly contingent on the Advanced Clinical student's availability and the needs of the project. Advanced Clinical students are expected to participate in as much of the regular clinical seminar and seminar simulations as possible given pre-existing scheduling constraints. Advanced students may arrange with the instructor to receive between two and seven units. No student may receive more than 27 overall clinical credits, however, during the course of the student's law school career.

**LAW 664. Advanced Legal Writing: Business Transactions. 3 Units.**

This course is designed to give students practical preparation in drafting and analyzing contracts and managing business transactions. It should especially appeal to students interested in working in a law firm and practicing transactional law (be it corporate, intellectual property, environmental, real estate, etc.). It will also appeal to those interested in business litigation who would like to gain some basics in contract analysis and those curious about the work of transactional lawyers. The course offers a wide range of realistic legal writing and drafting problems--completed both inside and outside of class. These drafting assignments will help students improve their writing, drafting and editing skills and develop their sensitivity to the expectations of the attorneys and clients for whom they will be working. In the course, students will learn the foundational tools necessary to analyze a variety of business agreements. Students will learn how to write clear, effective, plain language contracts. Students will also be exposed to other transactional writing and learn how to manage complex business transactions.

**LAW 668. Legal Technology and Informatics. 2-3 Units.**

Legal technology is rapidly transforming both the practice and nature of law. This class seeks to explore both the current trends and the future possibilities of this transformation, as we begin to train the future generation of technology savvy lawyers, and technologists who understand the intricacies and potential of what the law could be. Legal informatics could be defined as a computational perspective of law: where does legal information reside, how is it manipulated, and which algorithms and data structures are used in various legal functions? Note that there are no prerequisites for this class beyond an interest in the subject. There are numerous examples of technologically driven legal transformation. Case law search has moved from hard copy to closed digital systems such as Westlaw and LexisNexis, and into free cloud-based systems such as Google Scholar and Wikipedia. More and more statutes are available online. Changes can be seen in e-discovery, privacy, the delivery of (online) legal services, and the budding legal technology startup community. As a result, questions arise as to the proper statutory and ethical boundaries between humans and machines in implementing legal activities. Beyond the current and near-term technologies, however, are core academic and philosophical questions that will have increasing import as machines gain in sophistication and capability. For example, although the law differentiates between the responsibility assignable to minors compared to adults, we are far from identifying the point at which an agent or robot is morally responsible for its own actions, as opposed to the responsibility being assigned to its creator.

**LAW 669. Narrative Skills and the Law. 3 Units.**

A lawyer who communicates not only in a cerebrally persuasive way, but also in an emotionally gripping way, has an enormous strategic advantage. Judges, jurors, and clients are all human beings, susceptible to compelling stories like everyone else. This course - conducted by a television and film writer who is also a lawyer with experience in all three branches of government, private practice, political campaigns, and a labor union - teaches how to compose an engaging story and how to apply those skills to a variety of legal situations. The first part of the course will cover the art of storytelling on both a theoretical and a practical track. On the theoretical track, students will study story drive; narrative structure; beginnings, middles, and ends; openings; plot and character; exposition; and transitions. The class will have a healthy amount of assigned reading and viewing that illustrate each of these components in literature, drama, and film. On the practical track, students will undertake writing exercises that parallel the theoretical discussion, to develop a first-hand facility with those facets of storytelling. In the second part of the course, students will apply their storytelling insights and skills to specific legal situations: A criminal case. An appellate case. A legislative proposal. A labor negotiation. A public relations crisis. Students will discuss in depth their narrative approaches to these situations, along with those taken by lawyers in other cases in the respective areas. By the end of the course students will have a powerful tool few of their peers will possess, and be able to approach their day-to-day professional challenges in a more effective and confident way.

**LAW 670. White Collar Crime. 3 Units.**

This course explores the law of economic and political crimes associated with the rubric "white collar crime." Key topics are: bribery and gratuities, mail and wire fraud, tax fraud, extortion, securities fraud, racketeering, and money laundering, along with quasi-criminal laws on forfeiture of assets. The course covers specific statutes (mostly federal) in considerable detail, while also speculating about the jurisprudence underlying these crimes, and related issues of prosecutorial discretion and attorney ethics.

**LAW 671. Critical Theory. 3 Units.**

This course will review the most important developments in critical theory as it relates to law and jurisprudence. It will begin with a brief review of the critical tradition in Western philosophy including thinkers such as Friedrich Nietzsche, Karl Marx, Max Weber, Jean Paul Sartre and Michel Foucault. We will then look at the influence of this critical tradition in American legal theory, tracing the critical turn through the American legal realists, Critical Legal Studies and the emergence of identity based critical movements such as Critical Race Theory, Critical Feminist Theory and Critical Approaches to Sexual Orientation.

**LAW 674. Advanced Legal Writing: Litigation. 4 Units.**

Building on the skills developed in Federal Litigation, this course will give students additional practice with legal analysis, argument structure, and writing in the pre-trial litigation context. Students will draft pleadings, briefs, and documentary evidence in support of and opposition to pre-trial motions in a hypothetical case set in federal district court. Students also will complete short writing exercises in and out of class (these will consist of drills such as omitting surplus words, preferring active voice, using concrete words, punctuating carefully, etc). The goals of this class are to help students organize facts and principles in a succinct and logical way and to deepen their understanding of the legal reasoning process. In particular, students will develop proficiencies in critical reading and thinking (dissecting and synthesizing cases); legal problem solving (identifying legal issues and interpreting authority); legal analysis (accurately deriving rules and applying authority to a client's situation); and legal drafting (organizing and explaining ideas clearly using appropriate conventions). The course should appeal to students interested in litigation practice and those wishing to hone their writing skills.

**LAW 675. Human Trafficking: Historical, Legal, and Medical Perspectives. 3 Units.**

(Same as History 105C / 5C) Interdisciplinary approach to understanding the extent and complexity of the global phenomenon of human trafficking, especially for forced prostitution and labor exploitation, focusing on human rights violations and remedies. Provides a historical context for the development and spread of human trafficking. Analyzes the current international and domestic legal and policy frameworks to combat trafficking and evaluates their practical implementation. Examines the medical, psychological, and public health issues involved. Uses problem-based learning and offers an optional service component.

**LAW 676. Rethinking Refugee Communities. 2 Units.**

Tens of millions of people have been forcibly uprooted by conflict or persecution worldwide. Although some of these people obtain asylum in advanced industrialized countries, a far larger number remain as refugees and internally-displaced people living in hastily-built refugee communities in the developing world. This project-based, interdisciplinary class is focused on exploring alternatives to improve the planning, design, and governance of refugee communities. It considers some of the legal, design, engineering, and governance challenges associated with communities of refugees and other forced migrants. The goal is to exercise and enhance students' ability to deal with multifaceted complex issues by developing recommendations that can be implemented by the Office of the United Nations High Commissioner for Refugees (UNHCR).

**LAW 677. Professional Responsibility. 3 Units.**

Professional Responsibility introduces students to the goals, rules and responsibilities of the American legal profession and its members.

**LAW 678. Introduction to Microeconomics. 3 Units.**

**COURSE SUBSTANCE:** It is no secret that economic ideas are being used increasingly in law school courses, in law practice, and in a wide variety of other fields that a law school graduate might choose to pursue - antitrust, corporate, environmental, tax, labor, and securities are just some of the immediate examples that come to mind. While many Stanford Law School students have already taken courses in economics as undergraduates, or might even have majored in economics, many of you have not. This course is offered to "bring you up to speed" so that you will not be at a disadvantage in other courses at the Law School that draw on economic ideas (or, just as importantly, not be at a disadvantage when you graduate and you encounter economic ideas and arguments on the job or in life.) So, what is economics, exactly? All societies face the problem of scarcity - there are not enough resources to satisfy people's desires for all things. Economics studies how individuals and societies deal with scarcity and the mechanisms for deciding what to produce, how to produce it, and who gets the output. It is as simple and complex as that! As you can imagine, the practical applications are nearly endless. Please note that the course focus will be microeconomics - the branch of economics that focuses on the economic behavior of individual decision-making units, such as households and firms, and how these individual decisions fit together. (I will not discuss macroeconomics in this course - i.e. the behavior of the economy as a whole, particularly inflation, unemployment, and business cycles.) More specifically, I will spend the vast majority of the course taking you through the basic supply and demand model of markets - what it is, where it came from, how and when it works, and when it does not work so well. With that base, I can branch out accordingly to help you apply it to a wide variety of relevant issues. Though I will not focus specifically on how economic ideas have been used in a legal context (there is another course and seminar that does that), I will make some effort to link the economic ideas we discuss directly to legal topics. **COURSE PROCEDURE:** My primary goal is to teach you the fundamental principles of microeconomics by (1) providing you the relevant schema to understand the basic tools of economic analysis; and by (2) drilling you extensively with problems, cases, current events, and other applied materials so as to help you develop the ability to use these tools and truly make them your own. A heavy emphasis will be placed on building a conceptual understanding of some key economic models, looking closely at the underlying assumptions of those models, and engaging in the process of questioning and relaxing those assumptions in the context of actual "real life" issues. Please do not mistake the analytical rigor I will require, to mean that we will use sophisticated mathematics. To the contrary, I believe that most powerful economic principles should be highly intuitive and non-quantitative.

**LAW 679. The Rule of Law - The Foundation of Functional Communities. 2 Units.**

We will seek to determine a useful meaning of the notion of the rule of law, a much diluted concept, and the importance of the rule of law in the development and security of communities of opportunity and equity around the world. We will focus on accountable government; just laws; open process for the enactment, administration and enforcement of laws and effective dispute resolution. Readings and discussion will include the works of ancient philosophers, political theorists and jurists from the 17th to the 20th century, modern political economists and contemporary scholars. This seminar will feature several experts in the field as guest lecturers.

**LAW 680. Pivotal Moments in American Institutions and Public Law, 1791-Present. 3 Units.**

(Same as PoliSci 223R) American lawyers and policymakers work today in a system of institutions that are strikingly unique in comparative and historical terms. With some exceptions, that system is characterized by relatively stable political and legal institutions, low levels of explicit corruption, high bureaucratic capacity in public organizations, and relatively open, impersonal access to political, policymaking, and legal institutions. Although these characteristics are now often taken for granted, the process through which they emerged remains remarkably opaque. In the 1780s under the Articles of Confederation, the United States was a poor developing country on the fringe of the Atlantic community with limited capacity and a striking inability to provide basic public goods, such as security. One hundred years later, it well along the way to becoming the richest nation in the world. How did this transformation occur? Drawing on judicial opinions, legal scholarship, political science, economics, and history, this course explores how institutions evolved to create such a system. It traces the problem of institutional development through several critical periods in the history of American public law, including the emergence of the Constitution, the events leading up to and following the Civil War, the Progressive era, World War II, institutional changes occurring roughly during 1964-75, and the emergence of the modern administrative state. Although the primary focus is on the American experience, we place these developments in comparative context as well.

**LAW 685. The American Legal Profession. 3 Units.**

This course will deal with selected aspects of the history, organization, economics, ethics, and possible futures of the legal profession in the United States. Likely topics will include, in addition to the ABA's Model Rules of Professional Conduct: demographic changes in the profession, the evolution of law firms, bar associations, and law schools from the early twentieth century to the present; the development of corporate law, personal injury, mass torts, prosecutorial and criminal defense practices, and the "public-interest" bar; the dominant professional ethic of adversary-advocacy, and its critics; the regulation of lawyers; the economics of the market for legal services; the organization and culture of law firm practice; the role of the lawyer as counselor; and the export of American lawyering models abroad.

**LAW 701. SPILS Law and Society Seminar. 3 Units.**

This seminar is restricted to students who are in the SPILS program. The seminar deals with the relationship between legal systems and the societies in which they are embedded. The materials are drawn from studies of many different societies. Among the issues dealt with are: What influence does culture have on the operation of legal systems? What are the social forces which produce particular forms of law? What impact do legal interventions have on society and on human behavior?.

**LAW 703. Corporate Governance and Practice Seminar. 2 Units.**

The seminar on corporate governance meets over the course of the academic year and forms the core of the LL.M. Program in Corporate Governance & Practice LL.M. In the Autumn quarter, the seminar will provide an in-depth look into series of corporate law and governance topics. The Autumn quarter is intended to be taken in conjunction with Corporations. Attendance and active participation are important to the success of the seminar and an important factor in the overall grade. Students are expected to have carefully read and reviewed assigned materials in advance of each session. Students will be required to submit a weekly reflection paper (2 to 3 pages in length) that evaluates, critiques, and discusses some or all of the key topics reviewed in the previous week's session.

**LAW 704. Law, Science, and Technology Colloquium. 2 Units.**

The Law, Science & Technology Colloquium offers students in the Law, Science & Technology LLM Program the opportunity to discuss cutting-edge legal issues at the intersection of law and technology with leading experts in the field, including Stanford faculty, visiting scholars, technology and IP lawyers, entrepreneurs, and executives from Silicon Valley technology companies. Satisfies the colloquium requirement for Law, Science, and Technology LLM (LST) candidates. Open to LLM students only.

**LAW 705. SPILS Masters Thesis. 4 Units.**

The writing of a work of original scholarship in the area of research of the student's choosing is necessary requirement of the JSM degree. During the spring quarter students are expected to finalize their research project, and write and submit their thesis. Towards this end, students meet regularly with their thesis primary and secondary advisors.

**LAW 707. SPILS Research Methods Workshop. 2 Units.**

This is a mandatory course for SPILS Fellows as part of the program's core curriculum. Its main goal is to offer students an interdisciplinary perspective about socio-legal research, and research tools for designing and implementing their individual research projects. This winter term Workshop will complement the Research Design for Empirical Legal Studies Seminar taken in the fall by 1) expanding and elaborating on some of the methods analyzed during the seminar; and 2) assisting students in using such methods towards their individual research project. The Workshop will consist of specialized sessions, and the fellows are expected to attend those that are most relevant to their thesis data collection methods and analytical framework employed. In addition, the workshop will provide tools to facilitate the writing of the required SPILS thesis, including writing tutorials. During the quarter the fellows are expected to submit drafts of different chapters of their thesis. If appropriate, the workshop may also include group and/or individual sessions designed to address the very specific needs of the research undertaken by the SPILS Fellows.

**LAW 708. Advanced Legal Writing for American Practice. 3 Units.**

This course orients LLM students to a range of legal writing genres used by American lawyers in practice and by law students in papers and exams. At the core of these genres are the techniques of legal research, objective and persuasive legal writing, and related legal analysis, as practiced in American law offices and courts. The course presents students with realistic legal writing scenarios that they address in and out of class. Students prepare an analytical memorandum, advising a hypothetical corporate client, and a short brief for a mediator. The assignments are designed to help students adapt their writing skills by incorporating methods that American lawyers use to analyze typical legal problems and to advocate on behalf of their clients.

**LAW 709. Introduction to American Law. 3 Units.**

This special course for foreign graduate students in the LLM and SPILS programs is offered during August, before the start of the regular law school semester. The course is designed to introduce foreign graduate students to basic concepts of American law and provides an overview of U.S. legal process and institutions.

**LAW 712. Research Design for Empirical Legal Studies. 3-4 Units.**

Empirical legal studies have become popular in the US and are now spreading to non-US law faculties as well. Usually the term applies to analyses of quantitative data and the researcher relies on data collected by others. But the term "empirical" properly encompasses both qualitative and quantitative data, including interviews, legal documents, survey research and experimental results. Analysts interested in using such data need to understand how they were collected, in order to decide what data can appropriately be used to answer different kinds of questions. Often to answer the questions of interest, a researcher needs to collect new data. This seminar will introduce students to the wide range of research methods that can be used to answer empirical questions, provide a framework for choosing among methods, and explain how to use the methods.

**LAW 802. TGR: Dissertation. 0 Unit.**

## Law, Nonprofessional Courses

### **LAWGEN 103Q. Depth Psychology. 3 Units.**

Powerful unconscious forces impact human and social life. Depth psychology, founded by Sigmund Freud, Carl Jung, Wilhelm Reich, and others, studies these forces and how they shape inner life, personal relationships, religion, politics, art, and many other domains. The course draws from the founders, particularly Jung, and then goes on to include materials from modern theorists, primarily neo-Jungian. The starting point is how the unconscious and conscious mind interact in the individual person's life. We consider the implications of this interaction for psychotherapy and pathology as well as for ordinary life. On the social side, several sessions focus on religion and, to a lesser extent, mythology from a depth psychology perspective. The inquiry is open-ended throughout, encouraging personal reflection and engagement.

### **LAWGEN 105Q. Law and Popular Culture. 3 Units.**

(Same as AMSTUD 105Q) This seminar focuses on the interface between two important subjects: law and popular culture. Before class, students will see a series of films or television shows relating to law, lawyers, and the legal system. There is also a weekly homework assignment based on materials in the assigned text and the assigned film or TV show. We will discuss the pop culture treatment of subjects such as the adversary system, good and bad lawyers, female and gay lawyers, the work life of lawyers, legal education, ethical issues, the jury system, and criminal and civil justice. The seminar discussions will draw on film theory and film-making technique to deepen understanding of the interrelationship between law and popular culture. The discussions will illuminate the ways in which pop culture products both reflect and change social views about law and lawyers. The assigned text is Michael Asimov & Shannon Mader, "Law and Popular Culture: A Course Book" (Peter Lang 2004).

### **LAWGEN 111Q. Introduction to International Human Rights. 3 Units.**

This course will study the main international human rights declarations, treaties, covenants, committees, courts and tribunals. It will look at the effect of nation states, regional bodies, and key economic and military organizations upon human rights. Categories of rights -- civil, political, social, economic and cultural -- will be analyzed, with a particular focus on the rights of women and children, and the right to culture.

### **LAWGEN 112Q. Law and Inequality. 3 Units.**

Most Americans know that discrimination on the basis of race, sex and religion is unlawful. Seems simple enough. But advertisements in the back of newspapers still announce: Single White Female Seeks Single White Male? Isn't that discrimination on the basis of race and sex? Most businesses don't consider men for women's locker room or bathroom attendant. And why aren't those men and women's bathrooms and locker rooms illegal segregation? After all we know what would happened if some business set up separate bathrooms for blacks and whites. Isn't it discrimination for an employer to insist that men wear a jacket and tie and women to wear nylons and a skirt? Why are some forms of discrimination unlawful and others not? Why is discrimination against short people, overweight people or people with annoying personalities not against the law? We'll answer these and many other questions by looking court cases, legal theory and philosophy. We may also have conversations with guest lecturers who work in civil rights enforcement and the seminar may include a field trip to visit the offices of civil rights lawyers (lawyers tend to be busy people so these opportunities will depend on their schedules.) No prerequisites other than an open mind and a willingness to delve into unfamiliar material. Evaluation will be based on class participation and a short final paper.

### **LAWGEN 206Q. Thinking Like a Lawyer. 3-4 Units.**

(Same as GSBGEN 382). Open to all non-law graduate students at the University, this course provides students an analytical framework for understanding the core concepts of the law and familiarizes students with how lawyers analyze and structure their work. The course is taught by Vice Dean Mark Kelman and Law School faculty in their areas of expertise, with one to two classes devoted to each topic. It introduces students to some of the foundational principles of law and reviews topics such as contracts, litigation, intellectual property, securities and employment law.

### **LAWGEN 209Q. Community Police Academy. 1 Unitss.**

The Stanford Department of Public Safety (SUDPS) has a long history of providing a wide variety of services to the Stanford community. The Community Police Academy is a combination of classroom instruction and "hands-on" activities that provides participants the opportunity to experience life as a police officer. This class is designed to expand the participant's knowledge of the duties, responsibilities, decisions and constraints that face law enforcement officers today. The goal of the Community Police Academy is to demystify public safety, build trust and develop partnerships between the Department of Public Safety and the Stanford community. While this course is open to all students throughout the University, the units will not accrue to Law Degree Candidates for credit toward a degree in Law (JD, JSM, JSD, or LLM) . Prerequisites: minimum 18 years of age; valid driver's license; pass basic background check.

## Linguistics Courses

### **LINGUIST 1. Introduction to Linguistics. 4 Units.**

The cognitive organization of linguistic structure and the social nature of language use. Why language learning is difficult. Why computers have trouble understanding human languages. How languages differ from one another. How and why speakers of the same language speak differently. How language is used strategically.

### **LINGUIST 3. Glamour of Grammar. 3-4 Units.**

In this course, we will dispel many a mystery of English grammar, often presented as a dull and dreary subject in schools: we will see that the words *glamorous* and *grammar* come from the same root meaning *mysterious* or *occult* and we will ask: Why is there *stupidity* but not *smartity*? Why can we *blacken* fish or *whiten* teeth, but not *pinken* or *greenen* anything? Who makes up new words anyway? How do we put words together into meaningful sentences? And how do we understand the nuances of English without much direct instruction? While the focus of this course is on English grammar, we will also see that other languages possess grammars that are based on the same principles and constraints.

### **LINGUIST 5N. What's Your Accent? Investigations in Acoustic Phonetics. 3 Units.**

Preference to freshmen. Phonetic variation across accents of English; experimental design; practical experience examining accents of seminar participants; acoustic analysis of speech using Praat.

**LINGUIST 10N. Experimental Phonetics. 4 Units.**

Everyday, we face variation in language. As readers, we see words printed in different fonts, sizes, and typefaces, typically static on a page. As listeners, we hear a speech signal riddled with variation. We are exposed to words, but a single word is produced differently each time it is uttered. These words stream by listeners at a rate of about 5 syllables per second, further complicating the listeners' task. How listeners map a speech signal into meaning despite massive variation is an issue central to linguistic theory. The field of experimental phonetics investigates how listeners take words that often vary drastically and understand them as quickly and adeptly as they do. This class introduces students to acoustic and auditory phonetics. As a class, we will carry out a project in experimental phonetics aimed at understanding how different realizations of words are able to be understood by listeners. Throughout the course, students will read background literature, become familiar with the Stanford Linguistics Lab, and learn to use software integral to the design, data collection, and data analysis of experiments. Each week, we will have two meetings; one in a seminar setting and one in the lab.

**LINGUIST 36. The Arabic Language and Culture. 3 Units.**

(Formerly AMELANG 36). Arabic language from historical, social, strategic, and linguistic perspectives. History of the Arabic language and the stability of classical Arabic over the last 15 centuries. Why the functionality of classical Arabic has not changed as Latin, Old English, and Middle English have. Social aspects of the Arabic language, Ferguson's notion of diglossia. The main varieties of Arabic, differences among them, and when and where they are spoken. Role of Arabic and culture in current world politics, culture, and economy. Linguistic properties of Arabic such as root-based morphology, lexical ambiguity, and syntactic structure relating it to current linguistic theories.

Same as: ARABLANG 16, LINGUIST 270.

**LINGUIST 47N. Languages, Dialects, Speakers. 3 Units.**

Preference to freshmen. Variation and change in languages from around the world. The roots, historical development, and linguistic and social structures of variation. How languages differ from each other, and how issues in linguistics connect to other social and cultural issues. The systematic study of language.

**LINGUIST 52N. Spoken Sexuality: Language and the Social Construction of Sexuality. 3 Units.**

This course, divided into three sections, examines the many ways language is used in the construction of sexuality and sexual identity. In the first section, we consider how language is used as a resource for performing and perceiving sexual identity. Drawing on detailed linguistic analyses of pronunciation, word choice, and grammar, we will address questions such as the following: Is there a gay accent? Why isn't there a lesbian accent? How do transgendered people modify their linguistic behavior when transitioning? How are unmarked (heterosexual) identities linguistically constructed? While sexuality is largely an issue of identity, it is also an issue of desire. In the second section of the course, we examine iconic relations between elements of language (e.g. breathy voice quality, high pitch) and aspects of desire (e.g. arousal, excitement). In the final section, we investigate ways in which language encodes ideologies about sexuality. Specifically, we will study how language is used to talk about sexuality in public discourses about gay marriage and bullying, as well as in personal narratives of coming out. We will also consider how language encodes dominant ideologies about sexuality, evident in labels for sexual minorities as well as terminology for sex acts. Class activities will center on discussions of readings, explorations of how sexuality is portrayed in popular media, and analyses of primary data. Students will be expected to write a final research paper on a topic of their choice.

Same as: FEMST 52N.

**LINGUIST 66. Vernacular English and Reading. 4-5 Units.**

Discusses some of the literature on the relation between use of vernacular English varieties (e.g. African American Vernacular English, Chicano English) and the development of literacy (especially in Standard English). But our primary focus is on improving the reading skills of African American and Latino students in local schools through the Reading Road program developed at the University of Pennsylvania. Students must commit to tutoring one or more elementary students weekly, using the program. L65 AAVE recommended, but not required. Same as: LINGUIST 266.

**LINGUIST 83N. Translation. 3 Units.**

Preference to sophomores. What is a translation? The increased need for translations in the modern world due to factors such as tourism and terrorism, localization and globalization, diplomacy and treaties, law and religion, and literature and science. How to meet this need; different kinds of translation for different purposes; what makes one translation better than another; why some texts are more difficult to translate than others. Can some of this work be done by machines? Are there things that cannot be said in some languages?.

**LINGUIST 90. Teaching Spoken English. 3-4 Units.**

Practical approach to teaching English to non-native speakers. Teaching principles and the features of English which present difficulties. Preparation of lessons, practice teaching in class, and tutoring of non-native speaker.

**LINGUIST 105. Phonetics. 4 Units.**

The study of speech sounds: how to produce them, how to perceive them, and their acoustic properties. The influence of production and perception systems on sound change and phonological patterns. Acoustic analysis and experimental techniques. Lab exercises. Prerequisite: 110 or equivalent, or consent of instructor.

Same as: LINGUIST 205A.

**LINGUIST 106. Introduction to Speech Perception. 4 Units.**

Basics of acoustic phonetics and audition. What do listeners perceive when they perceive speech. Examine current research including: the categorical perception of speech, cross-language speech perception, infant speech perception. Theoretical questions of interest to speech perception researchers and experimental methods used in the field.

**LINGUIST 110. Introduction to Phonetics and Phonology. 4 Units.**

Differences in the sounds of the world's languages and how these sounds are made by the human vocal tract. Theories that account for cross-linguistic similarities in the face of differences.

**LINGUIST 112. Seminar in Phonology. 2-4 Units.**

Topics vary each year. Previous topics include variation in the phonology of words according to their contexts within larger expressions and the place of these phenomena in a theory of grammar. May be repeated for credit. Same as: LINGUIST 212A.

**LINGUIST 116. Morphology. 4 Units.**

A survey of words including their structures, pronunciations, meanings, and syntactic possibilities in a wide sampling of languages to provide a laboratory for investigating the nature of morphology.

**LINGUIST 120. Introduction to Syntax. 4 Units.**

Grammatical constructions, primarily English, and their consequences for a general theory of language. Practical experience in forming and testing linguistic hypotheses, reading, and constructing rules.



**LINGUIST 124. Introduction to Lexical Function Grammar. 2-4 Units.**

Presentation of a formal model of grammar designed to allow precise, computationally tractable descriptions of cross-linguistic variation in syntactic structure. Concentration on the formal properties of the model, its flexibility in teasing out language specific and possibly universal characteristics of natural languages and the place of syntax as a component within a larger linguistic architecture. Prerequisite: 120 or consent of instructor

Same as: LINGUIST 224.

**LINGUIST 130A. Introduction to Semantics and Pragmatics. 4 Units.**

Linguistic meaning and its role in communication. Topics include ambiguity, vagueness, presupposition, intonational meaning, and Grice's theory of conversational implicature. Applications to issues in politics, the law, philosophy, advertising, and natural language processing. Those who have not taken logic, such as PHIL 150 or 151, should also enroll in 130C. Pre- or corequisite: 120, 121, consent of instructor, or graduate standing in Linguistics.

Same as: LINGUIST 230A.

**LINGUIST 130B. Introduction to Lexical Semantics. 4 Units.**

Issues in the study of word meaning. Focus is on the core semantic properties and internal organization of the four major word categories in natural languages: nouns, verbs, adjectives, and prepositions.

**LINGUIST 130C. Logic Laboratory. 1 Unitss.**

Typically taken in conjunction with 130A/230A.

**LINGUIST 134A. The Structure of Discourse: Theory and Applications. 2-4 Units.**

The organization of language above the sentence level, and the manifestation of language in context. Practical experience in working with discourse data.

Same as: LINGUIST 234.

**LINGUIST 140. Language Acquisition I. 4 Units.**

Processes of language acquisition in early childhood; stages in development; theoretical issues and research questions. Practical experience in data collection.

Same as: LINGUIST 240.

**LINGUIST 142. Heritage Languages. 3-4 Units.**

The linguistic and cultural properties of Heritage languages, which are partially acquired and supplanted by a dominant language in childhood. Topics: Syntactic, phonological and morphological properties of heritage languages, implications from experimental HL research for language universals, cultural vs. linguistic knowledge, the role of schooling in HL competence, influence of the dominant language on the HL, and pedagogical issues for HL learners in the classroom.

Same as: LINGUIST 242.

**LINGUIST 143. Sign Languages. 4 Units.**

The linguistic structure of sign languages. How sign languages from around the world differ, and what properties they share. Accents and dialects in sign languages. How sign languages are similar to and different from spoken languages. How and why sign languages have emerged.

**LINGUIST 144. Introduction to Cognitive and Information Sciences. 4 Units.**

The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major.

Same as: PHIL 190, PSYCH 35, SYMSYS 100.

**LINGUIST 150. Language in Society. 4 Units.**

How language and society affect each other. Class, age, ethnic, and gender differences in speech. Prestige and stigma associated with different ways of speaking and the politics of language. The strategic use of language. Stylistic practice; how speakers use language to construct styles and adapt their language to different audiences and social contexts.

**LINGUIST 152. Sociolinguistics and Pidgin Creole Studies. 2-4 Units.**

Introduction to pidgins and creoles, organized around the main stages in the pidgin-creole life cycle: pidginization, creolization, and decreolization. Focus is on transformations in the English language as it was transported from Britain to Africa, Asia, the Caribbean, and the Pacific. Resultant pidginized and creolized varieties such as Nigerian Pidgin English, Chinese Pidgin English, New Guinea Tok Pisin, Suriname Sranan, and the creole continua of Guyana, Jamaica, and Hawaii. Also French, Dutch, Portuguese, Chinook, Motu, and Sango.

Same as: LINGUIST 252.

**LINGUIST 153. Language, Power & Politics. 3-4 Units.**

The integral role language plays in politics; how power operates in linguistic practices and political interaction. Critical examination of how language is used to articulate, maintain and subvert relations of power in society, emphasizing language in the media, the political rhetoric associated with war, and the construction of "truth" in politics. The role of ethnographic analysis in aiding sociolinguistic understandings of how social actors use and (re)interpret political language.

**LINGUIST 154. Sociolinguistics of Language Contact. 2-4 Units.**

The role of contact between speakers of different languages in processes of language borrowing, convergence, and shift. Attending both to linguistic aspects and social contexts, examine: second-language acquisition, bilingualism, code-switching, lexical and grammatical borrowing, first language attrition, language death, and the creation of new contact varieties such as jargons, mixed languages, pidgins, and creoles. Prerequisite: background in linguistics, at least one course in linguistics.

Same as: LINGUIST 254.

**LINGUIST 155. Hip Hop, Youth Identities, and the Politics of Language. 3-4 Units.**

Focus is on issues of language, identity, and globalization, with a focus on Hip Hop cultures and the verbal virtuosity within the Hip Hop nation. Beginning with the U.S., a broad, comparative perspective in exploring youth identities and the politics of language in what is now a global Hip Hop movement. Readings draw from the interdisciplinary literature on Hip Hop cultures with a focus on sociolinguistics and youth culture. Same as: AFRICAAM 121X, AMSTUD 121X, ANTHRO 121A, CSRE 121X, EDUC 121X.

**LINGUIST 160. Introduction to Language Change. 4 Units.**

Principles of historical linguistics; the nature of language change. Kinds and causes of change, variation and diffusion of changes through populations, differentiation of dialects and languages, determination and classification of historical relationships among languages, rates of change, the reconstruction of ancestral languages and intermediate changes, parallels with cultural and genetic evolutionary theory, and implications of variation and change for the description and explanation of language in general. Prerequisite: introductory course in linguistics or evolutionary theory.

**LINGUIST 167. Languages of the World. 3-4 Units.**

The diversity of human languages, their sound systems, vocabularies, and grammars. Tracing historical relationships between languages and language families. Parallels with genetic evolutionary theory. Language policy, endangered languages and heritage languages. Classification of sign languages.

**LINGUIST 173. The Structure of Russian. 2-4 Units.**

A synchronic overview of contemporary standard Russian, including its sound system, word formation and grammatical structure. Emphasis is on problems presented by Russian for current linguistic theory. The acquisition of Russian as a first language.

Same as: LINGUIST 273.

**LINGUIST 180. From Languages to Information. 3-4 Units.**

Automated processing of less structured information: human language text and speech, web pages, social networks, genome sequences, with goal of automatically extracting meaning and structure. Methods include: string algorithms, automata and transducers, hidden Markov models, graph algorithms, XML processing. Applications such as information retrieval, text classification, social network models, machine translation, genomic sequence alignment, word meaning extraction, and speech recognition.

Prerequisite: CS103, CS107, CS109.

Same as: CS 124, LINGUIST 280.

**LINGUIST 181. Grammar Engineering. 1-4 Units.**

Hands-on techniques for implementation of linguistic grammars, drawing on grammatical theory and engineering skills. The implementation of constraints in morphology, syntax, and semantics, working within a unification-based lexicalist framework. Focus is on developing small grammars for English and at least one other language. Prerequisite: basic syntactic theory or 120. No programming skills required.

Same as: LINGUIST 281.

**LINGUIST 182. Computational Theories of Syntax. 3-4 Units.**

Salient features of modern syntactic theories, including HPSG, LFG, and TAG, motivated by computational concerns. Impact of work within these frameworks on the design of algorithms in computational linguistics, and its influence in both linguistics and computer science. Topics include: notions of unification; unification algorithms and their relation to linguistic theory; agenda-driven chart processing for analysis and synthesis; the interface with morphology, the lexicon, and semantics; and applications, notably machine translation.

Same as: LINGUIST 282.

**LINGUIST 185. Writing Systems in a Digital Age. 2-3 Units.**

Introduction to the variety of writing systems and their behaviors. Classification of all existing scripts as alphabetic, syllabic, ideographic; unifying and differentiating features within each group. How writing captures human language in various ways. The development of the alphabet, from ancient Semitic scripts to modern times. How writing systems are extended to additional languages. Chinese writing, its characteristics and sphere of influence. Japanese writing as a hybrid system that includes Chinese. Korean writing as an ideally designed script. The Indian system of writing as the foundation of numerous Asian syllabic scripts. Unicode as global standard for encoding text in all languages. Font technology: the emulation of human writing in the digital realm. Basic knowledge of phonetics recommended. Knowledge of foreign languages helpful.

Same as: LINGUIST 284A.

**LINGUIST 188. Natural Language Understanding. 3-4 Units.**

Machine understanding of human language. Computational semantics (determination of word sense and synonymy, event structure and thematic roles, time, aspect, causation, compositional semantics, scopal operators), and computational pragmatics and discourse (coherence, coreference resolution, information packaging, dialogue structure). Theoretical issues, online resources, and relevance to applications including question answering and summarization. Prerequisites: one of LINGUIST 180 / CS 124 / CS 224N,S; and logic such as LINGUIST 130A or B, CS 157, or PHIL150).

Same as: CS 224U, LINGUIST 288.

**LINGUIST 191. Linguistics and the Teaching of English as a Second/ Foreign Language. 4-5 Units.**

Methodology and techniques for teaching languages, using concepts from linguistics and second language acquisition theory and research. Focus is on teaching English, but most principles and techniques applicable to any language. Optional 1-unit seminar in computer-assisted language learning. Same as: LINGUIST 291.

**LINGUIST 192. Language Testing. 2-4 Units.**

Measurement of production and reception of spoken and written language. Cross-disciplinary comparison of assessments in educational, clinical, and engineering contexts.

Same as: LINGUIST 292.

**LINGUIST 196. Introduction to Research for Undergraduates. 1 Unitss.**

Research seminar for undergraduate students interested in Linguistics.

Faculty and graduate students from the Linguistics department will rotate discussing their own research projects.

**LINGUIST 197A. Undergraduate Research Seminar. 1-3 Units.****LINGUIST 198. Honors Research. 1-15 Units.****LINGUIST 199. Independent Study. 1-15 Units.****LINGUIST 200. Foundations of Linguistic Theory. 4 Units.**

Theories that have shaped contemporary linguistics; recurrent themes and descriptive practice. Strong background in Linguistics or permission of instructor.

**LINGUIST 205A. Phonetics. 4 Units.**

The study of speech sounds: how to produce them, how to perceive them, and their acoustic properties. The influence of production and perception systems on sound change and phonological patterns. Acoustic analysis and experimental techniques. Lab exercises. Prerequisite: 110 or equivalent, or consent of instructor.

Same as: LINGUIST 105.

**LINGUIST 205B. Advanced Phonetics. 2-4 Units.**

Prerequisite: LINGUIST 205A.

**LINGUIST 207. Seminar in Phonetics: Speech Perception. 2-4 Units.**

Topics vary. Current topic is phonetic variation in speech perception. Previous topics include how variation is accommodated in current models of speech perception, and how perceptual models need to be altered to accommodate phonetic variation encountered by listeners. May be repeated for credit.

**LINGUIST 210A. Phonology. 4 Units.**

Introduction to phonological theory and analysis based on cross-linguistic evidence. Topics: phonological representations including features, syllables, metrical structure; phonological processes including assimilation and dissimilation; and phonological typology and universals; optimality theory.

**LINGUIST 210B. Advanced Phonology. 4 Units.**

A comparison of Stratal OT, Transderivational OT, and rule-based approaches, primarily on the empirical basis of stress, syllable structure, and prosodic organization. Course may be repeated once.

**LINGUIST 212A. Seminar in Phonology. 2-4 Units.**

Topics vary each year. Previous topics include variation in the phonology of words according to their contexts within larger expressions and the place of these phenomena in a theory of grammar. May be repeated for credit.

Same as: LINGUIST 112.

**LINGUIST 212B. Seminar in Phonology. 1-4 Units.**

May be repeated for credit.

**LINGUIST 213. Corpus Phonology. 2-4 Units.**

An introduction to constructing and using phonologically annotated corpora to test phonological hypotheses. Hands-on experience in corpus manipulation and phonological modeling.

**LINGUIST 214. Phonology Workshop. 1-2 Units.**

May be repeated for credit.

**LINGUIST 217. Morphosyntax. 2-4 Units.**

The role of morphology in grammar: how word structure serves syntax in the expression of meaning. Lexical semantics, Theta-roles, argument structure, and grammatical relations. Licensing: case, agreement, word order, and their interaction.

**LINGUIST 218. Seminar on Morphological Theories. 2-4 Units.**

Word formation and the lexicon: empirical generalizations and theoretical approaches. Lexicalist and Distributed Morphology. How words are built and interpreted: constituency and headedness, morpheme order and scope, the mirror principle, bracketing paradoxes, the hierarchy of functional categories. Paradigms, blocking, gaps, periphrasis, syncretism. Locality, head movement vs. selection, constraints on allomorphy, incorporation, polysynthesis, cliticization and prosodic re-ordering phenomena.

**LINGUIST 219. Frequency and the Grammar of Alternations. 1-4 Units.**

Variationist, and psycholinguistic studies of how syntactic alternations (for example, the English dative, genitive, and passive) develop in time and space.

**LINGUIST 221A. Foundations of English Grammar. 1-4 Units.**

A systematic introduction to the formal analysis of English grammar using the framework of head-driven phrase structure grammar (HPSG). Topics: feature structure modeling, lexical and phrasal organization in terms of type hierarchies and constraint inheritance, clausal types, patterns of complementation, the auxiliary system, extraction dependencies, wh-constructions, and the syntax-semantics interface.

**LINGUIST 221B. Studies in Universal Grammar. 1-4 Units.**

Focus is on grammatical analysis of individual languages. Builds directly on the theoretical foundations presented in 221A. Topics vary each year.

**LINGUIST 222A. Foundations of Syntactic Theory I. 3-4 Units.**

The roles of the verb and the lexicon in the determination of sentence syntax and their treatment in modern grammatical theories. Empirical underpinnings of core phenomena, including the argument/adjunct distinction, argument structure and argument realization, control and raising, operations on argument structure and grammatical function changing rules. Motivations for a lexicalist approach rooted in principles of lexical expression and subcategorization satisfaction. Prerequisite: 120 or permission of instructor.

**LINGUIST 222B. Foundations of Syntactic Theory II. 1-4 Units.**

The nature of unbounded dependency constructions and their treatment in modern grammatical theories. Filler-gap dependencies, island constraints, and the relation between grammar and processing. Prerequisite: 222A.

**LINGUIST 223. Introduction to Minimalist Syntax. 3-4 Units.**

Introduces the basics of Minimalist architecture and structure-building operations, with attention to the communication of syntax with the phonological and semantic interfaces. Topics include phrase structure, locality and phases, phrasal and head movement, functional categories, and features. A previous graduate-level syntax course, or permission of the instructor required.

**LINGUIST 224. Introduction to Lexical Function Grammar. 2-4 Units.**

Presentation of a formal model of grammar designed to allow precise, computationally tractable descriptions of cross-linguistic variation in syntactic structure. Concentration on the formal properties of the model, its flexibility in teasing out language specific and possibly universal characteristics of natural languages and the place of syntax as a component within a larger linguistic architecture. Prerequisite: 120 or consent of instructor

Same as: LINGUIST 124.

**LINGUIST 224A. From Text to Natural Logic. 1-4 Units.**

Integration of syntax and semantics using LFG (Lexical Functional Grammar) and CCG (Combinatory Categorical Grammar) as syntactic frameworks and Natural Logic as the semantic approach. Most of natural language semantics aims to specify the meaning of linguistic expressions in model-theoretic terms but formulas of first- or higher-order logics do not come with any effective procedures for reasoning that is required for drawing inferences or answering questions given some natural language input. Natural Logic is a cover term for a family of formal approaches to semantics and textual inferencing as currently practiced by computational linguists. They have in common a proof theoretical rather than a model-theoretic focus and an overriding concern with feasibility. Prerequisite: one syntax or one semantics course.

**LINGUIST 224B. Advanced Topics in Lexical Functional Grammar. 1-4 Units.**

May be repeated for credit.

**LINGUIST 225. Seminar in Syntax: Binding Theory. 2-4 Units.**

The course begins with a review of classic generative theories of anaphora, from early transformational analyses to GB Binding Theory and its competitors. We then survey the empirical typology of referentially dependent expressions and binding domains, including obviation, logophoricity, and the different binding properties of affixal, pronominal, and complex reflexives and reciprocals. We conclude by exploring how the cross-linguistic variation and generalizations can be addressed in the three principal current theoretical approaches: pragmatic, minimalist, and optimality-theoretic. May be repeated for credit.

**LINGUIST 227C. Projects in Syntax. 2-4 Units.**

Group research projects using quantitative syntactic data from texts, recordings, experiments, or historical records. Skills in extracting, graphically exploring, and analyzing naturalistic syntactic data, and in presenting results. May be repeated for credit. Prerequisite: 229A, B, or D, or equivalent.

**LINGUIST 229A. Laboratory Syntax I. 1-4 Units.**

Critiques of the empirical foundations of syntax. The roles of introspective, usage-based, experimental, and typological evidence. Modern methods of data collection and analysis used in syntax. Hands-on, practical work with data sets. May be repeated for credit.

**LINGUIST 229B. Laboratory Syntax II. 1-4 Units.**

Hands-on use of methods for handling syntactic data, including corpus work on ecologically natural data and controlled experimental paradigms. Explanatory models of syntactic processing and their relation to theories of grammar. May be repeated for credit.

**LINGUIST 229C. Laboratory Syntax III. 1-4 Units.**

Hands-on use of methods for handling syntactic data, including corpus work on ecologically natural data and controlled experimental paradigms. Explanatory models of syntactic processing and their relation to theories of grammar. May be repeated for credit.

**LINGUIST 229D. Empirical Syntax Research Seminar. 1-2 Units.**

Recent work in syntax that employs data-rich methods like corpora and laboratory studies, emphasizing research by seminar participants. May be repeated for credit.

**LINGUIST 230A. Introduction to Semantics and Pragmatics. 4 Units.**  
Linguistic meaning and its role in communication. Topics include ambiguity, vagueness, presupposition, intonational meaning, and Grice's theory of conversational implicature. Applications to issues in politics, the law, philosophy, advertising, and natural language processing. Those who have not taken logic, such as PHIL 150 or 151, should also enroll in 130C. Pre- or corequisite: 120, 121, consent of instructor, or graduate standing in Linguistics.  
Same as: LINGUIST 130A.

**LINGUIST 230B. Advanced Semantics and Pragmatics. 2-4 Units.**  
Expands on 130A/230A. Detailed study of selected topics in formal semantics and pragmatics. Prerequisites: LINGUIST 130A/230A or permission from instructor.

**LINGUIST 230D. Semantics Research Seminar. 1 Unitss.**  
registration for those students attending Thursday 2-3pm Semantics group.

**LINGUIST 232A. Lexical Semantics. 2-4 Units.**  
Introduction to issues in word meaning, focused primarily around verbs. Overview of the core semantic properties of verbs and the organization of the verb lexicon. Approaches to lexical semantic representation, including semantic role lists, proto-roles, and causal and aspectual theories of event conceptualization.

**LINGUIST 232B. Seminar in Lexical Semantics: Lexical Categories. 1-4 Units.**  
Current topic: A review of recent research into the nature of lexical categories. Topics include languages said to lack lexical category distinctions, languages lacking full lexical category inventories, and methodological issues facing investigations of lexical categories. Data will be drawn from various languages and several semantic domains. May be repeated for credit with different content. May be repeated for credit.

**LINGUIST 234. The Structure of Discourse: Theory and Applications. 2-4 Units.**  
The organization of language above the sentence level, and the manifestation of language in context. Practical experience in working with discourse data.  
Same as: LINGUIST 134A.

**LINGUIST 235. Semantic Fieldwork. 2-4 Units.**  
Techniques for evidence from less well-studied languages within formal semantic theory. Semantic phenomena, and techniques for investigating them, including scope, quantifiers, pronouns, focus, tense, aspect, mood, evidentiality, and information structure. Practical work on a language.

**LINGUIST 236. SEM IN SEMANTICS: Representations of meaning. 3 Units.**  
Representations of meaning from psychological, linguistic, and computational viewpoints. Topics include lambda calculus, probabilistic programming, and vector spaces. Special emphasis on the challenges of semantic composition. May be repeated for credit.  
Same as: PSYCH 236C.

**LINGUIST 237. Seminar in Semantics: Semantics of Questions and Commands. 1-4 Units.**  
Semantics of interrogatives and imperatives; propositional semantics of declaratives. Research emphasizing the meaning of questions. May be repeated for credit.

**LINGUIST 239. Semantics Research Seminar. 1-2 Units.**  
Presentation of ongoing research in semantics. May be repeated for credit.

**LINGUIST 240. Language Acquisition I. 4 Units.**  
Processes of language acquisition in early childhood; stages in development; theoretical issues and research questions. Practical experience in data collection.  
Same as: LINGUIST 140.

**LINGUIST 241. Language Acquisition II. 1-4 Units.**  
Pragmatics and acquisition. May be repeated for credit.

**LINGUIST 242. Heritage Languages. 3-4 Units.**  
The linguistic and cultural properties of Heritage languages, which are partially acquired and supplanted by a dominant language in childhood. Topics: Syntactic, phonological and morphological properties of heritage languages, implications from experimental HL research for language universals, cultural vs. linguistic knowledge, the role of schooling in HL competence, influence of the dominant language on the HL, and pedagogical issues for HL learners in the classroom.  
Same as: LINGUIST 142.

**LINGUIST 245. Experimental Design for Linguistics. 4 Units.**  
Hypothesis formation, confound avoidance, power, general methods, and analysis of results. Students complete a pilot experiment; write-up; peer review; presentation.

**LINGUIST 249. Language Processing. 2-4 Units.**  
Understanding spoken or written language requires the rapid, incremental processing of novel compositional structures, as well as the integration of the incoming language stream with multiple sources of information, such as the prior discourse, physical context, social information, etc. How are humans able to efficiently accomplish this task? To address this question, this course will consider principles of sentence and discourse processing that guide language understanding and features of sentence & discourse structure that facilitate comprehension. Specific topics are likely to include reference processing, memory & forgetting, individual differences in comprehension ability, the role of context, and computational models of language comprehension.

**LINGUIST 250. Sociolinguistic Theory and Analysis. 2-4 Units.**  
Methods of modeling the patterned variation of language in society. Emphasis is on variation, its relation to social structure and practice, and its role in linguistic change. Intersection between quantitative and qualitative analysis, combining insights of sociology and linguistic anthropology with quantitative linguistic data. Prerequisite: graduate standing in Linguistics or consent of instructor.

**LINGUIST 251. Sociolinguistic Field Methods. 4 Units.**  
Strengths and weaknesses of the principal methods of data collection in sociolinguistics.

**LINGUIST 252. Sociolinguistics and Pidgin Creole Studies. 2-4 Units.**  
Introduction to pidgins and creoles, organized around the main stages in the pidgin-creole life cycle: pidginization, creolization, and decreolization. Focus is on transformations in the English language as it was transported from Britain to Africa, Asia, the Caribbean, and the Pacific. Resultant pidginized and creolized varieties such as Nigerian Pidgin English, Chinese Pidgin English, New Guinea Tok Pisin, Suriname Sranan, and the creole continua of Guyana, Jamaica, and Hawaii. Also French, Dutch, Portuguese, Chinook, Motu, and Sango.  
Same as: LINGUIST 152.

**LINGUIST 253. Race, Ethnicity, and Language. 3-4 Units.**  
This seminar explores the linguistic construction of race and ethnicity across a wide variety of contexts and communities. Throughout the course, we will take a comparative perspective and highlight how different racial/ethnic formations participate in similar, yet different, ways of "doing race" though language, interaction and culture. Readings draw heavily from perspectives in (linguistic) anthropology and sociolinguistics. Prerequisite: consent of instructor.  
Same as: ANTHRO 320A, EDUC 389X.

**LINGUIST 254. Sociolinguistics of Language Contact. 2-4 Units.**

The role of contact between speakers of different languages in processes of language borrowing, convergence, and shift. Attending both to linguistic aspects and social contexts, examine: second-language acquisition, bilingualism, code-switching, lexical and grammatical borrowing, first language attrition, language death, and the creation of new contact varieties such as jargons, mixed languages, pidgins, and creoles. Prerequisite: background in linguistics, at least one course in linguistics.

Same as: LINGUIST 154.

**LINGUIST 255. Seminar in Sociolinguistics: California Dialectology. 2-5 Units.**

Topics vary by quarter. Current topic is based on sociolinguistic interviews gathered in the first two field seasons of the Voices of California project. May be repeated for credit.

**LINGUIST 256. Stylistic Practice. 4 Units.**

Research seminar focusing on the stylistic use of variation, locating it in broader theories of stylistic practice. Examining within-speaker stylistic variation and stylistic variation across social groups. Prerequisite: Phonetics, at least 1 sociolinguistics course, or permission of instructor. May be repeated for credit.

**LINGUIST 258. Analysis of Variation. 1-4 Units.**

The quantitative study of linguistic variability in time, space, and society emphasizing social constraints in variation. Hands-on work with variable data. Prerequisites: 105/205 and 250, or consent of instructor.

**LINGUIST 259. Topics in Sociolinguistics. 2-4 Units.**

Topics vary by quarter. Current topic is Sociophonetics. Repeatable for credit. This seminar explores new methods of collecting and analyzing sociophonetic data in an experimental setting, including electroglottography, aerodynamic measures, speech resynthesis, and perception study tasks. Requirements include both collaborative and individual research projects.

**LINGUIST 260A. Historical Morphology and Phonology. 4 Units.**

Sound change and analogical change in the perspective of linguistic theory. Internal and comparative reconstruction.

**LINGUIST 260B. Historical Morphosyntax. 2-4 Units.**

Morphological and syntactic variation and change. Reanalysis, grammaticalization. The use of corpora and quantitative evidence.

**LINGUIST 262. Constructionalization. 2-4 Units.**

Discussion of recent proposals about how to enhance work on grammaticalization and lexicalization by adopting a construction grammar perspective.

**LINGUIST 264. English Transplanted, English Transformed: Pidgins and Creoles. 2-4 Units.**

English varieties around the world, including white vernacular dialects and creole, pidgin, and indiginized Englishes. Emphasis is on the historical circumstances of origin, linguistic characteristics, and social setting in colonial and postcolonial societies. Theoretical issues pertaining to language contact, language shift, and pidgin and creole formation.

Same as: LINGUIST 164.

**LINGUIST 266. Vernacular English and Reading. 4-5 Units.**

Discusses some of the literature on the relation between use of vernacular English varieties (e.g. African American Vernacular English, Chicano English) and the development of literacy (especially in Standard English). But our primary focus is on improving the reading skills of African American and Latino students in local schools through the Reading Road program developed at the University of Pennsylvania. Students must commit to tutoring one or more elementary students weekly, using the program. L65 AAVE recommended, but not required.

Same as: LINGUIST 66.

**LINGUIST 270. The Arabic Language and Culture. 3 Units.**

(Formerly AMELANG 36). Arabic language from historical, social, strategic, and linguistic perspectives. History of the Arabic language and the stability of classical Arabic over the last 15 centuries. Why the functionality of classical Arabic has not changed as Latin, Old English, and Middle English have. Social aspects of the Arabic language, Ferguson's notion of diglossia. The main varieties of Arabic, differences among them, and when and where they are spoken. Role of Arabic and culture in current world politics, culture, and economy. Linguistic properties of Arabic such as root-based morphology, lexical ambiguity, and syntactic structure relating it to current linguistic theories.

Same as: ARABLANG 16, LINGUIST 36.

**LINGUIST 271. Structure of Basque. 2-4 Units.**

Introduction to key topics in Basque morphology, syntax, semantics and how they bear on current theoretical debates. Topics covered may include basic clause structure and word order, case-marking and ergativity, the expression of motion and location.

**LINGUIST 272. Structure of Finnish. 2-4 Units.**

Central topics in Finnish phonology/morphology and syntax/semantics and how they bear on current theoretical debates. Topics: stress; vowel harmony; clause structure; case; aspect; word order.

**LINGUIST 273. The Structure of Russian. 2-4 Units.**

A synchronic overview of contemporary standard Russian, including its sound system, word formation and grammatical structure. Emphasis is on problems presented by Russian for current linguistic theory. The acquisition of Russian as a first language.

Same as: LINGUIST 173.

**LINGUIST 274B. Field Methods II. 3-4 Units.**

First course in series with 274C, with a focus on phonetic topics in a targeted language. Prerequisite: one quarter of phonology and one quarter of syntax or permission of instructor. Graduate students are heavily encouraged to make a commitment to both 274B and 274C in the same year.

**LINGUIST 274C. Linguistic Field Methods: Syntax. 3-4 Units.**

Prerequisites include one quarter of phonology and one quarter of syntax or permission of instructor. Graduate students are heavily encouraged to make a commitment to both 274B and 274C in the same year.

**LINGUIST 275. Research Projects Practicum. 1-2 Units.**

Forum for students with ongoing linguistic research projects, intended to provide participants with feedback on issues of study design, data collection and analysis. Some sessions will provide brief introductions to specific topics in research methodology, chosen based on student interest.

**LINGUIST 276. Quantitative Methods in Linguistics. 2-4 Units.**

Introduction to methods for collecting and analyzing quantitative linguistic data, with a primary focus on the use of corpora in exploring theoretical questions in various areas of linguistics. Topics include the access and retrieval of corpus data (including web-based corpora), data annotation, and statistical modeling. Practical experience with R, Python scripting, and setting up online experiments through Amazon Mechanical Turk.

**LINGUIST 277. Laboratory Methods in Psycholinguistics. 2-4 Units.**

Issues that commonly arise in the design and implementation of linguistic experiments and in the statistical analysis of empirical results. Topics in experimental design include selection of stimuli, blocking, and power analysis and sample size calculation. How to fit and interpret statistical models using the multilevel regression and Bayesian inference, as implemented in software packages R and Bugs. Topics include interpretation of model coefficients for fixed and random effects, collinearity, model criticism, as well as comparison and reporting of models. Theoretical issues worked out at lab sessions using examples from experiments and corpus studies, including those provided by students.

**LINGUIST 278. Programming for Linguists. 1-4 Units.**

Computer programming techniques for collecting and analyzing data in linguistic research. Introduction to the UNIX, regular expressions, and Python scripting. Hands-on experience gathering, formatting, and manipulating corpus, field, and experimental data, combining data from multiple sources, and working with existing tools. Knowledge of computer programming not required.

**LINGUIST 280. From Languages to Information. 3-4 Units.**

Automated processing of less structured information: human language text and speech, web pages, social networks, genome sequences, with goal of automatically extracting meaning and structure. Methods include: string algorithms, automata and transducers, hidden Markov models, graph algorithms, XML processing. Applications such as information retrieval, text classification, social network models, machine translation, genomic sequence alignment, word meaning extraction, and speech recognition.

Prerequisite: CS103, CS107, CS109.

Same as: CS 124, LINGUIST 180.

**LINGUIST 281. Grammar Engineering. 1-4 Units.**

Hands-on techniques for implementation of linguistic grammars, drawing on grammatical theory and engineering skills. The implementation of constraints in morphology, syntax, and semantics, working within a unification-based lexicalist framework. Focus is on developing small grammars for English and at least one other language. Prerequisite: basic syntactic theory or 120. No programming skills required.

Same as: LINGUIST 181.

**LINGUIST 282. Computational Theories of Syntax. 3-4 Units.**

Salient features of modern syntactic theories, including HPSG, LFG, and TAG, motivated by computational concerns. Impact of work within these frameworks on the design of algorithms in computational linguistics, and its influence in both linguistics and computer science. Topics include: notions of unification; unification algorithms and their relation to linguistic theory; agenda-driven chart processing for analysis and synthesis; the interface with morphology, the lexicon, and semantics; and applications, notably machine translation.

Same as: LINGUIST 182.

**LINGUIST 283. Basic Algorithms for Computational Linguistics. 2-4 Units.**

Foundational algorithms of non-statistical computational linguistics, including string searching, suffix trees and suffix arrays, finite-state technology for phonology, morphology and dictionary access, classical back-tracking programs for sentence analysis, the use of charts in parsing, generation and translation. Students complete a programming project in one of these areas.

**LINGUIST 284. Natural Language Processing. 3-4 Units.**

Methods for processing human language information and the underlying computational properties of natural languages. Syntactic and semantic processing from linguistic and algorithmic perspectives. Focus is on modern quantitative techniques in NLP: using large corpora, statistical models for acquisition, translation, and interpretation; and representative systems.

Prerequisites: CS124 or CS121/221.

Same as: CS 224N.

**LINGUIST 284A. Writing Systems in a Digital Age. 2-3 Units.**

Introduction to the variety of writing systems and their behaviors.

Classification of all existing scripts as alphabetic, syllabic, ideographic; unifying and differentiating features within each group. How writing captures human language in various ways. The development of the alphabet, from ancient Semitic scripts to modern times. How writing systems are extended to additional languages. Chinese writing, its characteristics and sphere of influence. Japanese writing as a hybrid system that includes Chinese. Korean writing as an ideally designed script. The Indian system of writing as the foundation of numerous Asian syllabic scripts. Unicode as global standard for encoding text in all languages. Font technology: the emulation of human writing in the digital realm. Basic knowledge of phonetics recommended. Knowledge of foreign languages helpful.

Same as: LINGUIST 185.

**LINGUIST 285. Speech Recognition and Synthesis. 2-4 Units.**

Automatic speech recognition, speech synthesis, and dialogue systems.

Focus is on key algorithms including noisy channel model, hidden Markov models (HMMs), Viterbi decoding, N-gram language modeling, unit selection synthesis, and roles of linguistic knowledge. Prerequisite: programming experience. Recommended: CS 221 or 229.

Same as: CS 224S.

**LINGUIST 286. Information Retrieval and Web Search. 3 Units.**

Text information retrieval systems; efficient text indexing; Boolean, vector space, and probabilistic retrieval models; ranking and rank aggregation; evaluating IR systems. Text clustering and classification: classification algorithms, latent semantic indexing, taxonomy induction; Web search engines including crawling and indexing, link-based algorithms, and web metadata. Prerequisites: CS 107, CS 109, CS 161.

Same as: CS 276.

**LINGUIST 287. Extracting Social Meaning and Sentiment. 3 Units.**

Methods for extracting social meaning (speaker perspectives, emotions and attitudes) from text and speech. Topics include sentiment analysis and summarization, detection of deception, sarcasm, emotion, and personality. Analysis of meaning-bearing characteristics of the speaker and topic, including text, discourse, prosodic and other cues. Prerequisite: CS 124 or 221 or 229 or permission of instructors.

Same as: CS 424P.

**LINGUIST 288. Natural Language Understanding. 3-4 Units.**

Machine understanding of human language. Computational semantics (determination of word sense and synonymy, event structure and thematic roles, time, aspect, causation, compositional semantics, scopal operators), and computational pragmatics and discourse (coherence, coreference resolution, information packaging, dialogue structure). Theoretical issues, online resources, and relevance to applications including question answering and summarization. Prerequisites: one of LINGUIST 180 / CS 124 / CS 224N,S; and logic such as LINGUIST 130A or B, CS 157, or PHIL150).

Same as: CS 224U, LINGUIST 188.

**LINGUIST 289. Topics in Computational Linguistics: History of Computational Linguistics. 3-4 Units.**

Intellectual history of computational linguistics and natural language processing, together with related aspects of dialogue and speech processing, using primary sources. Reading of seminal early papers, interviews with historical figures, with the goal of understanding the origins and intellectual development of the field. Prerequisites: at least one of LING 180, 281, 283, 284, 286, or 288.

**LINGUIST 291. Linguistics and the Teaching of English as a Second/ Foreign Language. 4-5 Units.**

Methodology and techniques for teaching languages, using concepts from linguistics and second language acquisition theory and research. Focus is on teaching English, but most principles and techniques applicable to any language. Optional 1-unit seminar in computer-assisted language learning. Same as: LINGUIST 191.

**LINGUIST 294. Linguistic Research Discussion Group. 1 Unitss.**

Restricted to first-year Linguistics Ph.D. students.

**LINGUIST 390. M.A. Project. 1-6 Units.**

**LINGUIST 394. TA Training Workshop. 1 Unitss.**

For second-year graduate students in Linguistics.

**LINGUIST 395. Research Workshop. 1-2 Units.**

Restricted to students in the doctoral program. Student presentations of research toward qualifying papers. May be repeated for credit.

**LINGUIST 395C. Research Workshop III. 1-2 Units.**

Restricted to students in the doctoral program. Student presentations of ongoing research plus professional development sessions.

**LINGUIST 396. Research Projects in Linguistics. 2-3 Units.**

Mentored research project for first-year graduate students in linguistics.

**LINGUIST 397. Directed Reading. 1-15 Units.**

**LINGUIST 398. Directed Research. 1-15 Units.**

**LINGUIST 399. Dissertation Research. 1-15 Units.**

## Management Science Engineering Courses

**MSE 22Q. The Flaw of Averages. 3 Units.**

Uncertain assumptions in business and public policy are often replaced with single "best guess" or average numbers. This leads to a fallacy as fundamental as the belief that the earth is flat, which I call the Flaw of Averages. It states, in effect, that: plans based on average assumptions are wrong on average. This class will discuss mitigations of the flaw of averages using simulation and other methods from probability management.

**MSE 41. Financial Literacy. 1 Unitss.**

Practical knowledge about personal finance and money management including budgeting, pay checks, credit cards, banking, insurance, taxes, and saving. Class especially appropriate for those soon to be self-supporting. Limited enrollment. Admission by order of enrollment in Axxss.

**MSE 52. Introduction to Decision Making. 3 Units.**

Experienced management consultants share lessons and war stories. Case studies, disguised examples from real engagements, and movie clips illustrate theories and concepts of decision analysis. Student teams critique decisions made in actual organizations. Topics include what makes a good decision, how decisions can be made better, framing and structuring techniques, modeling and analysis tools, biases and probability assessment, evaluation and appraisal methods, decision psychology, creativity and organizational leadership, and effective presentation styles. Not intended for MS&E majors.

**MSE 71SI. Entrepreneurship through the Lens of Venture Capital. 1-2 Units.**

How successful startups navigate funding, managing, and scaling their new enterprise. Process explored through guest lectures and mentorship from experienced venture capital investors and seasoned entrepreneurs who manage these issues on a daily basis in Silicon Valley. Course themes: customer value equation, board management, market strategy, company culture, and hyper growth. Enrollment is limited to 20 students. Visit <http://www.stanford.edu/dept/MSandE/lensofvc> for application and more information.

**MSE 92Q. International Environmental Policy. 3 Units.**

Preference to sophomores. Science, economics, and politics of international environmental policy. Current negotiations on global climate change, including actors and potential solutions. Sources include briefing materials used in international negotiations and the U.S. Congress.

**MSE 101. Undergraduate Directed Study. 1-15 Units.**

Subject of mutual interest to student and faculty member. Prerequisite: faculty sponsor.

**MSE 107. Interactive Management Science. 3 Units.**

Analytical techniques such as linear and integer programming, Monte Carlo simulation, forecasting, decision analysis, and Markov chains in the environment of the spreadsheet. Probability management. Materials include spreadsheet add-ins for implementing these and other techniques. Emphasis is on building intuition through interactive modeling, and extending the applicability of this type of analysis through integration with existing business data structures.

Same as: MSE 207.

**MSE 108. Senior Project. 5 Units.**

Restricted to MS&E majors in their senior year. Students carry out a major project in groups of four, applying techniques and concepts learned in the major. Project work includes problem identification and definition, data collection and synthesis, modeling, development of feasible solutions, and presentation of results. Service Learning Course (certified by Haas Center).

**MSE 111. Introduction to Optimization. 4 Units.**

Formulation and analysis of linear optimization problems. Solution using Excel solver. Polyhedral geometry and duality theory. Applications to contingent claims analysis, production scheduling, pattern recognition, two-player zero-sum games, and network flows. Prerequisite: MATH 51. Same as: ENGR 62.

**MSE 112. Mathematical Programming and Combinatorial Optimization. 3 Units.**

Combinatorial and mathematical programming (integer and non-linear) techniques for optimization. Topics: linear program duality and LP solvers; integer programming; combinatorial optimization problems on networks including minimum spanning trees, shortest paths, and network flows; matching and assignment problems; dynamic programming; linear approximations to convex programs; NP-completeness. Hands-on exercises. Prerequisites: CS 106A or X; ENGR 62 or MATH 103. Same as: MSE 212.

**MSE 120. Probabilistic Analysis. 5 Units.**

Concepts and tools for the analysis of problems under uncertainty, focusing on model building and communication: structuring, processing, and presentation of probabilistic information. Examples from legal, social, medical, and physical problems. Spreadsheets illustrate and solve problems as a complement to analytical closed-form solutions. Topics: axioms of probability, probability trees, random variables, distributions, conditioning, expectation, change of variables, and limit theorems. Prerequisite: MATH 51. Recommended: knowledge of spreadsheets.

**MSE 121. Introduction to Stochastic Modeling. 4 Units.**

Stochastic processes and models in operations research. Discrete and continuous time parameter Markov chains. Queuing theory, inventory theory, simulation. Prerequisite: 120 or Statistics 116.

**MSE 130. Information Networks and Services. 3 Units.**

Architecture of the Internet and performance engineering of computer systems and networks. Switching, routing and shortest path algorithms. Congestion management and queuing networks. Peer-to-peer networking. Wireless and mobile networking. Information service engineering and management. Search engines and recommendation systems. Reputation systems and social networking technologies. Security and trust. Information markets. Select special topics and case studies. Prerequisites: 111, 120, and CS 106A.

**MSE 134. Organization Change and Information Systems. 3 Units.**

Leading organizational change and Information Systems. Case method discussions and lectures. Themes include: real-time enterprise; reengineering; organization transformation, cross-functional teams, IT development, and leading IT. Course includes a group project that is defined and approved during the first two weeks of class. Limited enrollment. Prerequisites: CS 106A, 180, or equivalents. Same as: MSE 234.

**MSE 140. Accounting for Managers and Entrepreneurs. 3-4 Units.**

Non-majors and minors who have taken or are taking elementary accounting should not enroll. Introduction to accounting concepts and the operating characteristics of accounting systems. The principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Interpretation and use of accounting information for decision making. Designed for the user of accounting information and not as an introduction to a professional accounting career. Enrollment limited. Admission by order of enrollment. Same as: MSE 240.

**MSE 142. Introductory Financial Analysis. 3 Units.**

Evaluation and management of money, complicated by temporary distributions and uncertainty. The "time-value of money" and its impact on economic decisions (both personal and corporate) with the introduction of interest rate (constant or varying over time); several approaches critically examined and made consistent as suitable metrics of comparison. The concept of investment diversification in the presence of uncertainty; portfolio selection and efficient frontier analysis leading to the formulation of the Capital Asset Pricing Model; practical implementation of the concepts, including comparison of loan (e.g., house and auto) terms, credit card financial terms, interest rate term structure and its relationship to rate-of-return analysis, and graphical presentation of uncertain investment alternatives; and current economic news of interest. Critical thinking, discussion, and interaction, using group and computer labs assignments. Prerequisites: differential calculus and probability. Recommended: optimization.

**MSE 146. Corporate Financial Management. 3 Units.**

Key functions of finance in both large and small companies, and the core concepts and key analytic tools that provide their foundation. Making financing decisions, evaluating investments, and managing cashflow, profitability and risk. Designing performance metrics to effectively measure and align the activities of functional groups and individuals within the firm. Structuring relationships with key customers, partners and suppliers. Prerequisite: 142 or 245G or equivalent.

**MSE 152. Introduction to Decision Analysis. 3-4 Units.**

How to make good decisions in a complex, dynamic, and uncertain world. People often make decisions that on close examination they regard as wrong. Decision analysis uses a structured conversation based on actional thought to obtain clarity of action in a wide variety of domains. Topics: distinctions, possibilities and probabilities, relevance, value of information and experimentation, relevance and decision diagrams, risk attitude. Students seeking to fulfill the Writing in the Major requirement should register for MS&E 152W. Same as: MSE 152W.

**MSE 152W. Introduction to Decision Analysis. 3-4 Units.**

How to make good decisions in a complex, dynamic, and uncertain world. People often make decisions that on close examination they regard as wrong. Decision analysis uses a structured conversation based on actional thought to obtain clarity of action in a wide variety of domains. Topics: distinctions, possibilities and probabilities, relevance, value of information and experimentation, relevance and decision diagrams, risk attitude. Students seeking to fulfill the Writing in the Major requirement should register for MS&E 152W. Same as: MSE 152.

**MSE 175. Innovation, Creativity, and Change. 3-4 Units.**

Problem solving in organizations; creativity and innovation skills; thinking tools; creative organizations, teams, individuals, and communities. Limited enrollment. (Katila).

**MSE 178. The Spirit of Entrepreneurship. 3 Units.**

Is there more to entrepreneurship than inventing the better mouse trap? This course uses the speakers from the Entrepreneurial Thought Leader seminar (MS&E472) to drive research and discussion about what makes an entrepreneur successful. Topics include venture financing, business models, and interpersonal dynamics in the startup environment. Students meet before and after MS&E 472 to prepare for and debrief after the sessions. Enrollment limited to 50 students. Admission by application.

**MSE 180. Organizations: Theory and Management. 4 Units.**

For undergraduates only; preference to MS&E majors. Classical and contemporary organization theory; the behavior of individuals, groups, and organizations. Limited enrollment. Admission by application. Students must attend first session.

**MSE 181. Issues in Technology and Work for a Postindustrial Economy. 3 Units.**

How changes in technology and organization are altering work and lives. Approaches to studying and designing work. How understanding work and work practices can assist engineers in designing better technologies and organizations. Topics include job design, distributed and virtual organizations, the blurring of boundaries between work and family life, computer supported cooperative work, trends in skill requirements and occupational structures, monitoring and surveillance in the workplace, downsizing and its effects on work systems, project work and project-based lifestyles, the growth of contingent employment, telecommuting, electronic commerce, and the changing nature of labor relations. Enrollment limited to 50 students. Preference to MS&E, STS, and CEE seniors, followed by MS&E, STS, and CEE juniors.

**MSE 185. Global Work. 4 Units.**

Issues, challenges, and opportunities facing workers, teams, and organizations working across national boundaries. Topics include geographic distance, time zones, language and cultural differences, technologies to support distant collaboration, team dynamics, and corporate strategy. Limited enrollment. Admission by application.



**MSE 189. Social Networks - Theory, Methods, and Applications. 3 Units.**

Introduces students to the theoretical, substantive, and methodological foundations of social networks. The social network paradigm seeks to explain how social relations facilitate and constrain an actor's opportunities, behaviors, and cognitions. Topics include: network concepts and principles; network data collection, measurement, and analysis; and applications in management, engineering, and related disciplines.

**MSE 190. Methods and Models for Policy and Strategy Analysis. 3 Units.**

Guest lectures by departmental practitioners. Emphasis is on links among theory, application, and observation. Environmental, national security, and health policy; marketing, new technology, and new business strategy analyses. Comparisons between domains and methods.

**MSE 193. Technology and National Security. 3 Units.**

The interaction of technology and national security policy from the perspective of history to implications for the new security imperative, homeland defense. Key technologies in nuclear and biological weapons, military platforms, and intelligence gathering. Policy issues from the point of view of U.S. and other nations. The impact of terrorist threat. Guest lecturers include key participants in the development of technology and/or policy. Students seeking to fulfill the WIM requirement should register for 193W.

Same as: MSE 193W, MSE 293.

**MSE 193W. Technology and National Security. 3 Units.**

The interaction of technology and national security policy from the perspective of history to implications for the new security imperative, homeland defense. Key technologies in nuclear and biological weapons, military platforms, and intelligence gathering. Policy issues from the point of view of U.S. and other nations. The impact of terrorist threat. Guest lecturers include key participants in the development of technology and/or policy. Students seeking to fulfill the WIM requirement should register for 193W.

Same as: MSE 193, MSE 293.

**MSE 197. Ethics and Public Policy. 5 Units.**

Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations.

Same as: PUBLPOL 103B, STS 110.

**MSE 201. Dynamic Systems. 3-4 Units.**

Goal is to think dynamically in decision making, and recognize and analyze dynamic phenomena in diverse situations. Concepts: formulation and analysis; state-space formulation; solutions of linear dynamic systems, equilibria, dynamic diagrams; eigenvalues and eigenvectors of linear systems, the concept of feedback; nonlinear dynamics, phase plane analysis, linearized analysis, Liapunov functions, catastrophe theory. Examples: grabber-holder dynamics, technology innovation dynamics, creation of new game dynamics in business competition, ecosystem dynamics, social dynamics, and stochastic exchange dynamics. Prerequisite: MATH 51 or equivalent.

**MSE 206. Art of Mathematical Modeling. 3 Units.**

Practicum. Students build mathematical models of real-life, ill-framed problems. Emphasis is on framing the issues, articulating modeling components logically (drawing from student's mathematical background), and analyzing the resulting model. Hands-on modeling. Project work in small groups. Prerequisites: basic analysis, calculus and algebra, and probability theory. Recommended: decision analysis, optimization and dynamic systems.

**MSE 207. Interactive Management Science. 3 Units.**

Analytical techniques such as linear and integer programming, Monte Carlo simulation, forecasting, decision analysis, and Markov chains in the environment of the spreadsheet. Probability management. Materials include spreadsheet add-ins for implementing these and other techniques. Emphasis is on building intuition through interactive modeling, and extending the applicability of this type of analysis through integration with existing business data structures.

Same as: MSE 107.

**MSE 208A. Practical Training. 1 Unitss.**

MS&E students obtain employment in a relevant industrial or research activity to enhance professional experience, consistent with the degree program they are pursuing. Students submit a one-page statement showing relevance to degree program along with offer letter before the start of the quarter, and a 2-3 page final report documenting the work done and relevance to degree program at the conclusion of the quarter. Master's students are limited to one quarter of practical training. B.S. and Ph.D. students may take each of A, B, and C once.

**MSE 208B. Practical Training. 1 Unitss.**

MS&E students obtain employment in a relevant industrial or research activity to enhance professional experience, consistent with the degree program they are pursuing. Students submit a one-page statement showing relevance to degree program along with offer letter before the start of the quarter, and a 2-3 page final report documenting the work done and relevance to degree program at the conclusion of the quarter. Master's students are limited to one quarter of practical training. B.S. and Ph.D. students may take each of A, B, and C once.

**MSE 208C. Practical Training. 1 Unitss.**

MS&E students obtain employment in a relevant industrial or research activity to enhance professional experience, consistent with the degree program they are pursuing. Students submit a one-page statement showing relevance to degree program along with offer letter before the start of the quarter, and a 2-3 page final report documenting the work done and relevance to degree program at the conclusion of the quarter. Master's students are limited to one quarter of practical training. B.S. and Ph.D. students may take each of A, B, and C once.

**MSE 211. Linear and Nonlinear Optimization. 3-4 Units.**

Optimization theory and modeling. The role of prices, duality, optimality conditions, and algorithms in finding and recognizing solutions.

Perspectives: problem formulation, analytical theory, computational methods, and recent applications in engineering, finance, and economics. Theories: finite dimensional derivatives, convexity, optimality, duality, and sensitivity. Methods: simplex and interior-point, gradient, Newton, and barrier. Prerequisite: MATH 51.

**MSE 212. Mathematical Programming and Combinatorial Optimization. 3 Units.**

Combinatorial and mathematical programming (integer and non-linear) techniques for optimization. Topics: linear program duality and LP solvers; integer programming; combinatorial optimization problems on networks including minimum spanning trees, shortest paths, and network flows; matching and assignment problems; dynamic programming; linear approximations to convex programs; NP-completeness. Hands-on exercises. Prerequisites: CS 106A or X; ENGR 62 or MATH 103.

Same as: MSE 112.

**MSE 220. Probabilistic Analysis. 3-4 Units.**

Concepts and tools for the analysis of problems under uncertainty, focusing on model building and communication: the structuring, processing, and presentation of probabilistic information. Examples from legal, social, medical, and physical problems. Spreadsheets illustrate and solve problems as a complement to analytical closed-form solutions. Topics: axioms of probability, probability trees, random variables, distributions, conditioning, expectation, change of variables, and limit theorems. Prerequisite: MATH 51. Recommended: knowledge of spreadsheets.

**MSE 221. Stochastic Modeling. 3 Units.**

Focus is on time-dependent random phenomena. Topics: discrete and continuous time Markov chains, renewal processes, queueing theory, and applications. Emphasis is on building a framework to formulate and analyze probabilistic systems. Prerequisite: 220 or consent of instructor.

**MSE 223. Simulation. 3 Units.**

Discrete-event systems, generation of uniform and non-uniform random numbers, Monte Carlo methods, programming techniques for simulation, statistical analysis of simulation output, efficiency-improvement techniques, decision making using simulation, applications to systems in computer science, engineering, finance, and operations research. Prerequisites: working knowledge of a programming language such as C, C++, Java, or FORTRAN; probability; and statistical methods.

**MSE 233. Networked Markets. 3 Units.**

An introduction to economic analysis for modern online services and systems. Topics include: Examples of networked markets. Online advertising. Recommendation and reputation systems. Pricing digital media. Network effects and network externalities. Social learning and herd behavior. Markets and information. Prerequisites: Math 51 and probability at the level of MS&E 220 or equivalent. No prior economics background will be assumed; requisite concepts will be introduced as needed.

**MSE 234. Organization Change and Information Systems. 3 Units.**

Leading organizational change and Information Systems. Case method discussions and lectures. Themes include: real-time enterprise; reengineering; organization transformation, cross-functional teams, IT development, and leading IT. Course includes a group project that is defined and approved during the first two weeks of class. Limited enrollment. Prerequisites: CS 106A, 180, or equivalents. Same as: MSE 134.

**MSE 236. Game Theory with Engineering Applications. 3 Units.**

Strategic interactions among multiple decision makers emphasizing applications to engineering systems. Topics: efficiency and fairness; collective decision making and cooperative games; static and dynamic noncooperative games; and complete and incomplete information models. Competition: Bertrand, Cournot, and Stackelberg models. Mechanism design: auctions, contracts. Examples from engineering problems. Prerequisites: MATH 51 and exposure to probability such as 120 or EE 178. Recommended: 211, concurrent enrollment in 241 or ECON 202.

**MSE 236H. Game Theory with Engineering Applications. 3 Units.**

Advanced and mathematically more rigorous version of MS&E 236. Strategic interactions among multiple decision makers emphasizing applications to engineering systems. Topics: efficiency and fairness; collective decision making and cooperative games; static and dynamic noncooperative games; and complete and incomplete information models. Competition: efficient markets; Bertrand, Cournot, and Stackelberg models. Mechanism design: auctions, contracts. Examples from engineering problems. Prerequisites: mathematical maturity; MATH 51; probability at the level of 220, STATS 116, or equivalent. Recommended: 211, concurrent enrollment in 241 or ECON 202.

**MSE 237. The Social Data Revolution: Data Mining and Electronic Business. 3 Units.**

Hands-on exploration of current and emergent data sources and their impact on individuals, business and society: recommendation engines, reputation systems, social network analysis, and engagement metrics. Guest speakers, homework assignments and group projects (e.g., Twitter and Facebook apps) combine data strategy, machine learning, modern and traditional marketing, behavioral economics, and incentive design. Cases include Amazon.com, BestBuy, MySpace, Lufthansa, and startups. Prerequisites: intellectual curiosity, entrepreneurial spirit, some programming experience (details at [weigend.com/teaching](http://weigend.com/teaching)), and willingness to implement in the real world.

**MSE 238. Leading Trends in Information Technology. 3 Units.**

Focuses on new trends and disruptive technologies in IT. Emphasis on the way technologies create a competitive edge and generate business value. Broad range of views presented by guest speakers, including top level executives of technology companies, and IT executives (e.g. CIOs) of Fortune 1000 companies. Special emphasis in technologies such as Virtualization, Cloud Computing, Security, Mobility and Unified Communications.

**MSE 238A. Leading Trends in Information Technology. 1 Unitss.**

Focuses on new trends and disruptive technologies in IT. Emphasis on the way technologies create a competitive edge and generate business value. Broad range of views presented by guest speakers, including top level executives of technology companies, and IT executives (e.g. CIOs) of Fortune 1000 companies. Special emphasis in technologies such as Virtualization, Cloud Computing, Security, Mobility and Unified Communications.

**MSE 239. Computational Advertising. 3 Units.**

Computational, economic, and optimization issues in online advertising, in contexts including web search, social networks, web surfing, and online multimedia. Overview of scientific and engineering issues arising in building online advertising platforms for Internet advertising formats, as well as ad pricing, ad auctions, and ad optimization. Research frontiers of this young discipline. Limited enrollment. Prerequisites: elementary probability and linear algebra.

**MSE 240. Accounting for Managers and Entrepreneurs. 3-4 Units.**

Non-majors and minors who have taken or are taking elementary accounting should not enroll. Introduction to accounting concepts and the operating characteristics of accounting systems. The principles of financial and cost accounting, design of accounting systems, techniques of analysis, and cost control. Interpretation and use of accounting information for decision making. Designed for the user of accounting information and not as an introduction to a professional accounting career. Enrollment limited. Admission by order of enrollment. Same as: MSE 140.

**MSE 241. Economic Analysis. 3-4 Units.**

Principal methods of economic analysis of the production activities of firms, including production technologies, cost and profit, and perfect and imperfect competition; individual choice, including preferences and demand; and the market-based system, including price formation, efficiency, and welfare. Practical applications of the methods presented. See 341 for continuation of 241. Recommended: 211, ECON 50.

**MSE 242. Investment Science. 3 Units.**

Theory and application of modern quantitative investment analysis from an engineering perspective. How investment concepts are used to evaluate and manage opportunities, portfolios, and investment products including stocks, bonds, mortgages, and annuities. Topics: deterministic cash flows (term structure of interest rates, bond portfolio immunization, project optimization); mean-variance theory (Markowitz model, capital asset pricing); and arbitrage pricing theory. Group project. Prerequisites: 120, MATH 51, or equivalents. Recommended: 111, 140, knowledge of spreadsheets. Limited enrollment.

**MSE 242H. Investment Science Honors. 3 Units.**

Concepts of modern quantitative finance and investments. Basic concepts under certainty including arbitrage, term structure of interest rates, and bond portfolio immunization. A situation of uncertainty in one period. Topics: arbitrage; theorems of asset pricing; pricing measures; derivative securities; applications and estimating of financial risk measures; mean-variance portfolio analysis; and equilibrium and the capital asset pricing model. Group projects involving financial market data. Enrollment limited. Prerequisites: basic probability, statistics, and economics such as MS&E 120, 121, MATH 51, or equivalents. No prior knowledge of finance required.

**MSE 242S. Investment Science. 3 Units.**

Emphasis is on a cash flow approach. Topics include deterministic cash flow analysis (time value of money, present value, internal rate of return, taxes, inflation), fixed income securities, duration and bond portfolio immunization, term structure of interest rates (spot rates, discount factors, forward rates), Fisher-Weill duration and immunization, capital budgeting, dynamic optimization problems, investments under uncertainty, mean-variance portfolio theory, capital asset pricing, and basic options theory. Goal is to create a link between engineering analysis and business decision making.

**MSE 243. Energy and Environmental Policy Analysis. 3 Units.**

Concepts, methods, and applications. Energy/environmental policy issues such as automobile fuel economy regulation, global climate change, research and development policy, and environmental benefit assessment. Group project. Prerequisite: MS&E 241 or ECON 50, 51.

**MSE 245G. Finance for Non-MBAs. 3-5 Units.**

For graduate students and advanced undergraduates. The foundations of finance; applications in corporate finance and investment management. Financial decisions made by corporate managers and investors with focus on process valuation. Topics include criteria for investment decisions, valuation of financial assets and liabilities, relationships between risk and return, market efficiency, and the valuation of derivative securities. Corporate financial instruments including debt, equity, and convertible securities. Equivalent to core MBA finance course, FINANCE 220. Prerequisites: ECON 51, or ENGR 60, or equivalent; ability to use spreadsheets, and basic probability and statistics concepts including random variables, expected value, variance, covariance, and simple estimation and regression. Same as: ECON 135.

**MSE 247G. International Financial Management. 4 Units.**

With a daily volume of more than \$1.8tr the foreign exchange market is by far the largest financial market in the world. It is also one of the most important ones as it is impossible to avoid exchange rate risk in the global economy. We will examine various aspects of the foreign exchange market. First, we will examine the role of governments and central banks. We will then focus on the markets for spot exchange, currency forwards, options, swaps, international bonds, and international equities. For each of these markets, the valuation of instruments traded in these markets and, through cases, the application of these instruments to managing exposure to exchange rates, financing in international capital markets, and international capital budgeting. It is strongly recommended that students take Finance for Non-MBAs (FINANCE 221/MS&E 245G/ECON 135) as a pre- or co-requisite to this course. MS&E 242/242S/242H or MATH 238/STATS 250 are also acceptable.

**MSE 247S. International Investments. 3 Units.**

International financial markets, their comparative behavior and interrelations. Focus is on assets traded in liquid markets: currencies, equities, bonds, swaps, and derivatives. Topics: institutional arrangements, taxation and regulation, international arbitrage and parity conditions, valuation of target firms for cross-border acquisitions, direct foreign investment, international diversification and portfolio management, derivative instruments and dynamic investment strategies, international performance analysis, international capital flows and financial crises, and topics of current relevance and importance.

**MSE 248. Economics of Natural Resources. 3-4 Units.**

Intertemporal economic analysis of natural resource use, particularly energy, and including air, water, and other depletable mineral and biological resources. Emphasis is on an integrating theory for depletable and renewable resources. Stock-flow relationships; optimal choices over time; short- and long-run equilibrium conditions; depletion/extinction conditions; market failure mechanisms (common-property, public goods, discount rate distortions, rule-of-capture); policy options. Prerequisite: 241 or ECON 51.

**MSE 249. Economic Growth and Development. 3 Units.**

What generates economic growth. Emphasis is on theory accompanied by intuition, illustrated with country cases. Topics: the equation of motion of an economy; optimal growth theory; calculus of variations and optimal control approaches; deriving the Euler and Pontraguine equations from economic reasoning. Applications: former planned economies in Russia and E. Europe; the present global crisis: causes and consequences; a comparative study of India and China. The links between economic growth and civilization; the causes of the rise and decline of civilizations; lessons for the future. Intended for graduate students. Prerequisite: multivariable calculus.

**MSE 250A. Engineering Risk Analysis. 3 Units.**

The techniques of analysis of engineering systems for risk management decisions involving trade-offs (technical, human, environmental aspects). Elements of decision analysis; probabilistic risk analysis (fault trees, event trees, systems dynamics); economic analysis of failure consequences (human safety and long-term economic discounting); and case studies such as space systems, nuclear power plants, and medical systems. Public and private sectors. Prerequisites: probability, decision analysis, stochastic processes, and convex optimization.

**MSE 250B. Project Course in Engineering Risk Analysis. 3 Units.**

Students, individually or in groups, choose, define, formulate, and resolve a real risk management problem, preferably from a local firm or institution. Oral presentation and report required. Scope of the project is adapted to the number of students involved. Three phases: risk assessment, communication, and management. Emphasis is on the use of probability for the treatment of uncertainties and sensitivity to problem boundaries. Limited enrollment. Prerequisites: MS&E 250A and consent of instructor.

**MSE 251. Stochastic Decision Models. 3 Units.**

Efficient formulation and computational solution of sequential decision problems under uncertainty. Markov decision chains and stochastic programming. Maximum expected present value and rate of return. Optimality of simple policies: myopic, linear, index, acceptance limit, and (s,S). Optimal stationary and periodic infinite-horizon policies. Applications to investment, options, overbooking, inventory, production, purchasing, selling, quality, repair, sequencing, queues, capacity, transportation. MATLAB is used. Prerequisites: probability, linear programming. Same as: EE 365.

**MSE 252. Decision Analysis I: Foundations of Decision Analysis. 3-4 Units.**

Coherent approach to decision making, using the metaphor of developing a structured conversation having desirable properties, and producing actional thought that leads to clarity of action. Socratic instruction; computational problem sessions. Emphasis is on creation of distinctions, representation of uncertainty by probability, development of alternatives, specification of preference, and the role of these elements in creating a normative approach to decisions. Information gathering opportunities in terms of a value measure. Relevance and decision diagrams to represent inference and decision. Principles are applied to decisions in business, technology, law, and medicine. See 352 for continuation.

**MSE 254. The Ethical Analyst. 1-3 Units.**

The ethical responsibility for consequences of professional analysts who use technical knowledge in support of any individual, organization, or government. The means to form ethical judgments; questioning the desirability of physical coercion and deception as a means to reach any end. Human action and relations in society in the light of previous thought, and research on the desired form of social interactions. Attitudes toward ethical dilemmas through an explicit personal code.

**MSE 255. Decision Systems I. 2-3 Units.**

(Formerly MS&E 451.) Professional tools and techniques for designing decision systems that help when facing decisions such as buying a car, bidding on the Internet, hiring NFL players, making charitable donations, or choosing medical treatment. Demonstrations; small project. Topics: automatic decision diagram formulation, decision-class analysis, and dynamic sensitivity analysis. No programming required. Recommended: 252 or equivalent.

**MSE 256. Technology Assessment and Regulation of Medical Devices. 1-3 Units.**

(Formerly 475.) Regulatory approval and reimbursement for new medical technologies as a key component of product commercialization. The regulatory and payer environment in the U.S. and abroad, and common methods of health technology assessment. Framework to identify factors relevant to adoption of new medical devices, and the management of those factors in the design and development phases. Case studies; guest speakers from government (FDA) and industry.

**MSE 260. Introduction to Operations Management. 3-4 Units.**

Operations management focuses on the effective planning, scheduling, and control of manufacturing and service entities. This course introduces students to a broad range of key issues in operations management. Topics include determination of optimal facility location, production planning, optimal timing and sizing of capacity expansion, and inventory control. Prerequisites: basic knowledge of Excel spreadsheets, probability, and optimization.

**MSE 261. Inventory Control and Production Systems. 3 Units.**

Topics in the planning and control of manufacturing systems. The functions of inventory, determination of order quantities and safety stocks, alternative inventory replenishment systems, item forecasting, production-inventory systems, materials requirements planning (MRP), just-in-time systems, master and operations scheduling, supply chain management, and service operations. Limited enrollment. Prerequisite: 120, or STATS 116, or equivalent.

**MSE 262. Supply Chain Management. 3 Units.**

Definition of a supply chain; coordination difficulties; pitfalls and opportunities in supply chain management; inventory/service tradeoffs; performance measurement and incentives. Global supply chain management; mass customization; supplier management. Design and redesign of products and processes for supply chain management; tools for analysis; industrial applications; current industry initiatives. Enrollment limited to 50. Admission determined in the first class meeting. Prerequisite: 260 or 261.

**MSE 264. Sustainable Product Development and Manufacturing. 3-4 Units.**

Strategies and techniques for development of sustainable products and manufacturing processes. Topics: strategic decisions in new product development when environmental and resource externalities are accounted for; effect of regulatory requirements on ability of a firm to achieve its business objectives; contributions of sustainable products/processes to the firm's competitive advantage and operational efficiency and to enabling entrepreneurial opportunities; industrial ecology and life cycle analysis techniques in integrating traditional product development requirements with those of the environment and society. Maybe repeatable for credit once.

**MSE 266. Management of New Product Development. 3 Units.**

Techniques of managing or leading the process of new product development that have been found effective. Emphasis is placed on how much control is desirable and how that control can be exercised in a setting where creativity has traditionally played a larger role than discipline. Topics: design for manufacturability, assessing the market, imposing discipline on the new product development process, selecting the appropriate portfolio of new product development projects, disruptive technology, product development at internet speed, uncertainty in product development, role of experimentation in new product development, creating an effective development organization, and developing products to hit cost targets.

**MSE 268. Operations Strategy. 3 Units.**

The development and implementation of the operations functional strategy. The integration of operations strategy with business and corporate strategies of a manufacturing-based firm. Topics: types and characteristics of manufacturing technologies, quality management, capacity planning and facilities choice, organization and control of operations, and operations' role in corporate strategy. Prerequisites: 260 or 261, or equivalent experience.

**MSE 270. Strategy in Technology-Based Companies. 3-4 Units.**

For graduate students only. Introduction to the basic concepts of strategy, with emphasis on high technology firms. Topics: competitive positioning, resource-based perspectives, co-opetition and standards setting, and complexity/evolutionary perspectives. Limited enrollment.

**MSE 271. Global Entrepreneurial Marketing. 3-4 Units.**

Skills needed to market new technology-based products to customers around the world. Case method discussions. Cases include startups and global high tech firms. Course themes: marketing toolkit, targeting markets and customers, product marketing and management, partners and distribution, sales and negotiation, and outbound marketing. Team-based take-home final exam. Limited enrollment. Admission by application.

**MSE 272. Startup Boards. 3 Units.**

Accelerate your startup through hands-on guidance from a board of venture capitalists and experienced entrepreneurs custom built for your team. Like real startup boards, your board will help your team identify critical milestones, assist in achieving them, and hold your team accountable through regular board meetings. Learn how to avoid common mistakes which lead to ineffective board meetings, fired CEOs, and sometimes even the failure of an otherwise promising venture. Topics include designing a board, recruiting board members, managing board meetings, making strategic decisions, conflicts of interests, fiduciary responsibilities, ethical responsibilities, and CEO succession. Limited enrollment. Admission by application. Preference given to teams with demonstrated commitment to a viable startup business.

**MSE 273. Technology Venture Formation. 3-4 Units.**

Open to graduate students interested in technology driven start-ups. Provides the experience of an early-stage entrepreneur seeking initial investment, including: team building, opportunity assessment, customer development, go-to-market strategy, and IP. Teaching team includes serial entrepreneurs and venture capitalists. Student teams validate the business model using R&D plans and financial projections, and define milestones for raising and using venture capital. Final exam is an investment pitch delivered to a panel of top tier VC partners. In addition to lectures, teams interact with mentors and teaching team weekly. Enrollment limited. Recommended: 270, 271, or equivalent.

**MSE 274. Dynamic Entrepreneurial Strategy. 3 Units.**

Primarily for graduate students. How entrepreneurial strategy focuses on creating structural change or responding to change induced externally. Grabber-holder dynamics as an analytical framework for developing entrepreneurial strategy to increase success in creating and shaping the diffusion of new technology or product innovation dynamics. Topics: First mover versus follower advantage in an emerging market; latecomer advantage and strategy in a mature market; strategy to break through stagnation; and strategy to turn danger into opportunity. Modeling, case studies, and term project.

**MSE 276. Entrepreneurial Management and Finance. 3 Units.**

For graduate students only with a preference for engineering and science majors. Emphasis on managing the challenges high-growth ventures experience, especially those based on technology products and services. Students develop a set of skills and approaches to becoming effective entrepreneurial managers. Topics include business model management, deal structure and negotiation, raising capital and financial management, venture operations and organizational administration, managing the interplay between ownership and growth, and handling adversity as well as failure. Limited enrollment. Admission by application. Prerequisite: 140/240, or equivalent.

**MSE 277. Creativity and Innovation. 3-4 Units.**

Experiential course explores factors that promote and inhibit creativity and innovation in individuals, teams, and organizations. Teaches creativity tools using workshops, case studies, field trips, expert guests, and team design challenges. Enrollment limited to 40. Admission by application. See <http://creativity.stanford.edu>.

**MSE 278. Patent Law and Strategy for Innovators and Entrepreneurs. 2-3 Units.**

Inventors and entrepreneurs have four concerns related to patent law: protecting their inventions in the very early stages of product development, determining the patentability of their invention, avoiding infringement of a competitor's patent, and leveraging their patent as a business asset. This course will address each of these concerns through the application of law cases and business cases to an invention of the Student's choice. Although listed as a ME/MSE course, the course is not specific to any discipline or technology. Same as: ME 208.

**MSE 280. Organizational Behavior: Evidence in Action. 3-4 Units.**

Organization theory; concepts and functions of management; behavior of the individual, work group, and organization. Emphasis is on cases and related discussion. Enrollment limited; priority to MS&E students.

**MSE 283. Scaling up Excellence in Organizations. 4 Units.**

A problem for every manager is to make 'good' behaviors spread quickly and to shrink 'undesirable' behaviors quickly. This course provides you practical frameworks to accomplish these managerial goals. We will examine issues such as scaling Idea generation, scaling knowledge sharing, scaling the adoption of ideas across firms, scaling change in global firms. We will be using a newly written series of cases for this course and also draw on guest speakers.

**MSE 289. Designing for Sustainable Abundance. 3-4 Units.**

Hands-on, team-based, multidisciplinary class, uses radically human-centered approach to tackle sustainability challenges in areas like food and transportation. Teams develop solutions that improve environmental and economic sustainability as well as physical and emotional well-being. Students benefit from close interaction with the teaching team, support from project sponsors, and the varied perspectives of numerous guest speakers. Application required. Limited enrollment. Design Institute class; see <http://dschool.stanford.edu>.

**MSE 292. Health Policy Modeling. 3 Units.**

Primarily for master's students; also open to undergraduates and doctoral students. The application of mathematical, statistical, economic, and systems models to problems in health policy. Areas include: disease screening, prevention, and treatment; assessment of new technologies; bioterrorism response; and drug control policies.

**MSE 293. Technology and National Security. 3 Units.**

The interaction of technology and national security policy from the perspective of history to implications for the new security imperative, homeland defense. Key technologies in nuclear and biological weapons, military platforms, and intelligence gathering. Policy issues from the point of view of U.S. and other nations. The impact of terrorist threat. Guest lecturers include key participants in the development of technology and/or policy. Students seeking to fulfill the WIM requirement should register for 193W.

Same as: MSE 193, MSE 193W.

**MSE 294. Climate Policy Analysis. 3 Units.**

Design and application of formal analytical methods in climate policy development. Issues include instrument design, technology development, resource management, multiparty negotiation, and dealing with complexity and uncertainty. Links among art, theory, and practice. Emphasis is on integrated use of modeling tools from diverse methodologies and requirements for policy making application. Recommended: background in economics, optimization, and decision analysis.

**MSE 295. Energy Policy Analysis. 3 Units.**

Design and application of formal analytical methods for policy and technology assessments of energy efficiency and renewable energy options. Emphasis is on integrated use of modeling tools from diverse methodologies and requirements for policy and corporate strategy development. Recommended: background in economics, optimization, and decision analysis.

**MSE 299. Voluntary Social Systems. 1-3 Units.**

Ethical theory, feasibility, and desirability of a social order in which coercion by individuals and government is minimized and people pursue ends on a voluntary basis. Topics: efficacy and ethics; use rights for property; contracts and torts; spontaneous order and free markets; crime and punishment based on restitution; guardian-ward theory for dealing with incompetents; the effects of state action-hypothesis of reverse results; applications to help the needy, armed intervention, victimless crimes, and environmental protection; transition strategies to a voluntary society.

**MSE 300. Ph.D. Qualifying Tutorial or Paper. 1-3 Units.**

Restricted to Ph.D. students assigned tutorials as part of the MS&E Ph.D. qualifying process. Enrollment optional.

**MSE 301. Dissertation Research. 1-15 Units.**

Prerequisite: doctoral candidacy.

**MSE 310. Linear Programming. 3 Units.**

Formulation of standard linear programming models. Theory of polyhedral convex sets, linear inequalities, alternative theorems, and duality. Variants of the simplex method and the state of art interior-point algorithms.

Sensitivity analyses, economic interpretations, and primal-dual methods.

Relaxations of harder optimization problems and recent convex conic linear programs. Applications include game equilibrium facility location.

Prerequisite: MATH 113 or consent of instructor.

**MSE 311. Optimization. 3 Units.**

Applications, theories, and algorithms for finite-dimensional linear and nonlinear optimization problems with continuous variables. Elements of convex analysis, first- and second-order optimality conditions, sensitivity and duality. Algorithms for unconstrained optimization, and linearly and nonlinearly constrained problems. Modern applications in communication, game theory, auction, and economics. Prerequisites: MATH 113, 115, or equivalent.

**MSE 312. Advanced Methods in Numerical Optimization. 3 Units.**

Topics include interior-point methods, relaxation methods for nonlinear discrete optimization, sequential quadratic programming methods, optimal control and decomposition methods. Topic chosen in first class; different topics for individuals or groups possible. Individual or team projects. May be repeated for credit.

Same as: CME 334.

**MSE 313. Vector Space Optimization. 3 Units.**

Optimization theory from the unified framework of vector space theory: treating together problems of mathematical programming, calculus of variations, optimal control, estimation, and other optimization problems. Emphasis is on geometric interpretation. Duality theory. Topics: vector spaces including function spaces; Hilbert space and the projection theorem; dual spaces and the separating hyperplane theorem; linear operators and adjoints; optimization of functionals, including theory of necessary conditions in general spaces, and convex optimization theory; constrained optimization including Fenchel duality theory. Prerequisite: MATH 115.

**MSE 314. Linear and Conic Optimization with Applications. 3 Units.**

Linear, semidefinite, conic, and convex nonlinear optimization problems as generalizations of classical linear programming. Algorithms include the interior-point, barrier function, and cutting plane methods. Related convex analysis, including the separating hyperplane theorem, Farkas lemma, dual cones, optimality conditions, and conic inequalities. Complexity and/or computation efficiency analysis. Applications to combinatorial optimization, sensor network localization, support vector machine, and graph realization. Prerequisite: MS&E 211 or equivalent.

Same as: CME 336.

**MSE 315. Numerical Optimization. 3 Units.**

Solution of nonlinear equations; unconstrained optimization; linear programming; quadratic programming; global optimization; general linearly and nonlinearly constrained optimization. Theory and algorithms to solve these problems. Prerequisite: background in analysis and numerical linear algebra.

Same as: CME 304.

**MSE 316. Discrete Mathematics and Algorithms. 3 Units.**

Topics: enumeration such as Cayley's theorem and Prufer codes, SDR, flows and cuts (deterministic and randomized algorithms), probabilistic methods and random graphs, asymptotics (NP-hardness and approximation algorithms). Topics illustrated with EE, CS, and bioinformatics applications. Prerequisites: MATH 51 or 103 or equivalents.

Same as: CME 305.

**MSE 317. Algorithms for Modern Data Models. 3 Units.**

We traditionally think of algorithms as running on data available in a single location, typically main memory. In many modern applications including web analytics, search and data mining, computational biology, finance, and scientific computing, the data is often too large to reside in a single location, is arriving incrementally over time, is noisy/uncertain, or all of the above. Paradigms such as map-reduce, streaming, sketching, Distributed Hash Tables, Bulk Synchronous Processing, and random walks have proved useful for these applications. This course will provide an introduction to the design and analysis of algorithms for these modern data models.

Prerequisite: Algorithms at the level of CS 261.

Same as: CS 263.

**MSE 318. Large-Scale Numerical Optimization. 3 Units.**

The main algorithms and software for constrained optimization emphasizing the sparse-matrix methods needed for their implementation.

Iterative methods for linear equations and least squares. The simplex method. Basic factorization and updates. Interior methods. The reduced-gradient method, augmented Lagrangian methods, and SQP methods. Prerequisites: Basic numerical linear algebra, including LU, QR, and SVD factorizations, and an interest in MATLAB, sparse-matrix methods, and gradient-based algorithms for constrained optimization. Recommended: MS&E 310, 311, 312, 314, or 315; CME 108, 200, 302, 304, 334, or 335. Same as: CME 338.

**MSE 319. Approximation Algorithms. 3 Units.**

Combinatorial and mathematical programming techniques to derive approximation algorithms for NP-hard optimization problems. Possible topics include: greedy algorithms for vertex/set cover; rounding LP relaxations of integer programs; primal-dual algorithms; semidefinite relaxations. May be repeated for credit. Prerequisites: 112 or CS 161.

**MSE 321. Stochastic Systems. 3 Units.**

Topics in stochastic processes, emphasizing applications. Markov chains in discrete and continuous time; Markov processes in general state space; Lyapunov functions; regenerative process theory; renewal theory; martingales, Brownian motion, and diffusion processes. Application to queueing theory, storage theory, reliability, and finance. Prerequisites: 221 or STATS 217; MATH 113, 115. (Glynn).

**MSE 322. Stochastic Calculus and Control. 3 Units.**

Itô integral, existence and uniqueness of solutions of stochastic differential equations (SDEs), diffusion approximations, numerical solutions of SDEs, controlled diffusions and the Hamilton-Jacobi-Bellman equation, and statistical inference of SDEs. Applications to finance and queueing theory. Prerequisites: 221 or STATS 217; MATH 113, 115.

**MSE 323. Stochastic Simulation. 3 Units.**

Emphasis is on the theoretical foundations of simulation methodology. Generation of uniform and non-uniform random variables. Discrete-event simulation and generalized semi-Markov processes. Output analysis (autoregressive, regenerative, spectral, and stationary times series methods). Variance reduction techniques (antithetic variables, common random numbers, control variables, discrete-time, conversion, importance sampling). Stochastic optimization (likelihood ratio method, perturbation analysis, stochastic approximation). Simulation in a parallel environment. Prerequisite: MS&E 221 or equivalent.

**MSE 332. Security and Risk in Computer Networks. 3 Units.**

Risk management of large scale computing and networking systems with respect to security, data integrity, performance collapse, and service disruption. Qualitative and analytical basis for assessment, modeling, control, and mitigation of network risks. Stochastic risk models. Contact process. Random fields on networks. Virus and worm propagation dynamics and containment. Denial of service attacks. Intruder detection technologies. Distributed network attacks and countermeasures. Disaster recovery networks. Network protection services and resource placement. Autonomic self-defending networks. Economics of risk management. Emphasis is on analytics and quantitative methods.

**MSE 335. Queueing and Scheduling in Processing Networks. 3 Units.**

Advanced stochastic modeling and control of systems involving queueing and scheduling operations. Stability analysis of queueing systems. Key results on single queues and queueing networks. Controlled queueing systems. Dynamic routing and scheduling in processing networks. Applications to modeling, analysis and performance engineering of computing systems, communication networks, flexible manufacturing, and service systems. Prerequisite: 221 or equivalent.

**MSE 336. Topics in Game Theory with Engineering Applications. 3 Units.**

Seminar. Recent research applying economic methods to engineering problems. Recent topics include: incentives in networked systems; mechanism design in engineered systems; and dynamics and learning in games. Prerequisites: mathematics at the level of MATH 115; game theory at the level of 246 or ECON 203; probability at the level of 220; optimization at the level of 211. May be repeated for credit.

**MSE 337. Information Networks. 3 Units.**

Network structure of the Internet and the web. Modeling, scale-free graphs, small-world phenomenon. Algorithmic implications in searching and inter-domain routing; the effect of structure on performance. Game theoretic issues, routing games, and network creation games. Security issues, vulnerability, and robustness. Prerequisite: basic probability and graph theory.

Same as: CME 337.

**MSE 338. Advanced Topics in Information Science and Technology. 3 Units.**

Advanced material in this area is sometimes taught for the first time as a topics course. Prerequisite: consent of instructor.

**MSE 342. Advanced Investment Science. 3 Units.**

Topics: forwards and futures contracts, continuous and discrete time models of stock price behavior, geometric Brownian motion, Ito's lemma, basic options theory, Black-Scholes equation, advanced options techniques, models and applications of stochastic interest rate processes, and optimal portfolio growth. Computational issues and general theory. Teams work on independent projects. Prerequisite: 242.

**MSE 347. Credit Risk: Modeling and Management. 3 Units.**

Credit risk modeling, valuation, and hedging emphasizing underlying economic, probabilistic, and statistical concepts. Point processes and their compensators. Structural, incomplete information and reduced form approaches. Single name products: corporate bonds, equity, equity options, credit and equity default swaps, forwards and swaptions. Multiname modeling: index and tranche swaps and options, collateralized debt obligations. Implementation, calibration and testing of models. Industry and market practice. Data and implementation driven group projects that focus on problems in the financial industry. Prerequisites: stochastic processes at the level of MSE 321, 322 or equivalent, and financial engineering at the level of MSE 342, MATH 180, MATH 240, FINANCE 622 or equivalent.

**MSE 348. Optimization of Uncertainty and Applications in Finance. 3 Units.**

How to make optimal decisions in the presence of uncertainty, solution techniques for large-scale systems resulting from decision problems under uncertainty, and applications in finance. Decision trees, utility, two-stage and multi-stage decision problems, approaches to stochastic programming, model formulation; large-scale systems, Benders and Dantzig-Wolfe decomposition, Monte Carlo sampling and variance reduction techniques, risk management, portfolio optimization, asset-liability management, mortgage finance. Projects involving the practical application of optimization under uncertainty to financial planning.

**MSE 349. Capital Deployment. 3 Units.**

Methods for efficiently allocating capital among alternatives, constructing business plans, determining the value of risky projects, and creating alternatives that enhance value. Prerequisites: 242, 342.

**MSE 351. Dynamic Programming and Stochastic Control. 3 Units.**

Markov population decision chains in discrete and continuous time. Risk posture. Present value and Cesaro overtaking optimality. Optimal stopping. Successive approximation, policy improvement, and linear programming methods. Team decisions and stochastic programs; quadratic costs and certainty equivalents. Maximum principle. Controlled diffusions. Examples from inventory, overbooking, options, investment, queues, reliability, quality, capacity, transportation. MATLAB. Prerequisites: MATH 113, 115; Markov chains; linear programming.

**MSE 352. Decision Analysis II: Professional Decision Analysis. 3-4 Units.**

How to organize the decision conversation, the role of the decision analysis cycle and the model sequence, assessing the quality of decisions, framing decisions, the decision hierarchy, strategy tables for alternative development, creating spare and effective decision diagrams, biases in assessment, knowledge maps, uncertainty about probability. Sensitivity analysis, approximations, value of revelation, joint information, options, flexibility, bidding, assessing and using corporate risk attitude, risk sharing and scaling, and decisions involving health and safety. See 353 for continuation. Prerequisite: 252.

**MSE 353. Decision Analysis III: Frontiers of Decision Analysis. 3 Units.**

The concept of decision composite; probabilistic insurance and other challenges to the normative approach; the relationship of decision analysis to classical inference and data analysis procedures; the likelihood and exchangeability principles; inference, decision, and experimentation using conjugate distributions; developing a risk attitude based on general properties; alternative decision aiding practices such as analytic hierarchy and fuzzy approaches. Student presentations on current research. Goal is to prepare doctoral students for research. Prerequisite: 352.

**MSE 355. Influence Diagrams and Probabilistic Networks. 3 Units.**

Network representations for reasoning under uncertainty: influence diagrams, belief networks, and Markov networks. Structuring and assessment of decision problems under uncertainty. Learning from evidence. Conditional independence and requisite information. Node reductions. Belief propagation and revision. Simulation. Linear-quadratic-Gaussian decision models and Kalman filters. Dynamic processes. Bayesian meta-analysis. Prerequisites: 220, 252, or equivalents, or consent of instructor.

**MSE 364. Multi-echelon Inventory Models. 3 Units.**

Theoretical treatment of control problems arising in inventory management, production, and distribution systems. Inventory control for single and multi-location systems. Emphasis is on operating characteristics, performance measures, and optimal operating and control policies. Dynamic programming and applications in inventory control. Prerequisite: STATS 217 or equivalent, linear programming.

**MSE 365. Advanced Models in Operations Management. 3 Units.**

Primarily for doctoral students. Focus on quantitative models dealing with sustainability and related to operations management. Prerequisite: consent of instructor. May be repeated for credit.

**MSE 371. Innovation and Strategic Change. 2-3 Units.**

Doctoral research seminar, limited to Ph.D. students. Current research on innovation strategy. Topics: scientific discovery, innovation search, organizational learning, evolutionary approaches, and incremental and radical change. Topics change yearly. Recommended: course in statistics or research methods.

**MSE 372. Entrepreneurship Doctoral Research Seminar. 1-3 Units.**

Classic and current research on entrepreneurship. Limited enrollment, restricted to PhD students. Prerequisites: SOC 363 or equivalent, and permission of instructor.

**MSE 374. Dynamic Corporate Strategy. 3 Units.**

Restricted to Ph.D. students. Research on the creation and shaping of disruptive industry dynamics and how companies can formulate and implement strategies to excel in such changing environments. Dynamic system model approach; case studies. Prerequisites: 201 or equivalent, 274.

**MSE 375. Research on Entrepreneurship. 3 Units.**

Restricted to Ph.D. students. Organization theory, economics, and strategy perspectives. Limited enrollment. Prerequisites: SOC 360 or equivalent, and consent of instructor.

**MSE 376. Strategy Doctoral Research Seminar. 3 Units.**

Classic and current research on business and corporate strategy. Limited enrollment, restricted to PhD students. Prerequisites: SOC 363 or equivalent, and permission of instructor. Course may be repeated for credit.

**MSE 380. Doctoral Research Seminar in Organizations. 3 Units.**

Limited to Ph.D. students. Topics from current published literature and working papers. Content varies. Prerequisite: consent of instructor.

**MSE 381. Doctoral Research Seminar in Work, Technology, and Organization. 2-3 Units.**

Enrollment limited to Ph.D. students. Topics from current published literature and working papers. Content varies. Prerequisite: consent of instructor.

**MSE 383. Doctoral Seminar on Ethnographic Research. 3 Units.**

For graduate students; upper-level undergraduates with consent of instructor. Ethnosemantic interviewing and participant observation. Techniques for taking, managing, and analyzing field notes and other qualitative data. 15 hours per week outside class collecting and analyzing own data. Methods texts and ethnographies offer examples of how to analyze and communicate ethnographic data. Prerequisite: consent of instructor. (Barley).

**MSE 384. Groups and Teams. 3 Units.**

Research on groups and teams in organizations from the perspective of organizational behavior and social psychology. Topics include group effectiveness, norms, group composition, diversity, conflict, group dynamics, temporal issues in groups, geographically distributed teams, and intergroup relations.

**MSE 389. Seminar on Organizational Theory. 5 Units.**

The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.  
Same as: EDUC 375A, SOC 363A.

**MSE 390. Doctoral Research Seminar in Health Systems Modeling. 1-3 Units.**

Restricted to PhD students, or by consent of instructor. Doctoral research seminar covering current topics in health policy, health systems modeling, and health innovation. May be repeated for credit.

**MSE 391. Doctoral Research Seminar in Energy-Environmental Systems Modeling and Analysis. 1-3 Units.**

Restricted to PhD students, or by consent of instructor. Doctoral research seminar covering current topics in energy and environmental modeling and analysis. Current emphasis on approaches to incorporation of uncertainty and technology dynamics into complex systems models. May be repeated for credit.

**MSE 408. Directed Reading and Research. 1-15 Units.**

Directed study and research on a subject of mutual interest to student and faculty member. Prerequisite: faculty sponsor. (Staff).

**MSE 444. Investment Practice. 3-4 Units.**

Theory of real options, soft derivatives, and related ideas. Problems from financial engineering and risk management. Examples from industry. Small group projects formulate and design solutions to actual industry problems. Enrollment limited to 30. Admission by application.

**MSE 445. Projects in Wealth Management. 3-4 Units.**

Recent theory and standard practice in portfolio design for institutions, individuals, and funds. Student projects and case studies derived from the financial industry.

**MSE 446. Policy and Economics Research Roundtable. 1 Unitss.**

Research in progress or contemplated in policy and economics areas. Emphasis depends on research interests of participants, but is likely to include energy, environment, transportation, or technology policy and analysis. May be repeated for credit.  
Same as: PERR.

**MSE 450. Lessons in Decision Making. 1 Unitss.**

Entrepreneurs, senior management consultants, and executives from Fortune 500 companies share real-world stories and insights from their experience in decision making.

**MSE 452. Decision Analysis Projects: Helping Real Leaders Make Real Decisions. 3 Units.**

A virtual consulting firm directed by professional decision analysts who offer advice and guidance as student teams help local organizations make a current business strategy or public policy decision. Projects for businesses, governments, or other institutions typically include start-up venture funding, R&D portfolio planning, new product or market entry, acquisition or partnering, cost reduction, program design, or regulatory policy decisions. Emphasis is on developing clarity of action and delivering insights to clients. Satisfies MS&E project course requirement. Prerequisite: 252. Recommended: 352.

**MSE 453. Decision Analysis Applications: Business Strategy and Public Policy. 2-3 Units.**

How decision analysis is used to make decisions in organizations. Who applies these methods to what decisions, and when, where, and why. Case studies: entrepreneurial ventures, consulting projects, litigation, chip manufacturing, consumer electronics, Corvette design, blockbuster movies, R&D priorities, real estate portfolios, HIV/HCV drug trial design, cancer diagnostics, Mars contamination, oil E&P, economics and energy pricing, nuclear waste, climate change, marine resources, bioterrorism preparedness, nuclear weapons control, effective interactions, and ethics. Corequisite: MS&E 252 recommended.

**MSE 454. Decision Analysis Seminar. 1 Unitss.**

Current research and related topics presented by doctoral students and invited speakers. May be repeated for credit. Prerequisite: 252.



**MSE 464. Global Project Coordination. 3-4 Units.**

Students engage in projects that are global in nature, and related to the planning, design, and operations of supply chains, marketing, manufacturing, and product development. Project teams from Stanford and an overseas university work on common projects using telephones, faxes, email, Internet, video conferences, and face-to-face meetings. As part of the project, students travel to Hong Kong. Applications due in November. See <http://www.stanford.edu/class/msande464/>.

**MSE 472. Entrepreneurial Thought Leaders' Seminar. 1 Unitss.**

Entrepreneurial leaders share lessons from real-world experiences across entrepreneurial settings. ETL speakers include entrepreneurs, leaders from global technology companies, venture capitalists, and best-selling authors. Half-hour talks followed by half hour of class interaction. Required web discussion. May be repeated for credit.

**MSE 485. Cross-Cultural Design. 3 Units.**

International design research is in high demand, but is difficult, expensive and time consuming. Has technology finally developed enough to allow meaningful cross-cultural design and collaboration without getting on an airplane (or with limited travel)? Focus on using design ethnography to understand users in different national cultures (U.S. and Chile) and leveraging this understanding to inform the design of products. Project-based with teams composed of Stanford University and Universidad Católica (UC) students working concurrently at both locations around a real design opportunity. When exploring the cross-cultural collaboration space, we will address all three areas: technology, design management, and cultural understanding. Will involve travel for a limited subset of the students. Design Institute course: <http://dschool.stanford.edu>.

**MSE 491. Clean Energy Development. 3 Units.**

Clean energy project class for graduate students committed to clean energy and entrepreneurship, strong analytic and communication skills, and serious individual and group work. Teams will conceive, prepare and present business plan for a clean energy project or company. Class sessions devoted to guidance necessary for team projects and outside guest speakers. Grades based on team performance in development and presentation of a business concept, outline and plan. Enrollment limited to 30. Admission by application.

**MSE 802. TGR Dissertation. 0 Unit.**

## Marketing Courses

**MKTG 240. Marketing Management. 3 Units.**

The objectives of this course are to introduce students to the substantive and procedural aspects of marketing management and to sharpen skills for critical analytical thinking and effective communication. Specifically, the goals are to introduce students to marketing strategy and to the elements of marketing analysis: customer analysis, competitor analysis, and company analysis; to familiarize students with the elements of the marketing mix (product strategy, pricing, advertising and promotion, and distribution), and to enhance problem solving and decision-making abilities in these operational areas of marketing; and to provide students with a forum (both written and verbal) for presenting and defending their own recommendations, and for critically examining and discussing the recommendations of others.

**MKTG 249. Sloan: Re-Imagining Marketing: The Power of Stories. 2 Units.**

Marketing as both a discipline and in practice is much broader and more important than ever before in promoting products, services, and brands at the local and global levels. Since all Sloans are experienced managers who wish to enhance their organizational impact, understanding how to tell stories to further business objectives is a high level skill that is critical to their success (and to that of their organizations). The objective of this class is to provide you with perspectives on modern day marketing, and to teach you about the power of focused story telling as a call to action. As such, this 5-week course will be experiential and invites active participation by all students. Course Content: In preparation for this core class you will be assigned some reading to introduce you to core marketing principles; the first week of the class will be a review of the material. Questions to be explored include, What is the importance of marketing? How has marketing changed in the last few years? How do you define a marketing strategy? Then we will do a four-week dive into a more experiential class built around the power of story in business. Guest speakers will share the power of the stories they have created at different parts of the life cycle, which we hope will inspire you to the importance of developing your own compelling stories. You will be assigned to a 4-person group and decide what brand/project you want to work on. You will hone in on a single focused goal, figure out how to "reverse the rules" (i.e., tackle the single focused goal in a way that no one else has done, with a fresh approach) in order to grab attention, then tell a story. At the end of the five weeks, we hope that we will have been successful in helping you better understand the new marketing landscape within our hyperconnected world, and how to leverage the power of technology so that you can be confident that your story has impact and meaning.

**MKTG 335. Product Launch. 3 Units.**

Our focus is on the question, "When launching a product, what are the framing issues that will help determine success?" In particular, we will provide you with tools to analyze market situations and determine whether it makes sense to launch a product or engage in a marketing-related investment. The course is not designed to cover issues such as execution of a strategy (although we will touch on this a bit), but on whether to enter a market to begin with. Thus, the course is decision oriented; we want you to think about market entry decisions and how you would make them. The tools that you will be provided won't consist of equations; instead, we'll arm you with a set of questions to ask, whose answers will help you make better decisions. This course is an advanced applications marketing course. Unlike the base core course that is designed to cover every basic topic in marketing, here we focus on a number of basic questions and explore them in depth. Although we will have some lectures for background, the bulk of this endeavor will be accomplished through case discussions. In other words, we can't and won't cover everything, as this course is not designed to be comprehensive. We are going to rely on your academic background in marketing to cover the basics; here and there, it is possible that some material will be a review of what you've done before (there's nothing wrong with a little de ja vu). Unfortunately, due to the tight schedule we will not be able to cover any of the basics that are not already included in the course material. The course includes, cases, lectures, and guest lectures.

**MKTG 344. Marketing Research. 4 Units.**

This course aims to help students ask interesting and relevant marketing questions, select the appropriate research methodology, and make comprehensive evaluations of the research output. The main objectives are to equip students with 1) a familiarity with marketing research frameworks and terminology, 2) an understanding of both the value and limitations of the most widely-used research techniques, and 3) sufficient hands-on experience with research tools for answering students' own marketing research questions. The course is designed to help managers to use research effectively in addressing substantive marketing problems such as: market segmentation, product targeting and positioning, forecasting market demand, designing promotional campaigns, pricing, and developing new products.

**MKTG 353. Social Brands. 4 Units.**

As savvy consumers are increasingly participating in brands rather than merely receiving their messages, how do leading organizations stoke conversations, co-create experiences and stories, and build engaging relationships with consumers? Moreover, how do they harness social media to build a brand, and empower employees and consumers to share these brand stories with others? Social Brands is a hands-on, project-based course that will draw brain power from the GSB, School of Engineering, and other Stanford graduate programs to collaboratively and creatively explore these questions. While we examine various inspiring examples of social brands, we will find that the rules are yet to be written. This emerging genre of social commerce and marketing is the "Wild West" and students working in mixed teams will be challenged to design and launch their own social experiments to form their own hypotheses. Assignments will push student teams to audit a brand, focus on a strategic goal, and design a social interaction that invites people on campus to participate in an extraordinary personal experience with that brand. Teams will then capture this experience in short videos and compile them into a story -- one that highlights the brand experience they orchestrated, its impact, and their key learnings. This course will integrate approaches from the d.school and marketing curriculum - including brand strategy, storytelling fundamentals, human-centered methods, rapid prototyping, and a bias toward action. This is a class for those that want to learn by doing and creating. MKTG 353 - Social Brands class website: <http://www.stanford.edu/class/mktg353/>.

**MKTG 355. Designing Happiness. 4 Units.**

We assume happiness is stable, an endpoint to achieve or goal to chase. It's not. What we think drives our happiness often doesn't. So what does? And how can knowing this help us create strong companies and brands? Understanding happiness is crucial to building successful relationships, products, and organizations. Yet recent research suggests that our definition of happiness is often confused and misguided. In this class, we explore new data on happiness, focusing on: re-thinking happiness (a happy you) designing happiness (a happy company) spreading happiness (a happy brand) Students will work together to use an iterative design-thinking approach to understand our own definitions of happiness, uncover what really makes us happy (vs. what we think makes us happy), prototype solutions/products to increase our happiness, and design happy companies and brands. The class will be data-driven, drawing on multiple methodologies both quantitative and ethnographic. Throughout the quarter, students will build a class-wide database to investigate real-world happiness data via an Designing Happiness app, and test hypotheses about what truly makes them, their teams and their customers happy. This class is recommended for students who plan to be a future entrepreneur building a strong brand, an employee who finds meaning in their work, or someone who wants to understand happiness.

**MKTG 365. Marketing Analytics. 4 Units.**

Firms operate in an increasingly challenging business environment, with greater competition, more informed customers and rapidly changing market trends. Simultaneously, they also have access to more information about their customers, the marketplace and their competitors than ever before. In this environment, knowing how to use this information to make optimal business decisions is a crucial competitive advantage. Firms often have access to data that they do not know how to use. The objectives of this course are to introduce students to state-of-the-art marketing analytics and to teach them how to practically apply these analytics to real-world business decisions. The following are examples of the types of questions that the course will address: How should a firm determine the prices for its products and services? What is the effect of television advertising on a brand's sales and how should advertising be optimized? What can a firm learn about its customers from online browsing behavior and how can this knowledge be used for targeted advertising and promotions? How should a firm allocate its sales force? How should a firm manage the allocation of its promotional budget in order to maximize its returns? How should the mailing of catalogs or direct mail be targeted to increase response rates? The course will use a mix of lectures, cases, homework assignments and a course project to learn the material. Students do not need to have an advanced statistical background to take this course. Familiarity with the material in an introductory marketing course and an introductory statistics course will be assumed, but necessary material will be reviewed during the course of the quarter as necessary.

**MKTG 375. Consumer Behavior. 4 Units.**

Contemporary approaches to marketing emphasize the importance of adopting a consumer focus, from determining consumers' wants and needs to shaping their attitudes and ensuring their loyalty. This course provides insight into consumer psychology and the means by which consumer behavior can be influenced or altered. The course has both theoretical and practical objectives in that it will: (1) explore theory and research that is relevant to understanding consumer psychology and behavior, and (2) apply these theories and findings to generate ideas for developing effective marketing techniques and tactics. By shedding light on the psychological underpinnings of consumers' thoughts, attitudes, preferences, needs, and decision-making styles, this course will help students make more insightful and effective marketing decisions. Moreover, because this course takes a broad psychological perspective, it highlights novel ideas for grabbing attention, shaping behavior, and changing people's minds both within and outside of traditional marketing contexts.

**MKTG 526. Marketing Research for Entrepreneurs. 2 Units.**

An entrepreneur looking to fund a new venture is very likely to be asked the following questions: 1) What is your unique value proposition? 2) What is the size of your market opportunity? 3) What is your cost of customer acquisition? 4) What is your rate of customer retention? 5) How well are you performing against your success metrics? In this two-unit course, students will work through a well-structured and disciplined process for discovering the answers to these questions. Our focus will be on market research methods that can be put into practice with the typically limited amount of resources available to entrepreneurs.

**MKTG 532. Persuasion. 1 Unitss.**

The aim of this course is to provide insight into the psychology of persuasion. We will hear from industry experts to discover what they believe makes for an effective persuasive appeal (e.g., a successful pitch to investors), and we will supplement those sessions with class discussions about persuasion theory and research. The goal is provide you with deep and diverse insight into persuasion strategy. Over the course of the week, we will have speakers from a number of fields - giving us a broad perspective on persuasion, what constitutes (or qualifies as) persuasion, and what makes a particular persuasive message or strategy successful.

**MKTG 536. Entrepreneurial Ventures in Luxury Markets. 2 Units.**

The broad goal of this Bass Seminar is to apply the key concepts covered in *The Frinky Science of the Human Mind* (GSBGEN 520)\* for identifying and proposing new ventures in the "luxury" space. For this course, "luxury" will be viewed in a broader than usual fashion, namely creating distinctive differences to fundamentally change an otherwise mundane product category. An example of such a view will be the venture, Mr., an upscale barbershop in San Francisco, started by two GSB alums, Kumi Walker and Sean Heywood. Another example will be Voss, an upscale brand in the bottled water category. Students in this course will work in groups to identify promising opportunities in the "luxury" space early in the quarter. The groups will then hone their new venture ideas through meetings with entrepreneurs, experts in private equity, product design, etc., who will serve as guest speakers in this course. In this regard, each session will be structured to begin with a guest speaker followed by a brainstorming/discussion session. The final deliverable will be a business plan that is put together by each group for a new venture in the "luxury" space. \*Students who could not take GSBGEN 520 are strongly encouraged to attend preparatory sessions that will be scheduled in the first week of December. Such students may also contact the instructor (shiv\_baba@gsb.stanford.edu) to see if they can sit in on some of the GSBGEN 520 sessions that will be relevant for this Bass Seminar.

**MKTG 547. Strategic Marketing Communication - Compressed. 2 Units.**

The course is designed to sharpen students' grasp of the strategic and tactical aspects of Marketing Communications that lead to competitive advantages in the marketplace. The course will begin a focus on strategy and introduce students to frameworks that address two broad goals of any firm: (1) Establish a competitive advantage by offering a superior customer value proposition and (2) Generate sustainable organic growth. The course will then segue into marketing communication tactics that will enable the firm effectively accomplish its strategic objectives. Here, the concepts and frameworks will only be applicable to traditional approaches (such as the use of television, print, and point-of-purchase promotions) but also to emergent approaches (such as the use of the internet, mobile media, etc.). Designed from the perspective of executives who are often involved in making strategic as well as tactical marketing decisions to solve contemporary business problems, this course is intended for students whose career plans include consulting and entrepreneurial ventures, apart from those thinking of careers in marketing.

**MKTG 555. Designing Happiness. 2 Units.**

We assume happiness is stable, an endpoint to achieve or a goal to "chase." It's not. Recent research suggests that the meaning of happiness changes every 3-4 years. Understanding happiness is crucial to building successful products, organizations and relationships. In this MBA seminar, we explore the data-driven research on happiness, revealing insights about (a) anticipating, (b) understanding, (c) visualizing, (d) spreading, (e) remembering, and (f) creating happiness. Students will work together to use an iterative design-thinking approach to understand our own current definition of happiness, uncover what really makes us happy (vs. what we think makes us happy), prototype solutions/products to increase our present happiness, and develop tools to continually understand and foster happiness as our lives change. The seminar will be data-driven, drawing on multiple methodologies including blogs (<http://www.wefeelfine.org/>), experiments and surveys.

**MKTG 641. Behavioral Research in Marketing I. 3 Units.**

This course prepares the student to do empirical behavioral research. It will cover all aspects of the research process, from hypothesis generation to experimental design to data analysis to writing up your results.

**MKTG 642. Behavioral Research in Marketing II: Consumer Behavior. 3 Units.**

This Ph.D. seminar provides coverage of the major research carried out in consumer research both in marketing and psychology. A vast set of topic will be covered including conscious and non-conscious consumer goals, motivations, emotions, attention and perception and consumer decision processes. The course will help students hone their ability to conceptualize, operationalize, and develop research idea and will provide a grasp of what it takes to be a successful academic in the field of consumer behavior.

**MKTG 644. Quantitative Research in Marketing. 3 Units.**

The goal of this seminar is to familiarize students with the quantitative marketing literature and develop the process of generating research ideas and topics. Sessions will involve a mix of: i) a discussion of papers in a particular area in quantitative marketing; and/or ii) a discussion of students' research ideas with respect to topics. The format will mix student presentations of papers with lectures by the instructor(s). When discussing papers in the literature, the focus will be on the topic and research question and not the methodological approach. When discussing research ideas, students should be able to articulate why their question is interesting, where it fits in the literature and how they would address their question.

**MKTG 645. Empirical Analysis of Dynamic Decision Contexts. 3 Units.**

This course will focus on empirical tools for analyzing dynamic decision contexts, wherein current actions of firms or consumers have effects on future payoffs, profits and/or competitive conduct. The course will build the relevant material generally, but our applications will be mostly focused on empirical marketing and industrial organization problems. We will have an applied focus overall, emphasizing the practical aspects of implementation, especially programming. The overall aim of the class is to help students obtain the skills to implement these methods in their research. By the end of the class, students are expected to be able to formulate a dynamic decision problem, program it in a language such as Matlab or C, and to estimate the model from data. The course starts with an overview of consumer theory and static models of consumer choice. We build on this material and introduce discrete choice markovian decision problems, and continuous markovian decision problems, and focus on building the computational toolkit for the numerical analysis of these problems. We then move on to specific applications, and discuss multi-agent dynamic equilibrium models. Finally, we discuss recently proposed advanced methods for alleviating computational burden in dynamic models.

**MKTG 646. Bayesian Inference: Methods and Applications. 3 Units.**

The course aims to develop a thorough understanding of Bayesian inference, with a special focus on empirical applications in marketing. The course will start with a brief theoretical foundation to Bayesian inference and will subsequently focus on empirical methods. Initial topics would include Bayesian linear regression, multivariate regression, importance sampling and its applications. Subsequently, the course will focus on Markov Chain Monte Carlo (MCMC) methods including the Gibbs Sampler and the Metropolis-Hastings algorithm and their applications. The overall focus of the course will be on applying these methods for empirical research using a programming language such as R.

**MKTG 661. Attitudes and Persuasion. 3 Units.**

This course will provide an overview of recent research on attitudes and persuasion. Content will include broad coverage of the issues of major importance to attitude theory, but will focus on more recent issues and controversies that have captured the interest of researchers in the field. The class will cover research areas such as attitude change, persuasion, and resistance processes; implicit versus explicit attitudes; attitude certainty; cognitive versus affective influences; dissonance and attitudinal ambivalence; selective exposure and biased processing; metacognition; and others. Students who take this course will become familiar with research methods and major issues in attitudes research and will have a better understanding of how individuals form, maintain, and change their evaluations. Throughout the course, students will be encouraged to critique existing research and formulate new research ideas.

**MKTG 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, HRMGT 691, MGTECON 691, OB 691, OIT 691, POLECON 691, STRAMGT 691.

**MKTG 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, HRMGT 692, MGTECON 692, OB 692, OIT 692, POLECON 692, STRAMGT 692.

**MKTG 695. Directed Research. 0 Unit.**

This course is designed to prepare new marketing PhD students for conducting rigorous, independent research. In this course, the student will work closely with a faculty member in collaborative research activities and will become familiar with various aspects of the research process, including developing hypotheses, designing and conducting experiments and/or analyses, and reporting results.

**MKTG 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, HRMGT 802, MGTECON 802, OB 802, OIT 802, POLECON 802, STRAMGT 802.

## Materials Science Engineer Courses

**MATSCI 10SC. Diamonds from Peanut Butter: Material Technologies and Human History. 2 Units.**

Technological importance of materials in history is captured in names: the Stone Age, Bronze Age, Iron Age, and now the Information Age or the Silicon Age. How materials have played, and continue to play, pivotal roles in the development of new technologies.

**MATSCI 11SC. Energy Technologies for a Sustainable Future. 2 Units.**

Wondering what the buzz is about sustainability, renewable energy, and clean fuels? Meeting the world's growing energy needs in a sustainable fashion is one of the most pressing problems of our time. This class will introduce the scope of the energy problem and define some of the options for sustainable energy. We will look into the scientific basis of sustainable energy technologies, such as solar cells, which convert the energy of the sun directly into electricity, and fuel cells, which convert chemical energy directly into electricity. Other topics will include biofuels, i.e., fuel derived from plant matter, and clean fuels such as hydrogen. The course will emphasize the fundamental science behind the devices and highlight some of the cutting-edge technological issues that are currently being explored. Assigned reading will include books on global energy issues as well as technical reading on the science and engineering of sustainable energy technologies. We will visit several local energy-technology companies, and students will have hands-on lab experience with solar cells, fuel cells, and generators. Students are expected to participate in classroom discussions, attend field trips, carry out laboratory experiments, and complete homework assignments, including a term paper.

**MATSCI 81N. Bioengineering Materials to Heal the Body. 3 Units.**

Preference to freshmen. How scientists and engineers are designing new materials for surgeon to use in replacing body parts such as heart tissue or the spinal cord. How cells, in the body and transplanted stem cells, communicate with implanted materials. Real-world examples of materials developed for tissue engineering and regenerative medicine therapies. Students identify a clinically important disease or injury that requires a better material, research approaches to the problem, and debate possible engineering solutions.

**MATSCI 82N. Science of the Impossible. 3 Units.**

Imagine a world where cancer is cured with light, objects can be made invisible, and teleportation is allowed through space and time. The future once envisioned by science fiction writers is now becoming a reality, thanks to advances in materials science and engineering. This seminar will explore `impossible` technologies - those that have shaped our past and those that promise to revolutionize the future. Attention will be given to both the science and the societal impact of these technologies. We will begin by investigating breakthroughs from the 20th century that seemed impossible in the early 1900s, such as the invention of integrated circuits and the discovery of chemotherapy. We will then discuss the scientific breakthroughs that enabled modern `impossible` science, such as photodynamic cancer therapeutics, invisibility, and mind-reading through advanced brain imaging. Lastly, we will explore technologies currently perceived as completely impossible and brainstorm the breakthroughs needed to make such science fiction a reality. The course will include introductory lectures and in-depth conversations based on readings. Students will also be given the opportunity to lead class discussions on a relevant `impossible science` topic of their choosing.

**MATSCI 100. Undergraduate Independent Study. 1-3 Units.**

Independent study in materials science under supervision of a faculty member.

**MATSCI 150. Undergraduate Research. 3-6 Units.**

Participation in a research project.

**MATSCI 151. Microstructure and Mechanical Properties. 3-4 Units.**

Primarily for students without a materials background. Mechanical properties and their dependence on microstructure in a range of engineering materials. Elementary deformation and fracture concepts, strengthening and toughening strategies in metals and ceramics. Topics: dislocation theory, mechanisms of hardening and toughening, fracture, fatigue, and high-temperature creep. Prerequisite: ENGR 50 or equivalent.

Same as: MATSCI 251.

**MATSCI 152. Electronic Materials Engineering. 4 Units.**

Materials science and engineering for electronic device applications. Kinetic molecular theory and thermally activated processes; band structure and electrical conductivity of metals and semiconductors; intrinsic and extrinsic semiconductors; diffusion; elementary p-n junction theory; operating principles of metal-oxide-semiconductor field effect transistors. Semiconductor processing including crystal growth, oxidation kinetics, ion implantation, thin film deposition, etching, and photolithography. Prerequisite: ENGR 50 or equivalent.

**MATSCI 153. Nanostructure and Characterization. 4 Units.**

The structure of materials at the nanoscale is in most cases the same crystalline form as the natural phase. Structures of materials such as semiconductors, ceramics, metals, and nanotubes; classification of these materials according to the principles of crystallography. Primary methods of structural characterization, X-ray diffraction, and electron microscopy; their applications to study such nanostructures.

**MATSCI 154. Thermodynamics of Energy Conversions at the Nanoscale. 4 Units.**

The principles of thermodynamics applied to the conversion of energy between light, heat, electricity, and chemical bonds. Modifications to thermodynamic phenomena, such as phase equilibria, when the material dimension approaches the nanometer length scale.

**MATSCI 155. Nanomaterials Synthesis. 4 Units.**

The science of synthesis of nanometer scale materials. Examples including solution phase synthesis of nanoparticles, the vapor-liquid-solid approach to growing nanowires, formation of mesoporous materials from block-copolymer solutions, and formation of photonic crystals. Relationship of the synthesis phenomena to the materials science driving forces and kinetic mechanisms. Materials science concepts including capillarity, Gibbs free energy, phase diagrams, and driving forces.

**MATSCI 156. Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution. 3-4 Units.**

Operating principles and applications of emerging technological solutions to the energy demands of the world. The scale of global energy usage and requirements for possible solutions. Basic physics and chemistry of solar cells, fuel cells, and batteries. Performance issues, including economics, from the ideal device to the installed system. The promise of materials research for providing next generation solutions.

Same as: MATSCI 256.

**MATSCI 157. Quantum Mechanics of Nanoscale Materials. 4 Units.**

Introduction to quantum mechanics and its application to the properties of materials. No prior background beyond a working knowledge of calculus and high school physics is presumed. Topics include: The Schrodinger equation and applications to understanding of the properties of quantum dots, semiconductor heterostructures, nanowires, and bulk solids. Tunneling processes and applications to nanoscale devices; the scanning tunneling microscope, and quantum cascade lasers. Simple models for the electronic properties and band structure of materials including semiconductors, insulators and metals and applications to semiconductor devices. Time-dependent perturbation theory and interaction of light with materials with applications to laser technology.

**MATSCI 159Q. Japanese Companies and Japanese Society. 3 Units.**

Preference to sophomores. The structure of a Japanese company from the point of view of Japanese society. Visiting researchers from Japanese companies give presentations on their research enterprise. The Japanese research ethic. The home campus equivalent of a Kyoto SCTI course.

Same as: ENGR 159Q.

**MATSCI 160. Nanomaterials Laboratory. 4 Units.**

Preference to sophomores and juniors. Hands-on approach to synthesis and characterization of nanoscale materials. How to make, pattern, and analyze the latest nanotech materials, including nanoparticles, nanowires, and self-assembled monolayers. Techniques such as soft lithography, self-assembly, and surface functionalization. The VLS mechanism of nanowire growth, nanoparticle size control, self-assembly mechanisms, and surface energy considerations. Laboratory projects. Enrollment limited to 24.

**MATSCI 161. Nanocharacterization Laboratory. 3-4 Units.**

Nanocharacterization techniques, such as: optical and electron microscopy, x-ray photoelectron spectroscopy and atomic force microscopy, will be explained in class and used in lab to determine structure of materials and understand why they have certain properties. This WIM class includes instruction on writing, statistics, generating effective plots with curve fits, using databases to find information and giving oral scientific presentations. Prerequisite: ENGR 50 or equivalent. (75 min. lecture + 3 hr. lab most weeks.)

Same as: MATSCI 171.

**MATSCI 162. X-Ray Diffraction Laboratory. 3-4 Units.**

Experimental x-ray diffraction techniques for microstructural analysis of materials, emphasizing powder and single-crystal techniques. Diffraction from epitaxial and polycrystalline thin films, multilayers, and amorphous materials using medium and high resolution configurations. Determination of phase purity, crystallinity, relaxation, stress, and texture in the materials. Advanced experimental x-ray diffraction techniques: reciprocal lattice mapping, reflectivity, and grazing incidence diffraction. Enrollment limited to 20.

Same as: MATSCI 172.

**MATSCI 163. Mechanical Behavior Laboratory. 3-4 Units.**

Experimental techniques for the study of the mechanical behavior of engineering materials in bulk and thin film form, including tension testing, nanoindentation, and wafer curvature stress analysis. Metallic and polymeric systems. Prerequisite: ENGR 50.

Same as: MATSCI 173.

**MATSCI 164. Electronic and Photonic Materials and Devices Laboratory. 4 Units.**

Lab course. Current electronic and photonic materials and devices. Device physics and micro-fabrication techniques. Students design, fabricate, and perform physical characterization on the devices they have fabricated. Established techniques and materials such as photolithography, metal evaporation, and Si technology; and novel ones such as soft lithography and organic semiconductors. Prerequisite: 152 or 199 or consent of instructor.

**MATSCI 165. Nanoscale Materials Physics Computation Laboratory. 3-4 Units.**

Computational exploration of fundamental topics in materials science using Java-based computation and visualization tools. Emphasis is on the atomic-scale origins of macroscopic materials phenomena. Simulation methods include molecular dynamics and Monte Carlo with applications in thermodynamics, kinetics, and topics in statistical mechanics. Required prerequisites: Freshman-level physics, undergraduate thermodynamics. Same as: MATSCI 175.

**MATSCI 171. Nanocharacterization Laboratory. 3-4 Units.**

Nanocharacterization techniques, such as: optical and electron microscopy, x-ray photoelectron spectroscopy and atomic force microscopy, will be explained in class and used in lab to determine structure of materials and understand why they have certain properties. This WIM class includes instruction on writing, statistics, generating effective plots with curve fits, using databases to find information and giving oral scientific presentations. Prerequisite: ENGR 50 or equivalent. (75 min. lecture + 3 hr. lab most weeks.)

Same as: MATSCI 161.

**MATSCI 172. X-Ray Diffraction Laboratory. 3-4 Units.**

Experimental x-ray diffraction techniques for microstructural analysis of materials, emphasizing powder and single-crystal techniques. Diffraction from epitaxial and polycrystalline thin films, multilayers, and amorphous materials using medium and high resolution configurations. Determination of phase purity, crystallinity, relaxation, stress, and texture in the materials. Advanced experimental x-ray diffraction techniques: reciprocal lattice mapping, reflectivity, and grazing incidence diffraction. Enrollment limited to 20.

Same as: MATSCI 162.

**MATSCI 173. Mechanical Behavior Laboratory. 3-4 Units.**

Experimental techniques for the study of the mechanical behavior of engineering materials in bulk and thin film form, including tension testing, nanoindentation, and wafer curvature stress analysis. Metallic and polymeric systems. Prerequisite: ENGR 50.

Same as: MATSCI 163.

**MATSCI 175. Nanoscale Materials Physics Computation Laboratory. 3-4 Units.**

Computational exploration of fundamental topics in materials science using Java-based computation and visualization tools. Emphasis is on the atomic-scale origins of macroscopic materials phenomena. Simulation methods include molecular dynamics and Monte Carlo with applications in thermodynamics, kinetics, and topics in statistical mechanics. Required prerequisites: Freshman-level physics, undergraduate thermodynamics. Same as: MATSCI 165.

**MATSCI 190. Organic and Biological Materials. 3-4 Units.**

Unique physical and chemical properties of organic materials and their uses. The relationship between structure and physical properties, and techniques to determine chemical structure and molecular ordering. Examples include liquid crystals, dendrimers, carbon nanotubes, hydrogels, and biopolymers such as lipids, protein, and DNA. Prerequisite: Thermodynamics and ENGR 50 or equivalent. Same as: MATSCI 210.

**MATSCI 192. Materials Chemistry. 3-4 Units.**

Chemical principles of materials: atomic and molecular bonding; acid and base chemistry; redox and electrochemistry; colloidal and surface chemistry; materials synthesis; and nanoscale chemistry. Same as: MATSCI 202.

**MATSCI 193. Atomic Arrangements in Solids. 3-4 Units.**

Atomic arrangements in perfect and imperfect solids, especially important metals, ceramics, and semiconductors. Elements of formal crystallography, including development of point groups and space groups. Same as: MATSCI 203.

**MATSCI 194. Thermodynamics and Phase Equilibria. 3-4 Units.**

The principles of heterogeneous equilibria and their application to phase diagrams. Thermodynamics of solutions; chemical reactions; non-stoichiometry in compounds; first order phase transitions and metastability; thermodynamics of surfaces, elastic solids, dielectrics, and magnetic solids. Same as: MATSCI 204.

**MATSCI 195. Waves and Diffraction in Solids. 3-4 Units.**

The elementary principals of x-ray, vibrational, and electron waves in solids. Basic wave behavior including Fourier analysis, interference, diffraction, and polarization. Examples of wave systems, including electromagnetic waves from Maxwell's equations. Diffracted intensity in reciprocal space and experimental techniques such as electron and x-ray diffraction. Lattice vibrations in solids, including vibrational modes, dispersion relationship, density of states, and thermal properties. Free electron model. Basic quantum mechanics and statistical mechanics including Fermi-Dirac and Bose-Einstein statistics. Prerequisite: 193/203 or consent of instructor. Same as: MATSCI 205.

**MATSCI 196. Imperfections in Solids. 3-4 Units.**

Atomic and molecular scale defects and their importance to the physical and mechanical properties of bulk and nanoscale materials. Point defects and dislocations in crystals. Imperfections in amorphous solids. Structure and properties of interfaces. Prerequisite: 193/203. Same as: MATSCI 206.

**MATSCI 197. Rate Processes in Materials. 3-4 Units.**

Diffusion and phase transformations in solids. Diffusion topics: Fick's laws, atomic theory of diffusion, and diffusion in alloys. Phase transformation topics: nucleation, growth, diffusional transformations, spinodal decomposition, and interface phenomena. Material builds on the mathematical, thermodynamic, and statistical mechanical foundations in the prerequisites. Prerequisites: 194/204. Same as: MATSCI 207.

**MATSCI 198. Mechanical Properties of Materials. 3-4 Units.**

Introduction to the mechanical behavior of solids, emphasizing the relationships between microstructure and mechanical properties. Elastic, anelastic, and plastic properties of materials. The relations between stress, strain, strain rate, and temperature for plastically deformable solids. Application of dislocation theory to strengthening mechanisms in crystalline solids. The phenomena of creep, fracture, and fatigue and their controlling mechanisms. Prerequisites: 193/203. Same as: MATSCI 208.

**MATSCI 199. Electronic and Optical Properties of Solids. 3-4 Units.**

The concepts of electronic energy bands and transports applied to metals, semiconductors, and insulators. The behavior of electronic and optical devices including p-n junctions, MOS-capacitors, MOSFETs, optical waveguides, quantum-well lasers, light amplifiers, and metallo-dielectric light guides. Emphasis is on relationships between structure and physical properties. Elementary quantum and statistical mechanics concepts are used. Prerequisite: 195/205 or equivalent. Same as: MATSCI 209.

**MATSCI 200. Master's Research. 1-15 Units.**

Participation in a research project.

**MATSCI 202. Materials Chemistry. 3-4 Units.**

Chemical principles of materials: atomic and molecular bonding; acid and base chemistry; redox and electrochemistry; colloidal and surface chemistry; materials synthesis; and nanoscale chemistry. Same as: MATSCI 192.

**MATSCI 203. Atomic Arrangements in Solids. 3-4 Units.**

Atomic arrangements in perfect and imperfect solids, especially important metals, ceramics, and semiconductors. Elements of formal crystallography, including development of point groups and space groups. Same as: MATSCI 193.

**MATSCI 204. Thermodynamics and Phase Equilibria. 3-4 Units.**

The principles of heterogeneous equilibria and their application to phase diagrams. Thermodynamics of solutions; chemical reactions; non-stoichiometry in compounds; first order phase transitions and metastability; thermodynamics of surfaces, elastic solids, dielectrics, and magnetic solids. Same as: MATSCI 194.

**MATSCI 205. Waves and Diffraction in Solids. 3-4 Units.**

The elementary principals of x-ray, vibrational, and electron waves in solids. Basic wave behavior including Fourier analysis, interference, diffraction, and polarization. Examples of wave systems, including electromagnetic waves from Maxwell's equations. Diffracted intensity in reciprocal space and experimental techniques such as electron and x-ray diffraction. Lattice vibrations in solids, including vibrational modes, dispersion relationship, density of states, and thermal properties. Free electron model. Basic quantum mechanics and statistical mechanics including Fermi-Dirac and Bose-Einstein statistics. Prerequisite: 193/203 or consent of instructor. Same as: MATSCI 195.

**MATSCI 206. Imperfections in Solids. 3-4 Units.**

Atomic and molecular scale defects and their importance to the physical and mechanical properties of bulk and nanoscale materials. Point defects and dislocations in crystals. Imperfections in amorphous solids. Structure and properties of interfaces. Prerequisite: 193/203. Same as: MATSCI 196.

**MATSCI 207. Rate Processes in Materials. 3-4 Units.**

Diffusion and phase transformations in solids. Diffusion topics: Fick's laws, atomic theory of diffusion, and diffusion in alloys. Phase transformation topics: nucleation, growth, diffusional transformations, spinodal decomposition, and interface phenomena. Material builds on the mathematical, thermodynamic, and statistical mechanical foundations in the prerequisites. Prerequisites: 194/204. Same as: MATSCI 197.

**MATSCI 208. Mechanical Properties of Materials. 3-4 Units.**

Introduction to the mechanical behavior of solids, emphasizing the relationships between microstructure and mechanical properties. Elastic, anelastic, and plastic properties of materials. The relations between stress, strain, strain rate, and temperature for plastically deformable solids. Application of dislocation theory to strengthening mechanisms in crystalline solids. The phenomena of creep, fracture, and fatigue and their controlling mechanisms. Prerequisites: 193/203.

Same as: MATSCI 198.

**MATSCI 209. Electronic and Optical Properties of Solids. 3-4 Units.**

The concepts of electronic energy bands and transports applied to metals, semiconductors, and insulators. The behavior of electronic and optical devices including p-n junctions, MOS-capacitors, MOSFETs, optical waveguides, quantum-well lasers, light amplifiers, and metallo-dielectric light guides. Emphasis is on relationships between structure and physical properties. Elementary quantum and statistical mechanics concepts are used. Prerequisite: 195/205 or equivalent.

Same as: MATSCI 199.

**MATSCI 210. Organic and Biological Materials. 3-4 Units.**

Unique physical and chemical properties of organic materials and their uses. The relationship between structure and physical properties, and techniques to determine chemical structure and molecular ordering. Examples include liquid crystals, dendrimers, carbon nanotubes, hydrogels, and biopolymers such as lipids, protein, and DNA. Prerequisite: Thermodynamics and ENGR 50 or equivalent.

Same as: MATSCI 190.

**MATSCI 230. Materials Science Colloquium. 1 Unitss.**

May be repeated for credit.

**MATSCI 251. Microstructure and Mechanical Properties. 3-4 Units.**

Primarily for students without a materials background. Mechanical properties and their dependence on microstructure in a range of engineering materials. Elementary deformation and fracture concepts, strengthening and toughening strategies in metals and ceramics. Topics: dislocation theory, mechanisms of hardening and toughening, fracture, fatigue, and high-temperature creep. Prerequisite: ENGR 50 or equivalent.

Same as: MATSCI 151.

**MATSCI 256. Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution. 3-4 Units.**

Operating principles and applications of emerging technological solutions to the energy demands of the world. The scale of global energy usage and requirements for possible solutions. Basic physics and chemistry of solar cells, fuel cells, and batteries. Performance issues, including economics, from the ideal device to the installed system. The promise of materials research for providing next generation solutions.

Same as: MATSCI 156.

**MATSCI 299. Practical Training. 3 Units.**

Educational opportunities in high-technology research and development labs in industry. Qualified graduate students engage in internship work and integrate that work into their academic program. Following the internship, students complete a research report outlining their work activity, problems investigated, key results, and any follow-on projects they expect to perform. Student is responsible for arranging own employment. See department student services manager before enrolling.

**MATSCI 300. Ph.D. Research. 1-15 Units.**

Participation in a research project.

**MATSCI 302. Solar Cells. 3 Units.**

Theory of conventional pn junction and excitonic solar cells. Design, fabrication and characterization of crystalline silicon, CdTe, CIGS, tandem and organic solar cells. The device simulator PC1D is used to predict the performance of solar cells with various designs, recombination lifetime and surface recombination rates. The materials science aspects of solar cells research is emphasized, but module design and economic hurdles that must be overcome for solar cell technology to generate a significant fraction of the world's electricity are also addressed.

**MATSCI 303. Principles, Materials and Devices of Batteries. 3 Units.**

Thermodynamics and electrochemistry for batteries. Emphasis on lithium ion batteries, but also different types including lead acid, nickel metal hydride, metal air, sodium sulfur and redox flow. Battery electrode materials, electrolytes, separators, additives and electrode-electrolyte interface. Electrochemical techniques; advanced battery materials with nanotechnology; battery device structure. Prerequisites: undergraduate chemistry.

**MATSCI 307. Green's Function Methods in Engineering. 3 Units.**

The concept of Green's Functions used to recast ordinary and partial dislocations as integral equations with built-in boundary conditions will be developed, including the inclusion of modified Green's Functions, where appropriate. Applications to the solutions of ODE's and elliptic, hyperbolic, and parabolic partial differential equations will be studied, including Laplace's equation, the wave and reduced wave equation, the diffusion/heat conduction equation, and the equations of motion of linear elastic theory. The course will be self-contained, so that a working knowledge of simple ODE's and the separation of variables method is the only prerequisite. Class notes will be provided.

Same as: ME 307.

**MATSCI 311. Lasers in Materials Processing. 3 Units.**

Principles of laser operation. Optically and electrically pumped lasers. Materials for solid-state lasers. Fundamentals of laser/materials interactions. Applications in thin film technology and microfabrication; laser annealing of defects and crystallization of amorphous films. Laser-induced shock waves. Extreme non-equilibrium laser processing; ultra-fast (femtosecond) lasers and their novel uses; micro- and nanofabrication of fluidic and photonic devices; intracellular nano-surgery.

**MATSCI 312. New Methods in Thin Film Synthesis. 3 Units.**

Materials base for engineering new classes of coatings and devices. Techniques to grow thin films at atomic scale and to fabricate multilayers/superlattices at nanoscale. Vacuum growth techniques including evaporation, molecular beam epitaxy (MBE), sputtering, ion beam assisted deposition, laser ablation, chemical vapor deposition (CVD), and electroplating. Future direction of material synthesis such as nanocluster deposition and nanoparticles self-assembly. Relationships between deposition parameters and film properties. Applications of thin film synthesis in microelectronics, nanotechnology, and biology. SCPD offering.

**MATSCI 316. Nanoscale Science, Engineering, and Technology. 3 Units.**

Sample application areas: renewable energy including nanoscaled photovoltaic cells, hydrogen storage, fuel cells, and nanoelectronics. Nanofabrication techniques including: self-assembly of amphiphilic molecules, block copolymers, organic-inorganic mesostructures, colloidal crystals, organic monolayers, proteins, DNA and abalone shells; biologically inspired growth of materials; photolithography, electron beam lithography, and scanning probe lithography; and synthesis of carbon nanotubes, nanowire, and nanocrystals. Other nanotechnology topics may be explored through a group project. SCPD offering.

**MATSCI 321. Transmission Electron Microscopy. 3 Units.**

Image formation and interpretation. The contrast phenomena associated with perfect and imperfect crystals from a physical point of view and from a formal treatment of electron diffraction theory. The importance of electron diffraction to systematic analysis and recent imaging developments. Recommended: 193/203, 195/205, or equivalent.

**MATSCI 322. Transmission Electron Microscopy Laboratory. 3 Units.**

Experimental application of electron microscopy to typical materials science studies. Topics include microscope operation and alignment, diffraction modes and analysis, bright-field/dark-field analysis of defects, high resolution imaging, and analytical techniques for compositional analysis (EDAX). Enrollment limited to 12. Prerequisites: 321, consent of instructor.

**MATSCI 323. Thin Film and Interface Microanalysis. 3 Units.**

The science and technology of microanalytical techniques, including Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), secondary ion mass spectroscopy (SIMS), ion scattering spectroscopy (ISS), and x-ray photoelectron spectroscopy (XPS or ESCA). Generic processes such as sputtering and high-vacuum generation. Prerequisite: some prior exposure to atomic and electronic structure of solids. SCPD offering.

**MATSCI 325. X-Ray Diffraction. 3 Units.**

Diffraction theory and its relationship to structural determination in solids. Focus is on applications of x-rays; concepts can be applied to neutron and electron diffraction. Topics: Fourier analysis, kinematic theory, Patterson functions, diffraction from layered and amorphous materials, single crystal diffraction, dynamic theory, defect determination, surface diffraction, techniques for data analysis, and determination of particle size and strain. Prerequisites: 193/203, 195/205.

**MATSCI 331. Atom-based computational methods for materials. 3 Units.**

Introduction to atom-based computational methods for materials with emphasis on quantum methods. Topics include density functional theory, tight-binding and empirical approaches. Computation of optical, electronic, phonon properties. Bulk materials, interfaces, nanostructures. Molecular dynamics. Prerequisites - undergraduate quantum mechanics.

**MATSCI 343. Organic Semiconductors for Electronics and Photonics. 3 Units.**

The science of organic semiconductors and their use in electronic and photonic devices. Topics: methods for fabricating thin films and devices; relationship between chemical structure and molecular packing on properties such as band gap, charge carrier mobility and luminescence efficiency; doping; field-effect transistors; light-emitting diodes; lasers; biosensors; photodetectors and photovoltaic cells. SCPD offering.

**MATSCI 346. Nanophotonics. 3 Units.**

Recent developments in micro- and nanophotonic materials and devices. Basic concepts of photonic crystals. Integrated photonic circuits. Photonic crystal fibers. Superprism effects. Optical properties of metallic nanostructures. Sub-wavelength phenomena and plasmonic excitations. Meta-materials. Prerequisite: Electromagnetic theory at the level of 242. Same as: EE 336.

**MATSCI 347. Introduction to Magnetism and Magnetic Nanostructures. 3 Units.**

Atomic origins of magnetic moments, magnetic exchange and ferromagnetism, types of magnetic order, magnetic anisotropy, domains, domain walls, hysteresis loops, hard and soft magnetic materials, demagnetization factors, and applications of magnetic materials, especially magnetic nanostructures and nanotechnology. Tools include finite-element and micromagnetic modeling. Design topics include electromagnet and permanent magnet, electronic article surveillance, magnetic inductors, bio-magnetic sensors, and magnetic drug delivery. Design projects, team work, and computer-aided design. Prerequisites: PHYSICS 29 and 43, or college-level electricity and magnetism.

**MATSCI 353. Mechanical Properties of Thin Films. 3 Units.**

The mechanical properties of thin films on substrates. The mechanics of thin films and of the atomic processes which cause stresses to develop during thin film growth. Experimental techniques for studying stresses in and mechanical properties of thin films. Elastic, plastic, and diffusional deformation of thin films on substrates as a function of temperature and microstructure. Effects of deformation and fracture on the processing of thin film materials. Prerequisite: 198/208.

**MATSCI 358. Fracture and Fatigue of Materials and Thin Film Structures. 3 Units.**

Linear-elastic and elastic-plastic fracture mechanics from a materials science perspective, emphasizing microstructure and the micromechanisms of fracture. Plane strain fracture toughness and resistance curve behavior. Mechanisms of failure associated with cohesion and adhesion in bulk materials, composites, and thin film structures. Fracture mechanics approaches to toughening and subcritical crack-growth processes, with examples and applications involving cyclic fatigue and environmentally assisted subcritical crack growth. Prerequisite: 151/251, 198/208, or equivalent. SCPD offering.

**MATSCI 359. Crystalline Anisotropy. 3 Units.**

Matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetism, thermodynamics, and optical properties of solids, on the level of J. F. Nye's *Physical Properties of Crystals*. Homework sets use Mathematica. Same as: ME 336.

**MATSCI 380. Nano-Biotechnology. 3 Units.**

Literature based. Principles that make nanoscale materials unique, applications to biology, and how biological systems can create nanomaterials. Molecular sensing, drug delivery, bio-inspired synthesis, self-assembling systems, and nanomaterial based therapies. Interactions at the nanoscale. Applications and opportunities for new technology.

**MATSCI 381. Biomaterials in Regenerative Medicine. 3 Units.**

Materials design and engineering for regenerative medicine. How materials interact with cells through their micro- and nanostructure, mechanical properties, degradation characteristics, surface chemistry, and biochemistry. Examples include novel materials for drug and gene delivery, materials for stem cell proliferation and differentiation, and tissue engineering scaffolds. Prerequisites: undergraduate chemistry, and cell/molecular biology or biochemistry. Same as: BIOE 361.

**MATSCI 382. Bio-chips, Imaging and Nanomedicine. 3 Units.**

The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies. Same as: EE 225, SBIO 225.



**MATSCI 399. Graduate Independent Study. 1-10 Units.**

Under supervision of a faculty member.

**MATSCI 400. Participation in Materials Science Teaching. 1-3 Units.**

May be repeated for credit.

**MATSCI 801. TGR Project for MS Students. 0 Unit.****MATSCI 802. TGR Dissertation for Ph.D Students. 0 Unit.**

## Mathematical Computational Science Courses

### Mathematics Courses

**MATH 16. Mathematics and Statistics in the Real World. 3 Units.**

This is an introductory quantitative literacy course, that offers an introduction to the mathematics (outside of calculus) used in real-world problems. Topics include: (a) Exponential functions, compound interest, population growth. (b) Geometric series, applications to mortgage payments, amortization of loans, present value of money, drug doses and blood levels. (c) First-order approximation, estimating areas and volumes. (d) Basic probability: Bayes's rule, false positives in disease detection and drug testing. (e) Basic descriptive statistics: mean, median, standard deviation f) Least squares and linear regression. Same as: STATS 90.

**MATH 19. Calculus. 3 Units.**

Introduction to differential calculus of functions of one variable. Topics: review of elementary functions including exponentials and logarithms, limits, rates of change, the derivative, and applications. Math 19, 20, and 21 cover the same material as Math 41 and 42, but in three quarters rather than two. Prerequisites: precalculus, including trigonometry, advanced algebra, and analysis of elementary functions.

**MATH 20. Calculus. 3 Units.**

Continuation of 19. Applications of differential calculus; introduction to integral calculus of functions of one variable, including: the definite integral, methods of symbolic and numerical integration, applications of the definite integral. Prerequisites: 19 or equivalent.

**MATH 21. Calculus. 4 Units.**

Continuation of 20. Applications of integral calculus, introduction to differential equations, infinite series. Prerequisite: 20 or equivalent.

**MATH 41. Calculus. 5 Units.**

Introduction to differential and integral calculus of functions of one variable. Topics: limits, rates of change, the derivative and applications, introduction to the definite integral and integration. Math 41 and 42 cover the same material as Math 19-20-21, but in two quarters rather than three. Prerequisites: trigonometry, advanced algebra, and analysis of elementary functions, including exponentials and logarithms. Same as: accelerated.

**MATH 41A. Calculus ACE. 6 Units.**

Students attend MATH 41 lectures with different recitation sessions, four hours instead of two, emphasizing engineering applications. Prerequisite: application; see <http://soe.stanford.edu/edp/programs/ace.html>.

**MATH 42. Calculus. 5 Units.**

Continuation of 41. Methods of symbolic and numerical integration, applications of the definite integral, introduction to differential equations, infinite series. Prerequisite: 41 or equivalent. Same as: Accelerated.

**MATH 42A. Calculus ACE. 6 Units.**

Students attend MATH 42 lectures with different recitation sessions, four hours instead of two, emphasizing engineering applications. Prerequisite: application; see <http://soe.stanford.edu/edp/programs/ace.html>.

**MATH 50V. Multivariable Differential Calculus. 4 Units.**

Differential calculus for functions of two or more variables. Topics: vectors and vector-valued functions in 2-space and 3-space, tangent and normal vectors, curvature, functions of two or more variables, partial derivatives and differentiability, directional derivatives and gradients, maxima and minima, and optimization using Lagrange multipliers. Prerequisites: two quarters of single variable calculus, or consent of instructor.

**MATH 51. Linear Algebra and Differential Calculus of Several Variables. 5 Units.**

Geometry and algebra of vectors, systems of linear equations, matrices and linear transformations, diagonalization and eigenvectors, vector valued functions and functions of several variables, parametric curves, partial derivatives and gradients, the derivative as a matrix, chain rule in several variables, constrained and unconstrained optimization. Prerequisite: 21, or 42, or a score of 4 on the BC Advanced Placement exam or 5 on the AB Advanced Placement exam, or consent of instructor.

**MATH 51A. Linear Algebra and Differential Calculus of Several Variables, ACE. 6 Units.**

Students attend MATH 51 lectures with different recitation sessions: four hours per week instead of two, emphasizing engineering applications. Prerequisite: application; see <http://soe.stanford.edu/edp/programs/ace.html>.

**MATH 51H. Honors Multivariable Mathematics. 5 Units.**

For prospective Mathematics majors in the honors program and students from other areas of science or engineering who have a strong mathematics background. Three quarter sequence covers the material of 51, 52, 53, and additional advanced calculus and ordinary and partial differential equations. Unified treatment of multivariable calculus, linear algebra, and differential equations with a different order of topics and emphasis from standard courses. Students should know one-variable calculus and have an interest in a theoretical approach to the subject. Prerequisite: score of 5 on BC Advanced Placement exam, or consent of instructor.

**MATH 51M. Introduction to MATLAB for Multivariable Mathematics. 1 Unitss.**

Corequisite: MATH 51.

**MATH 52. Integral Calculus of Several Variables. 5 Units.**

Iterated integrals, line and surface integrals, vector analysis with applications to vector potentials and conservative vector fields, physical interpretations. Divergence theorem and the theorems of Green, Gauss, and Stokes. Prerequisite: 51 and 42 or equivalents.

**MATH 52H. Honors Multivariable Mathematics. 5 Units.**

Continuation of 51H. Prerequisite: 51H.

**MATH 52V. Multivariable Integral Calculus. 5 Units.**

Integral calculus for functions of two or more variables. Topics: double and triple integrals, change of variables and the Jacobian, vector fields, line integrals, independence of path and the fundamental theorem of line integrals, Green's theorem, divergence theorem, Stokes's theorem. Prerequisites: one quarter of multivariable differential calculus (comparable to 50V or 51), or consent of instructor.

**MATH 53. Ordinary Differential Equations with Linear Algebra. 5 Units.**

Ordinary differential equations and initial value problems, systems of linear differential equations with constant coefficients, applications of second-order equations to oscillations, matrix exponentials, Laplace transforms, stability of non-linear systems and phase plane analysis, numerical methods. Prerequisite: 51 and 42 or equivalents.

**MATH 53H. Honors Multivariable Mathematics. 5 Units.**

Continuation of 52H. Prerequisite: 52H.

**MATH 70SI. The Game of Go: Strategy, Theory, and History. 1 Units.**

Strategy and mathematical theories of the game of Go, with guest appearance by a professional Go player.

**MATH 78SI. Speedcubing: History, Theory, and Practice. 1 Units.**

History of the Rubik's cube; the current cubing community; basic mathematical theory; concepts to improve speed solving skill. Prior ability to solve cube not required.

**MATH 80Q. Capillary Surfaces: Explored and Unexplored Territory. 3 Units.**

Preference to sophomores. Capillary surfaces: the interfaces between fluids that are adjacent to each other and do not mix. Recently discovered phenomena, predicted mathematically and subsequently confirmed by experiments, some done in space shuttles. Interested students may participate in ongoing investigations with affinity between mathematics and physics.

**MATH 87Q. Mathematics of Knots, Braids, Links, and Tangles. 3 Units.**

Preference to sophomores. Types of knots and how knots can be distinguished from one another by means of numerical or polynomial invariants. The geometry and algebra of braids, including their relationships to knots. Topology of surfaces. Brief summary of applications to biology, chemistry, and physics.

**MATH 88Q. The Mathematics of the Rubik's Cube. 3 Units.**

Preference to sophomores. Group theory through topics that can be illustrated with the Rubik's cube: subgroups, homomorphisms and quotient groups, the symmetric and alternating groups, conjugation, commutators, and Sylow subgroups.

**MATH 100. Mathematics for Elementary School Teachers. 4 Units.**

Mathematics and pedagogical strategies. Core mathematical content in grades K-6, classroom presentation, how to handle student errors, and mathematical issues that come up during instruction.

**MATH 104. Applied Matrix Theory. 3 Units.**

Linear algebra for applications in science and engineering: orthogonality, projections, the four fundamental subspaces of a matrix, spectral theory for symmetric matrices, the singular value decomposition, the QR decomposition, least-squares, the condition number of a matrix, algorithms for solving linear systems. Prerequisites: MATH 51 and MATH 52 or 53.

**MATH 106. Functions of a Complex Variable. 3 Units.**

Complex numbers, analytic functions, Cauchy-Riemann equations, complex integration, Cauchy integral formula, residues, elementary conformal mappings. Prerequisite: 52.

**MATH 108. Introduction to Combinatorics and Its Applications. 3 Units.**

Topics: graphs, trees (Cayley's Theorem, application to phylogony), eigenvalues, basic enumeration (permutations, Stirling and Bell numbers), recurrences, generating functions, basic asymptotics. Prerequisites: 51 or 103 or equivalent.

**MATH 109. Applied Group Theory. 3 Units.**

Applications of the theory of groups. Topics: elements of group theory, groups of symmetries, matrix groups, group actions, and applications to combinatorics and computing. Applications: rotational symmetry groups, the study of the Platonic solids, crystallographic groups and their applications in chemistry and physics. WIM.

**MATH 110. Applied Number Theory and Field Theory. 3 Units.**

Number theory and its applications to modern cryptography. Topics: congruences, finite fields, primality testing and factorization, public key cryptography, error correcting codes, and elliptic curves, emphasizing algorithms. WIM.

**MATH 111. Computational Commutative Algebra. 3 Units.**

Introduction to the theory of commutative rings, ideals, and modules. Systems of polynomial equations in several variables from the algorithmic viewpoint. Groebner bases, Buchberger's algorithm, elimination theory. Applications to algebraic geometry and to geometric problems.

**MATH 113. Linear Algebra and Matrix Theory. 3 Units.**

Algebraic properties of matrices and their interpretation in geometric terms. The relationship between the algebraic and geometric points of view and matters fundamental to the study and solution of linear equations. Topics: linear equations, vector spaces, linear dependence, bases and coordinate systems; linear transformations and matrices; similarity; eigenvectors and eigenvalues; diagonalization.

**MATH 113V. Linear Algebra. 3 Units.**

Topics: matrices, linear equations, vector spaces, linear dependence, bases and coordinates, linear transformations, similarity, eigenvectors and eigenvalues, and diagonalization. Prerequisites: two quarters of single variable calculus, or consent of instructor.

**MATH 115. Functions of a Real Variable. 3 Units.**

The development of real analysis in Euclidean space: sequences and series, limits, continuous functions, derivatives, integrals. Basic point set topology. Honors math majors and students who intend to do graduate work in mathematics should take 171. Prerequisite: 51.

**MATH 116. Complex Analysis. 3 Units.**

Analytic functions, Cauchy integral formula, power series and Laurent series, calculus of residues and applications, conformal mapping, analytic continuation, introduction to Riemann surfaces, Fourier series and integrals. Prerequisites: 52, and 115 or 171.

**MATH 120. Groups and Rings. 3 Units.**

Groups acting on sets, examples of finite groups, Sylow theorems, solvable and simple groups. Fields, rings, and ideals; polynomial rings over a field; PID and non-PID. Unique factorization domains. WIM.

**MATH 121. Galois Theory. 3 Units.**

Field of fractions, splitting fields, separability, finite fields. Galois groups, Galois correspondence, examples and applications. Prerequisite: Math 120.

**MATH 122. Modules and group representations. 3 Units.**

Modules over PID. Group representations and group rings. Tensor algebra over a field. Maschke's theorem and character theory. Character tables, construction of representations. Prerequisite: Math 120.

**MATH 131P. Partial Differential Equations I. 3 Units.**

An introduction to PDE; particularly suitable for non-Math majors. Topics include physical examples of PDE's, method of characteristics, D'Alembert's formula, maximum principles, heat kernel, Duhamel's principle, separation of variables, Fourier series, Harmonic functions, Bessel functions, spherical harmonics. Students who have taken MATH 171 should consider taking MATH 173 rather than 131p. Prerequisite: 53.

**MATH 132. Partial Differential Equations II. 3 Units.**

Laplace's equation and properties of harmonic functions. Green's functions. Distributions and Fourier transforms. Eigenvalue problems and generalized Fourier series. Numerical solutions. Prerequisite: 131P.

**MATH 136. Stochastic Processes. 3 Units.**

Introduction to measure theory,  $L_p$  spaces and Hilbert spaces. Random variables, expectation, conditional expectation, conditional distribution. Uniform integrability, almost sure and  $L_p$  convergence. Stochastic processes: definition, stationarity, sample path continuity. Examples: random walk, Markov chains, Gaussian processes, Poisson processes, Martingales. Construction and basic properties of Brownian motion. Prerequisite: STATS 116 or MATH 151 or equivalent. Recommended: MATH 115 or equivalent. Same as: STATS 219.

**MATH 137. Mathematical Methods of Classical Mechanics. 3 Units.**

Newtonian mechanics. Lagrangian formalism. E. Noether's theorem. Oscillations. Rigid bodies. Introduction to symplectic geometry. Hamiltonian formalism. Legendre transform. Variational principles. Geometric optics. Introduction to the theory of integrable systems. Prerequisites: 51, 52, 53, or 51H, 52H, 53H.

**MATH 138. Celestial Mechanics. 3 Units.**

Mathematically rigorous introduction to the classical N-body problem: the motion of N particles evolving according to Newton's law. Topics include: the Kepler problem and its symmetries; other central force problems; conservation theorems; variational methods; Hamilton-Jacobi theory; the role of equilibrium points and stability; and symplectic methods. Prerequisites: 53, and 115 or 171.

**MATH 143. Differential Geometry. 3 Units.**

Geometry of curves and surfaces in three-space and higher dimensional manifolds. Parallel transport, curvature, and geodesics. Surfaces with constant curvature. Minimal surfaces.

**MATH 146. Analysis on Manifolds. 3 Units.**

Differentiable manifolds, tangent space, submanifolds, implicit function theorem, differential forms, vector and tensor fields. Frobenius' theorem, DeRham theory. Prerequisite: 52 or 52H.

**MATH 147. Differential Topology. 3 Units.**

Smooth manifolds, transversality, Sard's theorem, embeddings, degree of a map, Borsuk-Ulam theorem, Hopf degree theorem, Jordan curve theorem. Prerequisite: 115 or 171.

**MATH 148. Algebraic Topology. 3 Units.**

Fundamental group, covering spaces, Euler characteristic, homology, classification of surfaces, knots. Prerequisite: 109 or 120.

**MATH 151. Introduction to Probability Theory. 3 Units.**

Counting; axioms of probability; conditioning and independence; expectation and variance; discrete and continuous random variables and distributions; joint distributions and dependence; central limit theorem and laws of large numbers. Prerequisite: 52 or consent of instructor.

**MATH 152. Elementary Theory of Numbers. 3 Units.**

Euclid's algorithm, fundamental theorems on divisibility; prime numbers; congruence of numbers; theorems of Fermat, Euler, Wilson; congruences of first and higher degrees; quadratic residues; introduction to the theory of binary quadratic forms; quadratic reciprocity; partitions.

**MATH 154. Algebraic Number Theory. 3 Units.**

Properties of number fields and Dedekind domains, quadratic and cyclotomic fields, applications to some classical Diophantine equations; introduction to elliptic curves. Prerequisites: 120 and 121, especially modules over principal ideal domains and Galois theory of finite fields.

**MATH 155. Analytic Number Theory. 3 Units.**

Topics in analytic number theory such as the distribution of prime numbers, the prime number theorem, twin primes and Goldbach's conjecture, the theory of quadratic forms, Dirichlet's class number formula, Dirichlet's theorem on primes in arithmetic progressions, and the fifteen theorem. Prerequisite: 152, or familiarity with the Euclidean algorithm, congruences, residue classes and reduced residue classes, primitive roots, and quadratic reciprocity.

**MATH 159. Discrete Probabilistic Methods. 3 Units.**

Modern discrete probabilistic methods suitable for analyzing discrete structures of the type arising in number theory, graph theory, combinatorics, computer science, information theory and molecular sequence analysis. Prerequisite: STATS 116/MATH 151 or equivalent.

**MATH 161. Set Theory. 3 Units.**

Informal and axiomatic set theory: sets, relations, functions, and set-theoretical operations. The Zermelo-Fraenkel axiom system and the special role of the axiom of choice and its various equivalents. Well-orderings and ordinal numbers; transfinite induction and transfinite recursion. Equinumerosity and cardinal numbers; Cantor's Alephs and cardinal arithmetic. Open problems in set theory. Prerequisite: students should be comfortable doing proofs.

**MATH 162. Philosophy of Mathematics. 4 Units.**

(Graduate students register for PHIL 262.) 20th-century approaches to the foundations and philosophy of mathematics. The background in mathematics, set theory, and logic. Schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisite: PHIL151 or consent of instructor. Same as: PHIL 162, PHIL 262.

**MATH 163. The Greek Invention of Mathematics. 3-5 Units.**

How was mathematics invented? A survey of the main creative ideas of ancient Greek mathematics. Among the issues explored are the axiomatic system of Euclid's Elements, the origins of the calculus in Greek measurements of solids and surfaces, and Archimedes' creation of mathematical physics. We will provide proofs of ancient theorems, and also learn how such theorems are even known today thanks to the recovery of ancient manuscripts. Same as: CLASSGEN 103.

**MATH 171. Fundamental Concepts of Analysis. 3 Units.**

Recommended for Mathematics majors and required of honors Mathematics majors. Similar to 115 but altered content and more theoretical orientation. Properties of Riemann integrals, continuous functions and convergence in metric spaces; compact metric spaces, basic point set topology. Prerequisite: 51H or 115 or consent of the instructor. WIM.

**MATH 172. Lebesgue Integration and Fourier Analysis. 3 Units.**

Similar to 205A, but for undergraduate Math majors and graduate students in other disciplines. Topics include Lebesgue measure on Euclidean space, Lebesgue integration,  $L^p$  spaces, the Fourier transform, the Hardy-Littlewood maximal function and Lebesgue differentiation. Prerequisite: 171 or consent of instructor.

**MATH 174. Calculus of Variations. 3 Units.**

An introductory course emphasizing the historical development of the theory, its connections to physics and mechanics, its independent mathematical interest, and its contacts with daily life experience. Applications to minimal surfaces and to capillary surface interfaces. Prerequisites: Math 171 or equivalent.

**MATH 175. Elementary Functional Analysis. 3 Units.**

Linear operators on Hilbert space. Spectral theory of compact operators; applications to integral equations. Elements of Banach space theory. Prerequisite: 115 or 171.

**MATH 180. Introduction to Financial Mathematics. 3 Units.**

Financial derivatives: contracts and options. Hedging and risk management. Arbitrage, interest rate, and discounted value. Geometric random walk and Brownian motion as models of risky assets. Initial boundary value problems for the heat and related partial differential equations. Self-financing replicating portfolio. Black-Scholes pricing of European options. Dividends. Implied volatility. Optimal stopping and American options. Prerequisite: 53. Corequisites: 131, 151 or STATS 116.

**MATH 193. Polya Problem Solving Seminar. 1 Unitss.**

Topics in mathematics and problem solving strategies with an eye towards the Putnam Competition. Topics may include parity, the pigeonhole principle, number theory, recurrence, generating functions, and probability. Students present solutions to the class. Open to anyone with an interest in mathematics.

**MATH 196. Undergraduate Colloquium. 1 Unitss.**

Weekly lectures by different experts on topics in pure and applied mathematics that go beyond the standard curriculum. May be repeated for credit for up to 3 units. Does not count toward the math major or minor.

**MATH 197. Senior Honors Thesis. 1-6 Units.**

(Staff) May be repeated 3 times for a max of 9 units.

**MATH 198. Category Theory and Functional Programming. 1 Unitss.**

An introduction to category theory and its applications in computer science: in particular to Haskell, a programming language with many language elements inspired by category theory. Students should have some familiarity with linear algebra, discrete mathematics and functional programming. Recommended corequisite: CS 242.

**MATH 199. Independent Work. 1-3 Units.**

Undergraduates pursue a reading program; topics limited to those not in regular department course offerings. Credit can fulfill the elective requirement for math majors. Approval of Undergraduate Affairs Committee is required to use credit for honors majors area requirement.

**MATH 205A. Real Analysis. 3 Units.**

Basic measure theory and the theory of Lebesgue integration. Prerequisite: 171 or equivalent.

**MATH 205B. Real Analysis. 3 Units.**

Point set topology, basic functional analysis, Fourier series, and Fourier transform. Prerequisites: 171 and 205A or equivalent.

**MATH 210A. Modern Algebra I. 3 Units.**

Basic commutative ring and module theory, tensor algebra, homological constructions, linear and multilinear algebra, introduction to representation theory. Prerequisite: 122 or equivalent.

**MATH 210B. Modern Algebra II. 3 Units.**

Continuation of 210A. Topics in Galois theory, commutative algebra, and algebraic geometry. Prerequisites: 210A, and 121 or equivalent.

**MATH 210C. Modern Algebra. 3 Units.**

Continuation of 210B. Semisimple rings and modules, representation theory, Lie algebras, Lie groups and their representations. This course is repeatable for credit a maximum of 3 times for a total of 9 units.

**MATH 215A. Complex Analysis, Geometry, and Topology. 3 Units.**

Analytic functions, complex integration, Cauchy's theorem, residue theorem, argument principle, conformal mappings, Riemann mapping theorem, Picard's theorem, elliptic functions, analytic continuation and Riemann surfaces.

**MATH 215B. Complex Analysis, Geometry, and Topology. 3 Units.**

Topics: fundamental group and covering spaces, homology, cohomology, products, basic homotopy theory, and applications. Prerequisites: 113, 120, and 171, or equivalent; 215A is not a prerequisite for 215B.

**MATH 215C. Complex Analysis, Geometry, and Topology. 3 Units.**

Differentiable manifolds, transversality, degree of a mapping, vector fields, intersection theory, and Poincare duality. Differential forms and the DeRham theorem. Prerequisite: 215B or equivalent.

**MATH 216A. Introduction to Algebraic Geometry. 3 Units.**

Algebraic curves, algebraic varieties, sheaves, cohomology, Riemann-Roch theorem. Classification of algebraic surfaces, moduli spaces, deformation theory and obstruction theory, the notion of schemes. May be repeated for credit. Prerequisites: 210ABC or equivalent.

**MATH 216B. Introduction to Algebraic Geometry. 3 Units.**

Continuation of 216A. May be repeated for credit.

**MATH 216C. Introduction to Algebraic Geometry. 3 Units.**

Continuation of 216B. May be repeated for credit.

**MATH 217A. Differential Geometry. 3 Units.**

Smooth manifolds and submanifolds, tensors and forms, Lie and exterior derivative, DeRham cohomology, distributions and the Frobenius theorem, vector bundles, connection theory, parallel transport and curvature, affine connections, geodesics and the exponential map, connections on the principal frame bundle. Prerequisite: 215C or equivalent.

**MATH 220. Partial Differential Equations of Applied Mathematics. 3 Units.**

First-order partial differential equations; method of characteristics; weak solutions; elliptic, parabolic, and hyperbolic equations; Fourier transform; Fourier series; and eigenvalue problems. Prerequisite: foundation in multivariable calculus and ordinary differential equations. Same as: CME 303.

**MATH 221A. Mathematical Methods of Imaging. 3 Units.**

Image denoising and deblurring with optimization and partial differential equations methods. Imaging functionals based on total variation and l-1 minimization. Fast algorithms and their implementation. Same as: CME 321A.

**MATH 221B. Mathematical Methods of Imaging. 3 Units.**

Array imaging using Kirchhoff migration and beamforming, resolution theory for broad and narrow band array imaging in homogeneous media, topics in high-frequency, variable background imaging with velocity estimation, interferometric imaging methods, the role of noise and inhomogeneities, and variational problems that arise in optimizing the performance of array imaging algorithms. Same as: CME 321B.

**MATH 222. Computational Methods for Fronts, Interfaces, and Waves. 3 Units.**

High-order methods for multidimensional systems of conservation laws and Hamilton-Jacobi equations (central schemes, discontinuous Galerkin methods, relaxation methods). Level set methods and fast marching methods. Computation of multi-valued solutions. Multi-scale analysis, including wavelet-based methods. Boundary schemes (perfectly matched layers). Examples from (but not limited to) geometrical optics, transport equations, reaction-diffusion equations, imaging, and signal processing.

**MATH 224. Topics in Mathematical Biology. 3 Units.**

Mathematical models for biological processes based on ordinary and partial differential equations. Topics: population and infectious diseases dynamics, biological oscillators, reaction diffusion models, biological waves, and pattern formation. Prerequisites: 53 and 131, or equivalents.

**MATH 227. Partial Differential Equations and Diffusion Processes. 3 Units.**

Parabolic and elliptic partial differential equations and their relation to diffusion processes. First order equations and optimal control. Emphasis is on applications to mathematical finance. Prerequisites: MATH 131 and MATH 136/STATS 219, or equivalents.

**MATH 228. Stochastic Methods in Engineering. 3 Units.**

Review of basic probability; Monte Carlo simulation; state space models and time series; parameter estimation, prediction, and filtering; Markov chains and processes; stochastic control; and stochastic differential equations. Examples from various engineering disciplines. Prerequisites: exposure to probability; background in real variables and analysis. Same as: CME 308.

**MATH 230A. Theory of Probability. 2-4 Units.**

Mathematical tools: sigma algebras, measure theory, connections between coin tossing and Lebesgue measure, basic convergence theorems. Probability: independence, Borel-Cantelli lemmas, almost sure and  $L_p$  convergence, weak and strong laws of large numbers. Large deviations. Weak convergence; central limit theorems; Poisson convergence; Stein's method. Prerequisites: 116, MATH 171. Same as: STATS 310A.

**MATH 230B. Theory of Probability. 2-3 Units.**

Conditional expectations, discrete time martingales, stopping times, uniform integrability, applications to 0-1 laws, Radon-Nikodym Theorem, ruin problems, etc. Other topics as time allows selected from (i) local limit theorems, (ii) renewal theory, (iii) discrete time Markov chains, (iv) random walk theory, (v) ergodic theory. Prerequisite: 310A or MATH 230A. Same as: STATS 310B.

**MATH 230C. Theory of Probability. 2-4 Units.**

Continuous time stochastic processes: martingales, Brownian motion, stationary independent increments, Markov jump processes and Gaussian processes. Invariance principle, random walks, LIL and functional CLT. Markov and strong Markov property. Infinitely divisible laws. Some ergodic theory. Prerequisite: 310B or MATH 230B. Same as: STATS 310C.

**MATH 231A. An Introduction to Random Matrix Theory. 3 Units.**

Patterns in the eigenvalue distribution of typical large matrices, which also show up in physics (energy distribution in scattering experiments), combinatorics (length of longest increasing subsequence), first passage percolation and number theory (zeros of the zeta function). Classical compact ensembles (random orthogonal matrices). The tools of determinantal point processes. Same as: STATS 351A.

**MATH 231C. Free Probability. 3 Units.**

Background from operator theory, addition and multiplication theorems for operators, spectral properties of infinite-dimensional operators, the free additive and multiplicative convolutions of probability measures and their classical counterparts, asymptotic freeness of large random matrices, and free entropy and free dimension. Prerequisite: STATS 310B or equivalent.

**MATH 232. Topics in Probability: Malliavin Calculus, Fractional Brownian Motion and Applications. 3 Units.**

Malliavin calculus: derivative and divergence operators, Skorohod integral. Fractional Brownian motion: relevance for financial mathematics, Ito and Tanaka formula, driving force for the heat equation. Ito formula for irregular Gaussian processes and other applications of Malliavin calculus. May be repeated for credit. Prerequisites: MATH 236, STATS 310C or equivalent.

**MATH 233. Probabilistic Methods in Analysis. 3 Units.**

Proofs and constructions in analysis obtained from basic results in Probability Theory and a 'probabilistic way of thinking.' Topics: Rademacher functions, Gaussian processes, entropy.

**MATH 234. Large Deviations Theory. 3 Units.**

Combinatorial estimates and the method of types. Large deviation probabilities for partial sums and for empirical distributions, Cramer's and Sanov's theorems and their Markov extensions. Applications in statistics, information theory, and statistical mechanics. Prerequisite: MATH 230A or STATS 310. Same as: STATS 374.

**MATH 236. Introduction to Stochastic Differential Equations. 3 Units.**

Brownian motion, stochastic integrals, and diffusions as solutions of stochastic differential equations. Functionals of diffusions and their connection with partial differential equations. Random walk approximation of diffusions. Prerequisite: 136 or equivalent and differential equations.

**MATH 238. Mathematical Finance. 3 Units.**

Stochastic models of financial markets. Forward and futures contracts. European options and equivalent martingale measures. Hedging strategies and management of risk. Term structure models and interest rate derivatives. Optimal stopping and American options. Corequisites: MATH 236 and 227 or equivalent. Same as: STATS 250.

**MATH 239. Computation and Simulation in Finance. 3 Units.**

Monte Carlo, finite difference, tree, and transform methods for the numerical solution of partial differential equations in finance. Emphasis is on derivative security pricing. Prerequisite: 238 or equivalent.

**MATH 243. Functions of Several Complex Variables. 3 Units.****MATH 244. Riemann Surfaces. 3 Units.**

Compact Riemann surfaces and algebraic curves; cohomology of sheaves; Serre duality; Riemann-Roch theorem and application; Jacobians; Abel's theorem. May be repeated for credit.

**MATH 245A. Topics in Algebraic Geometry: Moduli Theory. 3 Units.**

Topics in the study of moduli spaces: Basic of algebraic surfaces, Hodge structure of surfaces, moduli of K3 surfaces, cycles and rational curves in K3 surfaces, Torelli for K3 surfaces.

**MATH 245B. Topics in Algebraic Geometry: Intersection Theory. 3 Units.**

Topics such as intersection theory on surfaces, toric varieties, and homogeneous spaces; numerical criteria for positivity; Chow groups and rings. May be repeated for credit.

**MATH 245C. Topics in Algebraic Geometry: Alterations. 3 Units.****MATH 247. Topics in Group Theory. 3 Units.**

Topics include the Burnside basis theorem, classification of  $p$ -groups, regular and powerful groups, Sylow theorems, the Frattini argument, nilpotent groups, solvable groups, theorems of P. Hall, group cohomology, and the Schur-Zassenhaus theorem. The classical groups and introduction to the classification of finite simple groups and its applications. May be repeated for credit.

**MATH 248. Ergodic Theory and Szemerédi's Theorem. 3 Units.**

An introduction to ergodic theory leading to (and proving) Szemerédi's theorem and its multidimensional extension. Prerequisite: 205a and some knowledge of Hilbert spaces.

**MATH 248A. Algebraic Number Theory. 3 Units.**

Structure theory and Galois theory of local and global fields, finiteness theorems for class numbers and units, adelic techniques. Prerequisites: MATH 210A,B.

**MATH 249A. Topics in number theory. 3 Units.****MATH 249B. Topics in Number Theory. 3 Units.****MATH 249C. Topics in Number Theory. 3 Units.**

**MATH 252. Algebraic Groups. 3 Units.**

Smooth affine groups over general fields, quotients, tori, solvable groups, reductive groups, root systems, Existence and Isomorphism theorem, structure theory. If time permits, classification theory over interesting fields. Prerequisites: 210A, 210B, and familiarity with algebraic varieties over general fields.

**MATH 254. Geometric Methods in the Theory of Ordinary Differential Equations. 3 Units.**

Topics may include: structural stability and perturbation theory of dynamical systems; hyperbolic theory; first order PDE; normal forms, bifurcation theory; Hamiltonian systems, their geometry and applications. May be repeated for credit.

**MATH 256A. Partial Differential Equations. 3 Units.**

The theory of linear and nonlinear partial differential equations, beginning with linear theory involving use of Fourier transform and Sobolev spaces. Topics: Schauder and  $L^2$  estimates for elliptic and parabolic equations; De Giorgi-Nash-Moser theory for elliptic equations; nonlinear equations such as the minimal surface equation, geometric flow problems, and nonlinear hyperbolic equations.

**MATH 256B. Partial Differential Equations. 3 Units.**

Continuation of 256A.

**MATH 257A. Symplectic Geometry and Topology. 3 Units.**

Linear symplectic geometry and linear Hamiltonian systems. Symplectic manifolds and their Lagrangian submanifolds, local properties. Symplectic geometry and mechanics. Contact geometry and contact manifolds. Relations between symplectic and contact manifolds. Hamiltonian systems with symmetries. Momentum map and its properties. May be repeated for credit.

**MATH 257B. Symplectic Geometry and Topology. 3 Units.**

Continuation of 257A. May be repeated for credit.

**MATH 258. Topics in Geometric Analysis. 3 Units.**

May be repeated for credit.

**MATH 259. mirror symmetry. 3 Units.****MATH 261A. Functional Analysis. 3 Units.**

Geometry of linear topological spaces. Linear operators and functionals. Spectral theory. Calculus for vector-valued functions. Operational calculus. Banach algebras. Special topics in functional analysis. May be repeated for credit.

**MATH 263A. Lie Groups and Lie Algebras. 3 Units.**

Definitions, examples, properties. Semi-simple Lie algebras, their structure and classification. Cartan decomposition: real Lie algebras. Representation theory: Cartan-Stiefel diagram, weights. Weyl character formula. Orthogonal and symplectic representations. May be repeated for credit. Prerequisite: 210 or equivalent.

**MATH 264. Infinite Dimensional Lie Algebra. 3 Units.****MATH 266. Computational Signal Processing and Wavelets. 3 Units.**

Theoretical and computational aspects of signal processing. Topics: time-frequency transforms; wavelet bases and wavelet packets; linear and nonlinear multiresolution approximations; estimation and restoration of signals; signal compression. May be repeated for credit.

**MATH 269. Topics in symplectic geometry. 3 Units.**

May be repeated for credit.

**MATH 270. Geometry and Topology of Complex Manifolds. 3 Units.**

Complex manifolds, Kahler manifolds, curvature, Hodge theory, Lefschetz theorem, Kahler-Einstein equation, Hermitian-Einstein equations, deformation of complex structures. May be repeated for credit.

**MATH 271. The H-Principle. 3 Units.**

The language of jets. Thom transversality theorem. Holonomic approximation theorem. Applications: immersion theory and its generalizations. Differential relations and Gromov's h-principle for open manifolds. Applications to symplectic geometry. Microflexibility. Mappings with simple singularities and their applications. Method of convex integration. Nash-Kuiper  $C^1$ -isometric embedding theorem.

**MATH 272. Topics in Partial Differential Equations. 3 Units.****MATH 273A. Quantum Mechanics I. 3 Units.****MATH 273B. QUANTUM MECHANICS II. 3 Units.****MATH 282A. Low Dimensional Topology. 3 Units.**

The theory of surfaces and 3-manifolds. Curves on surfaces, the classification of diffeomorphisms of surfaces, and Teichmuller space. The mapping class group and the braid group. Knot theory, including knot invariants. Decomposition of 3-manifolds: triangulations, Heegaard splittings, Dehn surgery. Loop theorem, sphere theorem, incompressible surfaces. Geometric structures, particularly hyperbolic structures on surfaces and 3-manifolds.

**MATH 282B. Homotopy Theory. 3 Units.**

Homotopy groups, fibrations, spectral sequences, simplicial methods, Dold-Thom theorem, models for loop spaces, homotopy limits and colimits, stable homotopy theory.

**MATH 282C. Fiber Bundles and Cobordism. 3 Units.**

Possible topics: principal bundles, vector bundles, classifying spaces. Connections on bundles, curvature. Topology of gauge groups and gauge equivalence classes of connections. Characteristic classes and K-theory, including Bott periodicity, algebraic K-theory, and indices of elliptic operators. Spectral sequences of Atiyah-Hirzebruch, Serre, and Adams. Cobordism theory, Pontryagin-Thom theorem, calculation of unoriented and complex cobordism. May be repeated for credit.

**MATH 283. Topics in Algebraic and Geometric Topology. 3 Units.**

May be repeated for credit.

**MATH 283A. Topics in Topology. 3 Units.****MATH 284. Topics in Geometric Topology: Heegaard splittings and three-manifolds. 3 Units.**

Incompressible surfaces, irreducible manifolds, prime decomposition, Morse theory, Heegaard diagrams, Heegaard splittings, the Thurston norm, sutured manifold theory, Heegaard Floer homology, sutured Floer homology.

**MATH 284A. Geometry and Topology in Dimension 3. 3 Units.**

The Poincare conjecture and the uniformization of 3-manifolds. May be repeated for credit.

**MATH 284B. Geometry and Topology in Dimension 3. 3 Units.**

The Poincare conjecture and the uniformization of 3-manifolds. May be repeated for credit.

**MATH 286. Topics in Differential Geometry. 3 Units.**

May be repeated for credit.

**MATH 287. Introduction to optimal transportation. 3 Units.**

This will be an introductory course on Optimal Transportation theory. We will study Monge's problem, Kantorovich's problem,  $c$ -concave functions (also in the Riemannian setting), Wasserstein distance and geodesics (including a PDE formulation), applications to inequalities in convex analysis, as well as other topics, time permitting.

**MATH 290B. Model Theory B. 1-3 Units.**

Decidable theories. Model-theoretic background. Arithmetic of addition, real closed and algebraically closed fields, weak second order arithmetic, theories of terms, theories of arrays, temporal logic. Combining decision procedures. May be repeated for credit. Prerequisite: 151, 152 or equivalents.

Same as: PHIL 350B.

**MATH 292A. Set Theory. 3 Units.**

The basics of axiomatic set theory; the systems of Zermelo-Fraenkel and Bernays-Gödel. Topics: cardinal and ordinal numbers, the cumulative hierarchy and the role of the axiom of choice. Models of set theory, including the constructible sets and models constructed by the method of forcing. Consistency and independence results for the axiom of choice, the continuum hypothesis, and other unsettled mathematical and set-theoretical problems. Prerequisites: PHIL 151 and MATH 161, or equivalents.

Same as: PHIL 352A.

**MATH 293A. Proof Theory. 3 Units.**

Gentzen's natural deduction and sequential calculi for first-order propositional and predicate logics. Normalization and cut-elimination procedures. Relationships with computational lambda calculi and automated deduction. Prerequisites: 151, 152, and 161, or equivalents.

Same as: PHIL 353A.

**MATH 295. Computation and Algorithms in Mathematics. 3 Units.**

Use of computer and algorithmic techniques in various areas of mathematics. Computational experiments. Topics may include polynomial manipulation, Groebner bases, computational geometry, and randomness. May be repeated for credit.

**MATH 301. Advanced Topics in Convex Optimization. 3 Units.**

Modern developments in convex optimization: semidefinite programming; novel and efficient first-order algorithms for smooth and nonsmooth convex optimization. Emphasis on numerical methods suitable for large scale problems arising in science and engineering. Prerequisites: convex optimization (EE 364), linear algebra (Math 104), numerical linear algebra (CME 302); background in probability, statistics, real analysis and numerical optimization.

**MATH 355. Graduate Teaching Seminar. 1 Unitss.**

Required of and limited to first-year Mathematics graduate students.

**MATH 360. Advanced Reading and Research. 1-9 Units.****MATH 361. Research Seminar Participation. 1-3 Units.**

Participation in a faculty-led seminar which has no specific course number.

**MATH 381. Seminar in Analysis. 1-3 Units.****MATH 384. Seminar in Geometry. 1 Unitss.****MATH 385. Seminar in Topology. 1-3 Units.****MATH 388. Seminar in Probability and Stochastic Processes. 1-3 Units.****MATH 389. Seminar in Mathematical Biology. 1-3 Units.****MATH 391. Research Seminar in Logic and the Foundations of Mathematics. 1-3 Units.**

Contemporary work. May be repeated a total of three times for credit. Math 391 students attend the logic colloquium in 380-381T.

Same as: PHIL 391.

**MATH 394. Classics in Analysis. 3 Units.**

Original papers in analysis.

**MATH 395. Classics in Geometry and Topology. 3 Units.**

Original papers in geometry and in algebraic and geometric topology. May be repeated for credit.

**MATH 396. Graduate Progress. 1 Unitss.**

Results and current research of graduate and postdoctoral students. May be repeated for credit.

**MATH 802. TGR Dissertation. 0 Unit.**

## Mechanical Engineering Courses

**ME 10AX. Design Thinking and the Art of Innovation. 2 Units.**

This seminar will introduce students to techniques that designers use to create highly innovative solutions to wicked problems that cross domains. The project-based class will emphasize approaches to problem identification and problem solving. Along with a survey of tools such as need finding, structured brainstorming, synthesis, rapid prototyping, and visual communication, the class will include field trips to a local design firm, a robotics lab, and a prototyping lab. A secondary goal of the seminar is to introduce students to the pleasures of creative design and hands-on development of tangible solutions. Design has a unique approach to looking at both the problem domain and the solution domain in issues where technology, social issues, human behavior, and business needs overlap.

**ME 10N. Form and Function of Animal Skeletons. 3 Units.**

Preference to freshmen. The biomechanics and mechanobiology of the musculoskeletal system in human beings and other vertebrates on the level of the whole organism, organ systems, tissues, and cell biology. Field trips to labs.

Same as: BIOE 10N.

**ME 11SC. The Art and Science of Measuring Fluid Flows. 2 Units.**

The roles of fluid flows in natural systems such as swimming protozoa and planet-forming nebulae, and technologies such as biomolecular assay devices and jet engines. The analytical background for fluid sciences. Phenomena such as shock waves and vortex formation that create flow patterns while challenging engineers. Visualization and measurement techniques to obtain full-field flow pattern information. The physics behind these technologies. Field trips; lab work. (Eaton).

**ME 12N. The Jet Engine. 3 Units.**

Preference to freshmen. How a jet engine works; the technologies and analytical techniques required to understand them. Dynamics, thermodynamics, turbomachinery, combustion, advanced materials, cooling technologies, and control systems. Visits to research laboratories, examination of a partially disassembled engine, and probable operation of a small jet engine. Prerequisites: high school physics.

**ME 12SC. Hands-on Jet Engines. 2 Units.**

How jet engines transformed the world through intercontinental travel causing internationalization in daily life. Competition driving improvements in fuel economy, engine lifetime, noise, and emissions.

**ME 14N. How Stuff Is Made. 3 Units.**

The design and engineering of products and processes, such as machining, fabric, food, and electrical goods. Tradeoffs in choice of materials, features, and process selection. Final project: students research and redesign the engineering and manufacturing aspects of a product and its processes with an eye toward sustainability. Includes several field trips to manufacturing facilities.

**ME 15. Pre-field Course for Alternative Spring Break/Reform in New York City. 1 Unitss.**

65.1%. This is the graduation rate for NYC public schools. While this is an all-time high, it is important to note that only 49.2% of students passed the Regents, New York's standardized high school exam. With 1.1 million students in the Department of Education (DOE), that leaves over 500,000 students without a full high school diploma. Something needs to change. Is money the answer? Facebook recently gave \$100,000,000 to the Newark Public Schools (NPS). What about new leadership? DOE hired CEO extraordinaire, Cathie Black as their Chancellor last January; she resigned in April. What about design? Design thinking is a methodology used for solving problems. In *Breaking Out*, we will design workshops that instill creative confidence in students through a series of design challenges. To maximize the impact of these workshops, we will examine NYC's unique education landscape and visit local schools during the winter. *Breaking Out* will address education reform from both a macro and micro perspective, meeting with policy makers as well as educators. In the classrooms we visit, we will run design workshops teaching students how to creatively solve problems. We will also engage administrators in hopes of spreading the use of design thinking across curricula. Our goal on this trip to New York is to demonstrate the power of design thinking to spark the innate ingenuity within students. Break out of the old education paradigm. Break out of the Stanford bubble. Join our trip, and help youth break out of the Concrete Jungle.

**ME 16N. The Science of Flames. 3 Units.**

Preference to freshmen. The roles that chemistry and fluid dynamics play in governing the behaviors of flames. Emphasis is on factors that affect flame microstructure, external appearance, and on the fundamental physical and chemical processes that cause flames and fires to propagate. Topics: history, thermodynamics, and pollutant formation in flames. Trips to labs where flames are studied. Prerequisites: high school physics.

**ME 17N. Robotics Imitating Nature. 3 Units.**

Preference to freshmen. The dream of constructing robots that duplicate the functional abilities of humans and/or other animals has been promulgated primarily by science fiction writers. But biological systems provide models for the designers of robots. Building electromechanical devices that perform locomotory and sensing functions similar to those of an animal as a way of learning about how biological systems function. Walking and running machines, and the problem of giving a robot the capability to respond to its environment.

**ME 18Q. Teamology: Creative Teams and Individual Development. 3 Units.**

Preference to sophomores. Roles on a problem solving team that best suit individual creative characteristics. Two teams are formed for teaching experientially how to develop less conscious abilities from teammates creative in those roles. Reinforcement teams have members with similar personalities; problem solving teams are composed of people with maximally different personalities.

**ME 19. Pre-field Course for Alternative Spring Break: Design for Social Change. 1 Unitss.**

Focus is on applying design, technology and innovation to catalyze social change. Topics include identifying social needs, learning different brainstorming methods, developing an applicable service model or product, prototyping, implementation, and reiteration. Reading and service components, followed by week-long Alternative Spring Break trip. See <http://d4sc.blogspot.com>. Enrollment limited to 12. May be repeated for credit.

**ME 21N. Renaissance Machine Design. 3 Units.**

Preference to freshmen. Technological innovations of the 1400s that accompanied the proliferation of monumental art and architecture by Brunelleschi, da Vinci, and others who designed machines and invented novel construction, fresco, and bronze-casting techniques. The social and political climate, from the perspective of a machine designer, that made possible and demanded engineering expertise from prominent artists. Hands-on projects to provide a physical understanding of Renaissance-era engineering challenges and introduce the pleasure of creative engineering design. Technical background not required.

**ME 23Q. The Worldly Engineer. 3 Units.**

Preference given to sophomores. Engineering, its practice and products placed in multi-disciplinary context. Topics include the history of the engineering profession and engineering education; cultural influences on design; the role of national and international public policy and economics; dependence on natural resources; environmental impact; contemporary workforce development. Emphasis is on cultivating an appreciation of these issues to enrich the educational and professional pursuit of engineering.

**ME 25N. Energy Sustainability and Climate Change. 3 Units.**

One of the primary global challenges of the 21st century is providing the energy required to meet increasing demands due to population growth and economic development. A related challenge is mitigation of the effect of this energy growth on climate. This seminar will examine various scenarios for the energy resources required to meet future demand and the potential consequences on climate. The scientific issues underlying climate change and the coupling of energy use with changes in the global atmosphere that impact climate will be discussed.

**ME 26N. Think Like a Designer. 3 Units.**

Introduces students to techniques designers use to create highly innovative solutions across domains. The project-based class will emphasize approaches to problem identification and problem solving. Topics include need-finding, structured brainstorming, synthesis, rapid prototyping, and visual communication; field trips to a local design firm, a robotics lab, and a machining lab. A secondary goal of the seminar is to introduce students to the pleasures of creative design and hands-on development of tangible solutions.

**ME 27SI. Needfinding for Underserved Populations. 2 Units.**

The heart of any design process resides in empathy with users and their needs. Working in the realm of public service may engage a population to which the designer might not have been exposed. How different needfinding techniques can help designers to understand users from underserved populations and inspire them to create products and services that serve user needs.

**ME 29D. Design for Diversity: Collaboration by difference in digital age. 2 Units.**

The focus of this course is on applying design, technology, and social innovation to create an environment that fosters collaboration by difference. Students will learn how in digital age their cultural, social and ethnic differences amplify and create unique opportunities for them to bring about social change. They will learn resocializing skills through somatic literacy to understand the other's point of view. By the end of the quarter they will use design thinking tools to prototype a diversity imaginarium (Diversitarium), a portable structure and process, that amplifies and capitalizes different points of view to create an appreciation of voice and value to design socially meaningful product and processes.



**ME 29SI. Cars: A Crash Course. 1 Unitss.**

Focus is on the basic mechanics and significance of cars. Topics include a basic, real-world understanding of automobile workings, histories, industries, cultural impact, and related media. Field trips to Tesla Motors and Go-Kart Racer will be organized, and there will be guest appearances by local automotive historians and enthusiasts. Students will get hands on experience with maintaining real cars, see high performance engines run, and have the opportunity to learn how to drive a manual transmission.

**ME 70. Introductory Fluids Engineering. 4 Units.**

Elements of fluid mechanics as applied to engineering problems. Equations of motion for incompressible ideal flow. Hydrostatics. Control volume laws for mass, momentum, and energy. Bernoulli equation. Dimensional analysis and similarity. Flow in ducts. Boundary layer flows. Lift and drag. Lab experiment demonstrations. Prerequisites: ENGR 14 and 30.

**ME 80. Mechanics of Materials. 4 Units.**

Mechanics of materials and deformation of structural members. Topics include stress and deformation analysis under axial loading, torsion and bending, column buckling and pressure vessels. Introduction to stress transformation and multiaxial loading. Prerequisite: ENGR 14.

**ME 101. Visual Thinking. 4 Units.**

Lecture/lab. Visual thinking and language skills are developed and exercised in the context of solving design problems. Exercises for the mind's eye. Rapid visualization and prototyping with emphasis on fluent and flexible idea production. The relationship between visual thinking and the creative process. Enrollment limited to 60.

**ME 103D. Engineering Drawing and Design. 1 Unitss.**

Designed to accompany 203. The fundamentals of engineering drawing including orthographic projection, dimensioning, sectioning, exploded and auxiliary views, assembly drawings, and SolidWorks. Homework drawings are of parts fabricated by the student in the lab. Assignments in 203 supported by material in 103D and sequenced on the assumption that the student is enrolled in both courses simultaneously.

**ME 103N. Product Realization: Making is Thinking. 3 Units.**

Product Realization# encompasses those processes required to transform a concept into the creation of a functional, useful, and beautiful product. In this project-based seminar, students develop product realization confidence and intuition using the rich array of tools available in the Product Realization Lab as well as industry-standard design engineering software programs and course readings in design/realization philosophy. Students develop a portfolio of products including soft goods, composite utensils, wearable electronics, mechatronics devices, and a final project of their own choosing. Interactions with the Stanford design engineering community as well as field trips to iconic Bay area design engineering firms round out students' experience. Learning Goals -Build confidence in transforming concepts into products through foundational texts and rigorous exercises -Master integrated design/realization software and tools through hands-on learning and practice -Engage with the Stanford design engineering community on campus and well beyond.

**ME 104. The Designer's Voice. 1 Unitss.**

Course helps students develop a point of view about their design career that will enable them to articulate their design vision, inspire a design studio, or infect a business with a culture of design-thinking. Focus on the integration of work and worldview, professional values, design language, and the development of the designer's voice. Includes seminar-style discussions, role-playing, short writing assignments, guest speakers, and individual mentoring and coaching. Participants will be required to keep a journal.

**ME 104B. Designing Your Life. 2 Units.**

The course employs a design thinking approach to help students develop a point of view about their career. The course focuses on an introduction to design thinking, the integration of work and worldview, and practices that support vocation formation. The course will include seminar-style discussions, role-playing, short writing assignments, guest speakers, and individual mentoring and coaching. Participants will be required to keep a journal. Enrollment limited to 54; Jrs. and Srs., all majors. Admission to be confirmed by email to Axxess registered students prior to first class session. More information at [www.designingyourlife.org](http://www.designingyourlife.org). \*As of Fall 2012, course is no longer repeatable for credit.

**ME 110. Design Sketching. 1 Unitss.**

Freehand sketching, rendering, and design development. Students develop a design sketching portfolio for review by program faculty. May be repeated for credit.

**ME 112. Mechanical Systems Design. 4 Units.**

Lecture/lab. Characteristics of machine elements including gears, bearings, and shafts. Design for fatigue life. Electric motor fundamentals. Transmission design for maximizing output power or efficiency. Mechanism types, linkage analysis and kinematic synthesis. Team-based design projects emphasizing the balance of physical with virtual prototyping based on engineering analysis. Lab for dissection of mechanical systems and project design reviews. Prerequisites: 80, 101. Recommended: 203, ENGR 15.

**ME 113. Mechanical Engineering Design. 4 Units.**

Capstone course. Mechanical engineering design is experienced by students as they work on team projects obtained from industry or other organizations. Prerequisites: 80,101,112, 203. Enrollment priority to ME majors.

**ME 115A. Introduction to Human Values in Design. 3 Units.**

Lecture/lab. Introduces the central philosophy of the product design program, emphasizing the relation between technical and human values, the innovation process, and design methodology. Lab exercises include development of simple product concepts visualized in rapidly executed three-dimensional mockups. Prerequisite: 101.

**ME 115B. Product Design Methods. 3 Units.**

Problem-finding, problem-solving, intermediate creativity methods and effective techniques for researching and presenting product concepts. Individual- and team-based design projects emphasizing advanced visual thinking and prototyping skills. Prerequisite: ME115A.

**ME 115C. Design and Business Factors. 3 Units.**

Design and Business Factors: Introduces business concepts critical to determining the success of new products and services. Students will learn to estimate the cost of R&D for new product development. Using financial analysis, ROI, and tollgates to reduce development risk will be explored using case studies and simulations. Students will develop a bill of materials and a profit and loss statement for a sample product concept, prototype a design consultancy, and create a business proposal for a proposed new product company.

**ME 120. History and Philosophy of Design. 3 Units.**

Major schools of 19th- and 20th-century design (Arts and Crafts movement, Bauhaus, Industrial Design, and postmodernism) are analyzed in terms of their continuing cultural relevance. The relation of design to art, technology, and politics; readings from principal theorists, practitioners, and critics; recent controversies in industrial and graphic design, architecture, and urbanism. Enrollment limited to 65.

**ME 131A. Heat Transfer. 3-4 Units.**

The principles of heat transfer by conduction, convection, and radiation with examples from the engineering of practical devices and systems. Topics include transient and steady conduction, conduction by extended surfaces, boundary layer theory for forced and natural convection, boiling, heat exchangers, and graybody radiative exchange. Prerequisites: 70, ENGR 30. Recommended: intermediate calculus, ordinary differential equations.

**ME 131B. Fluid Mechanics: Compressible Flow and Turbomachinery. 4 Units.**

Engineering applications involving compressible flow: aircraft and rocket propulsion, power generation; application of mass, momentum, energy and entropy balance to compressible flows; variable area isentropic flow, normal shock waves, adiabatic flow with friction, flow with heat addition. Operation of flow systems: the propulsion system. Turbomachinery: pumps, compressors, turbines. Angular momentum analysis of turbomachine performance, centrifugal and axial flow machines, effect of blade geometry, dimensionless performance of turbomachines; hydraulic turbines; steam turbines; wind turbines. Compressible flow turbomachinery: the aircraft engine. Prerequisites: 70, ENGR 30.

**ME 139. Educating Young STEM Thinkers. 3-5 Units.**

The course will introduce students to the design thinking process, the national conversations about the future of STEM careers, and provide opportunities to work with middle school students and K-12 teachers in STEM-based after-school activities and intercession camps. The course will be both theory and practice focused. The purpose is twofold; to provide reflection and mentoring opportunities for students to learn about pathways to STEM careers and to introduce mentoring opportunities with young STEM thinkers.

Same as: EDUC 139X, EDUC 239X, ME 231.

**ME 140. Advanced Thermal Systems. 5 Units.**

Capstone course. Thermal analysis and engineering emphasizing integrating heat transfer, fluid mechanics, and thermodynamics into a unified approach to treating complex systems. Mixtures, humidity, chemical and phase equilibrium, and availability. Labs apply principles through hands-on experience with a turbojet engine, PEM fuel cell, and hybrid solid/oxygen rocket motor. Use of MATLAB as a computational tool. Prerequisites: ENGR 30, ME 70, and 131A,B.

**ME 161. Dynamic Systems, Vibrations and Control. 3 Units.**

(Graduate students only enroll in 261.) Modeling, analysis, and measurement of mechanical and electromechanical systems. Numerical and closed form solutions of ordinary differential equations governing the behavior of single and multiple degree of freedom systems. Stability, resonance, amplification and attenuation, and control system design. Prerequisite: background in dynamics and calculus such as ENGR 15 and MATH 43. Recommended: CME 102, and familiarity with differential equations, linear algebra, and basic electronics.

Same as: ME 261.

**ME 185. Electric Vehicle Design. 3 Units.**

This project based class focuses on the design and prototyping of electric vehicles. Students learn the fundamentals of vehicle design in class and apply the knowledge as they form teams and work on projects involving concept, specifications, structure, systems, integration, assembly, testing, etc. The class meets once a week to learn about the fundamentals, exchange their experiences, and coordinate between projects. The teams of 3-5 will work on their projects independently.

**ME 190. Ethical Issues in Mechanical Engineering. 4 Units.**

Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; whistle blowing; engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations, and engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies and field research. Enrollment limited to 25 Mechanical Engineering majors.

**ME 191. Engineering Problems and Experimental Investigation. 1-5 Units.**

Directed study and research for undergraduates on a subject of mutual interest to student and staff member. Student must find faculty sponsor and have approval of adviser.

**ME 191H. Honors Research. 1-5 Units.**

Student must find faculty honors adviser and apply for admission to the honors program. (Staff).

**ME 196. Design and Manufacturing Forum. 1 Unitss.**

Invited speakers address issues of interest to design and manufacturing engineering and business students. Sponsored by the Product Realization Laboratory at Stanford.

Same as: ME 396.

**ME 201. Dim Sum of Mechanical Engineering. 1 Unitss.**

Introduction to research in mechanical engineering for M.S. students and upper-division undergraduates. Weekly presentations by current ME Ph.D. and second-year fellowship students to show research opportunities across the department. Strategies for getting involved in a research project. (Sheppard).

**ME 203. Design and Manufacturing. 4 Units.**

Integrated experience involving need finding, product definition, conceptual design, detail design, prototype manufacture, public presentation of outcomes, archiving and interpreting the product realization process and its results. Presents an overview of manufacturing processes crucial to the practice of design. Corequisite: 103D or CAD experience. Corequisite for WIM for Mechanical Engineering and Product Design undergraduate majors: ENGR102M. Recommended: 101.

**ME 203X. Prototyping and Process Capture. 1 Unitss.**

Concepts and methods for low resolution prototyping as an integral activity in engineering design process. Class meetings include presentations by faculty and design oriented exercises by students. Assignments will be Blog Posts. ME203X is designed to work in phase with ME203 and offers greater depth in prototyping strategy, technique, and resultant insights. Concurrent enrollment in ME203 is required. Enrollment is optional and capped at 6 students.

**ME 205. Flexible Part Design. 3 Units.**

Project based course. Students design and fabricate tooling to create and refine elastomeric parts using RTV silicone rubber. Focus is on the development of elastomeric part design intuition through iteration. Fabrication techniques include manual/CNC machining and additive manufacturing, and molding liquid silicone. Prerequisites: ME203 or instructor consent. Recommended: ME318. Admission is by consent of the instructor. Class size limited to 10, must attend first lecture.

**ME 206A. Entrepreneurial Design for Extreme Affordability. 4 Units.**

Project course jointly offered by School of Engineering and Graduate School of Business. Students apply engineering and business skills to design product prototypes, distribution systems, and business plans for entrepreneurial ventures in developing countries for a specified challenge faced by the world's poor. Topics include user empathy, appropriate technology design, rapid prototype engineering and testing, social technology entrepreneurship, business modeling, and project management. Weekly design reviews; final course presentation. Industry and adviser interaction. Limited enrollment via application; see <http://www.stanford.edu/class/me206>.

**ME 206B. Entrepreneurial Design for Extreme Affordability. 4 Units.**

Part two of two-quarter project course jointly offered by School of Engineering and Graduate School of Business. Second quarter emphasizes prototyping and implementation of specific projects identified in first quarter. Students work in cross-disciplinary project teams. Industry and adviser interaction, weekly design reviews; final course presentation. Prerequisite: 206A. (Jointly offered as GSB OIT333B) Design Institute class; see <http://dschool.stanford.edu>.

**ME 208. Patent Law and Strategy for Innovators and Entrepreneurs. 2-3 Units.**

Inventors and entrepreneurs have four concerns related to patent law: protecting their inventions in the very early stages of product development, determining the patentability of their invention, avoiding infringement of a competitor's patent, and leveraging their patent as a business asset. This course will address each of these concerns through the application of law cases and business cases to an invention of the Student's choice. Although listed as a ME/MSE course, the course is not specific to any discipline or technology. Same as: MSE 278.

**ME 210. Introduction to Mechatronics. 4 Units.**

Technologies involved in mechatronics (intelligent electro-mechanical systems), and techniques to apply this technology to mechatronic system design. Topics include: electronics (A/D, D/A converters, op-amps, filters, power devices); software program design, event-driven programming; hardware and DC stepper motors, solenoids, and robust sensing. Large, open-ended team project. Limited enrollment. Prerequisites: ENGR 40, CS 106, or equivalents.

**ME 211. ReMake & Design Lessons from Restoration. 1 Unitss.**

Preference is given to early graduate and advanced undergraduate students. Course will focus on the restoration of the 1962 Cadillac DeVille project car as a design investigation. Topics include: what makes a car a classic? How does this car express luxury, and how is that different from contemporary luxury products? What does the car say about the American identity, and how has that changed over the past half-century? Every student can expect to get their hands dirty; prior automotive experience is not required but everyone is expected to be motivated to learn. Our goal is to have the car operational again by the end of the Fall Quarter. Enrollment limited to 15.

**ME 212. Calibrating the Instrument. 1 Unitss.**

For first-year graduate students in the Joint Program in Design. Means for calibrating the designer's mind/body instrument through tools including improvisation, brainstorming, creative imaging, educational kinesiology, and Brain Gym. Current design issues; guest speakers; shared stories; and goal setting.

**ME 214. Good Products, Bad Products. 3-4 Units.**

The characteristics of industrial products that cause them to be successes or failures: the straightforward (performance, economy, reliability), the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user), the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors to produce more successful products. Projects, papers, guest speakers, field trips. Same as: ME 314.

**ME 216A. Advanced Product Design: Needfinding. 3-4 Units.**

Human needs that lead to the conceptualization of future products, environments, systems, and services. Field work in public and private settings; appraisal of personal values; readings on social ethnographic issues; and needfinding for a corporate client. Emphasis is on developing the flexible thinking skills that enable the designer to navigate the future. Prerequisites for undergraduates: 116 and 203, or consent of instructor.

**ME 216B. Advanced Product Design: Implementation I. 4 Units.**

Summary project using knowledge, methodology, and skills obtained in Product Design major. Students implement an original design concept and present it to a professional jury. Prerequisite: 216A.

**ME 218A. Smart Product Design Fundamentals. 4-5 Units.**

Lecture/Lab. Team design project series on programmable electromechanical systems design. Topics: transistors as switches, basic digital and analog circuits, operational amplifiers, comparators, software design, state machines, programming in C. Lab fee. Limited enrollment.

**ME 218B. Smart Product Design Applications. 4-5 Units.**

Lecture/lab. Second in team design project series on programmable electromechanical systems design. Topics: user I/O, timer systems, interrupts, signal conditioning, software design for embedded systems, statecharts, sensors, actuators, noise, and power supplies. Lab fee. Limited enrollment. Prerequisite: 218A or passing the smart product design fundamentals proficiency examination.

**ME 218C. Smart Product Design Practice. 4-5 Units.**

Lecture/lab. Advanced level in series on programmable electromechanical systems design. Topics: inter-processor communication, system design with multiple microprocessors, architecture and assembly language programming for the PIC microcontroller, controlling the embedded software tool chain, A/D and D/A techniques, electronic manufacturing technology. Team project. Lab fee. Limited enrollment. Prerequisite: 218B.

**ME 218D. Smart Product Design: Projects. 3-4 Units.**

Lecture/lab. Industrially sponsored project is the culmination of the Smart Product Design sequence. Student teams take on an industrial project requiring application and extension of knowledge gained in the prior three quarters, including prototyping of a final solution with hardware, software, and professional documentation and presentation. Lectures extend the students' knowledge of electronic and software design, and electronic manufacturing techniques. Topics: chip level design of microprocessor systems, real time operating systems, alternate microprocessor architectures, and PCB layout and fabrication. Prerequisite: 218C.

**ME 219. The Magic of Materials and Manufacturing. 3 Units.**

ME219 is intended for design-oriented students who anticipate imagining and then creating new products with a focus on materiality and brand or design and business. ME219 assumes a basic knowledge of materials and manufacturing processes which results from taking E50, ME203, or equivalent course/life experience. Our graduates will acquire professional foundation information about materials and materiality from a product design point-of-view, manufacturing processes and business systems inside a factory, and story-telling by book authorship, essay writing, and multimedia presentation. We hope our graduates will exhibit a deep and life-long love of materials and manufacturing in order to make great products and tell a good story about each one.

**ME 220. Introduction to Sensors. 3-4 Units.**

Sensors are widely used in scientific research and as an integral part of commercial products and automated systems. The basic principles for sensing displacement, force, pressure, acceleration, temperature, optical radiation, nuclear radiation, and other physical parameters. Performance, cost, and operating requirements of available sensors. Elementary electronic circuits which are typically used with sensors. Lecture demonstration of a representative sensor from each category elucidates operating principles and typical performance. Lab experiments with off-the-shelf devices.

**ME 223. Innovating Water Solutions for Developing Countries. 2-3 Units.**

The future of global water resources is a challenge of immense salience. Currently 1.1 billion people lack safe drinking water and 2.6 billion people lack adequate sanitation. The United Nations, Food and Agriculture Organization states that by 2025, 1.9 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under stress conditions. The Stanford ChangeLabs has initiated a project called the 100 Liter Water project, designed to form strategies that will deliver a minimum of 100 liters of water per day per family to the poorest communities in the world. This class is meant primarily for Graduate students and Seniors with strong design and mechanical engineering backgrounds. This is a self-directed project class is restricted to 15 students, who are selected through an application process. Please go to <https://xxxx> to apply for this project based class being offered in Fall 2012-13. Students are expected to work individually and in teams on specific water related technologies such as Solar based low flow pumping systems, rainwater catchment systems, and storage systems. The studio class will entail working on the design of Solar Powered low flow pumps, rainwater catchment systems, and very low cost storage systems designed for sparsely distributed communities in water stressed regions of the world. Students will be expected to work with autonomy and self-direction, going through multiple rounds of prototyping to generate breakthrough technologies designed to make deep impact.

**ME 227. Vehicle Dynamics and Control. 3 Units.**

The application of dynamics, kinematics, and control theory to the analysis and design of ground vehicle behavior. Simplified models of ride, handling, and braking, their role in developing intuition, and limitations in engineering design. Suspension design fundamentals. Performance and safety enhancement through automatic control systems. In-car laboratory assignments for model validation and kinesthetic understanding of dynamics. Limited enrollment. Prerequisites: ENGR 105, consent of instructor.

**ME 231. Educating Young STEM Thinkers. 3-5 Units.**

The course will introduce students to the design thinking process, the national conversations about the future of STEM careers, and provide opportunities to work with middle school students and K-12 teachers in STEM-based after-school activities and intercession camps. The course will be both theory and practice focused. The purpose is twofold; to provide reflection and mentoring opportunities for students to learn about pathways to STEM careers and to introduce mentoring opportunities with young STEM thinkers.

Same as: EDUC 139X, EDUC 239X, ME 139.

**ME 233. Making it Big: Crossing the Entrepreneur's Gap. 3 Units.**

Students learn to take novel designs into entrepreneurial production and prepare for market production. Education, resources, and community are provided to help students cross the gap, founding ideas and making them real, in volume. Topics include entrepreneurial production methods and initiation, vendor selection and engagement, cost, design transfer, quality and testing, manufacturing planning and execution. Course prepares students for leadership roles in entrepreneurial as well as large production-oriented companies. Case studies, regular project reviews, final presentation, industry interaction.

**ME 236. Tales to Design Cars By. 3 Units.**

Investigating a person's relationship with cars through the application of research and with a generative storytelling focus will provide inspiration for designing a new automotive experience. This course will use ethnographic research, interviews, and a variety of narrative methods including verbal, non-verbal, cinema, and sound, and short collaborative projects to inform the creation of a physical prototype for a new car experience and the story around it. Restricted to co-term and graduate students.

**ME 238. Patent Prosecution. 2 Units.**

(Same as LAW231) Stages of the patent application process: identifying, capturing, and evaluating inventions; performing a patentability investigation, analyzing the documents, and the scope of the patent protection; composing claims that broadly cover the invention; creating a specification that supports the claims; filing a patent application with the U.S. Patent and Trademark Office; and analyzing an office action and preparing an appropriate response. Current rules and case law. Strategic decisions within each stage, such as: how does a patent application advance the patent portfolio; and in what countries should a patent application be filed? Same as Law 321.

**ME 239. Mechanics of the Cell. 3 Units.**

Kinematical description of basic structural elements used to model parts of the cell: rods, ropes, membranes, and shells. Formulation of constitutive equations: nonlinear elasticity and entropic contributions. Elasticity of polymeric networks. Applications to model basic filaments of the cytoskeleton: actin, microtubules, intermediate filaments, and complete networks. Applications to biological membranes.

**ME 250. Internal Combustion Engines. 1-5 Units.**

Internal combustion engines including conventional and turbocharged spark ignition, and diesel engines. Lectures: basic engine cycles, engine components, methods of analysis of engine performance, pollutant emissions, and methods of engine testing. Lab involves hands-on experience with engines and test hardware. Limited enrollment. Prerequisites: 140.

**ME 257. Turbine and Internal Combustion Engines. 3 Units.**

Principles of design analysis for aircraft gas turbines and automotive piston engines. Analysis for aircraft engines performed for Airbus A380 type aircraft. Design parameters determined considering aircraft aerodynamics, gas turbine thermodynamics, compressible flow physics, and material limitations. Additional topics include characteristics of main engine components, off-design analysis, and component matching. Performance of automotive piston engines including novel engine concepts in terms of engine thermodynamics, intake and exhaust flows, and in-cylinder flow. Same as: ME 357.

**ME 260. Fuel Cell Science and Technology. 3 Units.**

Emphasis on proton exchange membrane (PEM) and solid oxide fuel cells (SOFC), and principles of electrochemical energy conversion. Topics in materials science, thermodynamics, and fluid mechanics. Prerequisites: MATH 43, PHYSICS 55, and ENGR 30 or ME 140, or equivalents.

**ME 261. Dynamic Systems, Vibrations and Control. 3 Units.**

(Graduate students only enroll in 261.) Modeling, analysis, and measurement of mechanical and electromechanical systems. Numerical and closed form solutions of ordinary differential equations governing the behavior of single and multiple degree of freedom systems. Stability, resonance, amplification and attenuation, and control system design. Prerequisite: background in dynamics and calculus such as ENGR 15 and MATH 43. Recommended: CME 102, and familiarity with differential equations, linear algebra, and basic electronics. Same as: ME 161.

**ME 265. Technology Licencing and Commercialization. 3 Units.**

How to profit from technology; processes and strategies to commercialize functional or artistic inventions and creations (not limited to mechanical engineering). Business and legal aspects of determining what can be owned and licensed, how to determine commercial value, and what agreements are necessary. Contract and intellectual property law; focus is on provisions of license agreements and their negotiation.

**ME 266. Introduction to Physiology and Biomechanics of Hearing. 3 Units.**

Hearing is fundamental to our ability to communicate, yet in the US alone over 30 million people suffer some form of hearing impairment. As engineers and scientists, it is important for us to understand the underlying principles of the auditory system if we are to devise better ways of helping those with hearing loss. The goal of this course is to introduce undergraduate and graduate students to the anatomy, physiology, and biomechanics of hearing. Principles from acoustics, mechanics, and hydrodynamics will be used to build a foundational understanding of one of the most complex, interdisciplinary, and fascinating areas of biology. Topics include the evolution of hearing, computational modeling approaches, fluid-structure interactions, ion-channel transduction, psychoacoustics, diagnostic tools, and micrometer to millimeter scale imaging methods. We will also study current technologies for mitigating hearing loss via passive and active prostheses, as well as future regenerative therapies.

**ME 277. Graduate Design Research Techniques. 3-4 Units.**

ME 277 Design What? Graduate Design Research Techniques ζ This class brings together students from different backgrounds to work on real-world design challenges. ζ We will explore Design Thinking process with a particular emphasis on: ethnographic techniques, needfinding, framing and concept generation. ζ We use the Design Thinking process as a lens to explore ways to better understand people and their culture. ζ We use cultural differences as a source of design inspiration, with the understanding that design itself is a ζculturally embedded practice.

**ME 280. Skeletal Development and Evolution. 3 Units.**

The mechanobiology of skeletal growth, adaptation, regeneration, and aging is considered from developmental and evolutionary perspectives. Emphasis is on the interactions between mechanical and chemical factors in the regulation of connective tissue biology. Prerequisites: BIO 42, and ME 80 or BIOE 42. Same as: BIOE 280.

**ME 281. Biomechanics of Movement. 3 Units.**

Experimental techniques to study human and animal movement including motion capture systems, EMG, force plates, medical imaging, and animation. The mechanical properties of muscle and tendon, and quantitative analysis of musculoskeletal geometry. Projects and demonstrations emphasize applications of mechanics in sports, orthopedics, and rehabilitation. Same as: BIOE 281.

**ME 283. Introduction to Biomechanics. 3 Units.**

Introduction to the application of mechanical engineering analysis to understand human physiology and disease. Topics include basics of musculoskeletal force analysis, cell mechanics, blood flow, and mechanical behaviors of tissues. Undergraduates should have taken ME 70 and ME 80 or equivalents.

**ME 287. Mechanics of Biological Tissues. 3 Units.**

Introduction to the mechanical behaviors of biological tissues in health and disease. Overview of experimental approaches to evaluating tissue properties and mathematical constitutive models. Elastic behaviors of hard tissues, nonlinear elastic and viscoelastic models for soft tissues.

**ME 294. Medical Device Design. 1 Unitss.**

In collaboration with the School of Medicine. Introduction to medical device design for undergraduate and graduate engineering students. ME294 is the lecture portion of the class. For involvement with design and projects, co-enroll in the lab portion, ME294L.

**ME 294L. Medical Device Design Lab. 3 Units.**

In collaboration with the School of Medicine. This is the lab portion of ME294, which must be taken concurrently. Introduction to medical device design for undergraduate and graduate engineering students. Design, prototyping and labs. Medical device environments may include hands-on device testing; and field trips to operating rooms and local device companies. Prerequisite: 203.

**ME 297. Forecasting for Innovators:Technology, Tools & Social Change. 3 Units.**

Technologies from the steam engine to the microprocessor have been mixed gifts, at once benefitting humankind and creating many of the problems facing humanity today. This class will explore how innovators can use forecasting methods to identify new challenges, develop responsive innovations and anticipate unintended consequences. Students will produce a long-range forecast project, applying a variety of methodologies including research, expert interviews and graphical exploration.

**ME 298. Silversmithing and Design. 3-4 Units.**

Skills involved in working with precious metals at a small scale. Investment casting and fabrication techniques such as reticulation, granulations, filigree, and mokume gane.

**ME 299A. Practical Training. 1 Unitss.**

For master's students. Educational opportunities in high technology research and development labs in industry. Students engage in internship work and integrate that work into their academic program. Following internship work, students complete a research report outlining work activity, problems investigated, key results, and follow-up projects they expect to perform. Meets the requirements for curricular practical training for students on F-1 visas. Student is responsible for arranging own internship/employment and faculty sponsorship. Register under faculty sponsor's section number. All paperwork must be completed by student and faculty sponsor, as the Student Services Office does not sponsor CPT. Students are allowed only two quarters of CPT per degree program. Course may be repeated twice.

**ME 299B. Practical Training. 1 Unitss.**

For Ph.D. students. Educational opportunities in high technology research and development labs in industry. Students engage in internship work and integrate that work into their academic program. Following internship work, students complete a research report outlining work activity, problems investigated, key results, and follow-up projects they expect to perform. Meets the requirements for curricular practical training for students on F-1 visas. Student is responsible for arranging own internship/employment and faculty sponsorship. Register under faculty sponsor's section number. All paperwork must be completed by student and faculty sponsor, as the student services office does not sponsor CPT. Students are allowed only two quarters of CPT per degree program. Course may be repeated twice.

**ME 300A. Linear Algebra with Application to Engineering Computations. 3 Units.**

Computer based solution of systems of algebraic equations obtained from engineering problems and eigen-system analysis, Gaussian elimination, effect of round-off error, operation counts, banded matrices arising from discretization of differential equations, ill-conditioned matrices, matrix theory, least square solution of unsolvable systems, solution of non-linear algebraic equations, eigenvalues and eigenvectors, similar matrices, unitary and Hermitian matrices, positive definiteness, Cayley-Hamilton theory and function of a matrix and iterative methods. Prerequisite: familiarity with computer programming, and MATH104, 113, or equivalent. Same as: CME 200.

**ME 300B. Partial Differential Equations in Engineering. 3 Units.**

Geometric interpretation of partial differential equation (PDE) characteristics; solution of first order PDEs and classification of second-order PDEs; self-similarity; separation of variables as applied to parabolic, hyperbolic, and elliptic PDEs; special functions; eigenfunction expansions; the method of characteristics. If time permits, Fourier integrals and transforms, Laplace transforms. Prerequisite: CME 200/ME 300A, equivalent, or consent of instructor. Same as: CME 204.

**ME 300C. Introduction to Numerical Methods for Engineering. 3 Units.**

Numerical methods from a user's point of view. Lagrange interpolation, splines. Integration: trapezoid, Romberg, Gauss, adaptive quadrature; numerical solution of ordinary differential equations: explicit and implicit methods, multistep methods, Runge-Kutta and predictor-corrector methods, boundary value problems, eigenvalue problems; systems of differential equations, stiffness. Emphasis is on analysis of numerical methods for accuracy, stability, and convergence. Introduction to numerical solutions of partial differential equations; Von Neumann stability analysis; alternating direction implicit methods and nonlinear equations. Prerequisites: CME 200/ME 300A, CME 204/ME 300B. Same as: AA 214A, CME 206.

**ME 301. LaunchPad:Design and Launch your Product or Service. 4 Units.**

Apply principles of design thinking to the real-life challenge of imagining, prototyping, testing and iterating, building, marketing, and selling your product or service. Work will be in teams (you apply as an intact team) or alone. You must submit a proposal and team for approval. Proposal can be a physical good or service of any kind. Projects are treated as real start-ups, so the work will be intense. Proposal submitted by Feb 15, 2010 acceptance by March 1. Design Institute class; see <http://dschool.stanford.edu>.

**ME 302. The Future of the Automobile. 1 Unitss.**

The objective of this course is to develop an understanding for the requirements that go into the design of a highly complex yet easy-to-use product, i.e. the automobile. Students will learn about very different interdisciplinary aspects that characterize the automobile and personal mobility. In the first half of the quarter, the class will discuss different design parameters for everyone's favorite car and thereby realize certain characteristics and conflicts. In the second half of the quarter, guest speakers from academia and industry will share their vision regarding the future of the automobile and how design challenges are addressed within their respective organizations. At the end of the quarter, students will have developed a broader understanding of the intertwined technology - environmental - human - business - legal aspects that will shape the future of the automobile.

**ME 303. Biomechanics of Flight. 3 Units.**

Study of biological flight as an inspiration for designing robots. The goal is to give students a broad understanding of the biomechanics of animal and plant flight, and a more in-depth understanding of bird flight. This course will elucidate how students can pick and choose exciting biological questions, use biological and engineering techniques to answer them, and use the results as an inspiration to develop innovative flying robots. Techniques discussed will range from theoretical approaches, programming, engineering measurement techniques, ethical aspects of biological research, reward based training techniques for animal flight experiments, to bio-inspired design thinking. Prerequisites: (fluid mechanics OR aerodynamics) AND (Matlab OR Arduino OR similar programming skills). This multidisciplinary course provides all interested ME, AA, and BIOE students a unique opportunity to learn how to integrate biology, engineering, and design.

**ME 304. The Designer's Voice. 1 Unitss.**

Course helps students develop a point of view about their design career that will enable them to articulate their design vision, inspire a design studio, or infect a business with a culture of design-thinking. Focus on the integration of work and worldview, professional values, design language, and the development of the designer's voice. Includes seminar-style discussions, role-playing, short writing assignments, guest speakers, and individual mentoring and coaching. Participants will be required to keep a journal.

**ME 307. Green's Function Methods in Engineering. 3 Units.**

The concept of Green's Functions used to recast ordinary and partial dislocations as integral equations with built-in boundary conditions will be developed, including the inclusion of modified Green's Functions, where appropriate. Applications to the solutions of ODE's and elliptic, hyperbolic, and parabolic partial differential equations will be studied, including Laplace's equation, the wave and reduced wave equation, the diffusion/heat conduction equation, and the equations of motion of linear elastic theory. The course will be self-contained, so that a working knowledge of simple ODE's and the separation of variables method is the only prerequisite. Class notes will be provided. Same as: MATSCI 307.

**ME 308. Spatial Motion. 3 Units.**

The geometry of motion in Euclidean space. Fundamentals of theory of screws with applications to robotic mechanisms, constraint analysis, and vehicle dynamics. Methods for representing the positions of spatial systems of rigid bodies with their inter-relationships; the formulation of Newton-Euler kinetics applied to serial chain systems such as industrial robotics.

**ME 309. Finite Element Analysis in Mechanical Design. 3 Units.**

Basic concepts of finite elements, with applications to problems confronted by mechanical designers. Linear static, modal, and thermal formulations emphasized; nonlinear and dynamic formulations introduced. Application of a commercial finite element code in analyzing design problems. Issues: solution methods, modeling techniques, features of various commercial codes, basic problem definition. Individual projects focus on the interplay of analysis and testing in product design/development. Prerequisites: Math 103, or equivalent. Recommended: ME80 or CEE101A, or equivalent in structural and/or solid mechanics; some exposure to principles of heat transfer.

**ME 310A. Project-Based Engineering Design, Innovation, and Development. 4 Units.**

Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.

**ME 310B. Project-Based Engineering Design, Innovation, and Development. 4 Units.**

Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.

**ME 310C. Project-Based Engineering Design, Innovation, and Development. 4 Units.**

Three quarter sequence; for engineering graduate students intending to lead projects related to sustainability, automotive, biomedical devices, communication, and user interaction. Student teams collaborate with academic partners in Europe, Asia, and Latin America on product innovation challenges presented by global corporations to design requirements and construct functional prototypes for consumer testing and technical evaluation. Design loft format such as found in Silicon Valley consultancies. Typically requires international travel. Prerequisites: undergraduate engineering design project; consent of instructor.

**ME 310X. New Product Management. 1 Unit.**

Restricted to graduate students. Focus is on the role of the product manager in industry. Topics include product management skills, leadership and team management, getting a product management job, corporate and project finance for engineers, sales and marketing for engineers and business strategy. Seminar with in-class exercises and guest speakers from industry. Limited to 50. Prerequisite: Enrolled ME310 students only.

**ME 312. Advanced Product Design: Formgiving. 3 Units.**

Lecture/lab. Small- and medium-scale design projects carried to a high degree of aesthetic refinement. Emphasis is on form development, design process, and model making. Prerequisites: 203, 313. Corequisite: ARTSTUDI 260.

**ME 313. Human Values and Innovation in Design. 3 Units.**

Introduction to the philosophy, spirit, and tradition of the product design program. Hands-on design projects used as vehicles for design thinking, visualization, and methodology. The relationships among technical, human, aesthetic, and business concerns. Drawing, prototyping, and design skills. Focus is on tenets of design philosophy: point of view, user-centered design, design methodology, and iterative design.

**ME 314. Good Products, Bad Products. 3-4 Units.**

The characteristics of industrial products that cause them to be successes or failures: the straightforward (performance, economy, reliability), the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user), the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors to produce more successful products. Projects, papers, guest speakers, field trips. Same as: ME 214.

**ME 315. The Designer in Society. 3 Units.**

For graduate students. Career objectives and psychological orientation compared with existing social values and conditions. Emphasis is on assisting individuals in assessing their roles in society. Readings on political, social, and humanistic thought are related to technology and design. Experiential, in-class exercises, and term project. Enrollment limited to 24.

**ME 316A. Product Design Master's Project. 2-6 Units.**

For graduate Product Design or Design (Art) majors only. Student teams, under the supervision of the design faculty, spend the quarter researching master's project topics. Students are expected to demonstrate mastery of design thinking methods including; needfinding, brainstorming, field interviews and synthesis during this investigation. Masters projects are selected that involve the synthesis of aesthetics and technological concerns in the service of human need. Design Institute class; see <http://dschool.stanford.edu>. Prereq: ME216A, ME313, ME 311.

**ME 316B. Product Design Master's Project. 1-6 Units.**

Design Garage is a Winter/Spring class (a two quarter commitment is required). The class is a deep dive in design thinking that uses student-lead projects to teach design process and methods. The projects come from investigations conducted during the Fall quarter where the preliminary need finding, customer research, and product or service ideas have been developed to provide the "seed" projects for the student design teams. Students will learn the methodologies of design thinking by bringing a product, service, or experience to market. Students apply to Design Garage in the Fall, and teams are formed after interviews and applications are reviewed. Prerequisite: graduate student standing.

**ME 316C. Product Design Master's Project. 1-6 Units.**

This is the second half of the two quarter Design Garage sequence. Students will complete projects begun in ME316B the prior quarter. Prerequisite: ME316C and graduate student standing. Design Institute class; see <http://dschool.stanford.edu>.

**ME 317A. Design Methods: Product Definition. 4 Units.**

Systematic methodologies to define, develop, and produce world-class products. Student team projects to identify opportunities for improvement and develop a comprehensive product definition. Topics include value engineering, quality function deployment, design for assembly and producibility, design for variety and supply chain, design for life-cycle quality, and concurrent engineering. Students must take 317B to complete the project and obtain a letter grade. On-campus enrollment limited to 20; SCPD class size limited to 50, and each site must have at least 3 students to form a project team.

**ME 317B. Design Methods: Quality By Design. 4 Units.**

Building on 317A, focus is on the implementation of competitive product design. Student groups apply structured methods to optimize the design of an improved product, and plan for its manufacture, testing, and service. The project deliverable is a comprehensive product and process specification. Topics: concept generation and selection (Pugh's Method), FMEA applied to the manufacturing process, design for robustness, Taguchi Method, SPC and six sigma process, tolerance analysis, flexible manufacturing, product testing, rapid prototyping. Enrollment limited to 40, not including SCPD students. Minimum enrollment of two per SCPD viewing site; single student site by prior consent of instructor. On-campus class limited to 20. For SCPD students, limit is 50 and each site must have a minimum of three students to form a project team and define a project on their own. Prerequisite: 317A.

**ME 318. Computer-Aided Product Creation. 4 Units.**

Design course focusing on an integrated suite of computer tools: rapid prototyping, solid modeling, computer-aided machining, and computer numerical control manufacturing. Students choose, design, and manufacture individual products, emphasizing individual design process and computer design tools. Field trips demonstrate Stanford Product Realization Lab's relationship to the outside world. Structured lab experiences build a basic CAD/CAM/CNC proficiency. Limited enrollment. Prerequisite: consent of instructor.

**ME 319. Fundamentals of Design for Design Thinkers. 2-4 Units.**

This course is an introduction to the fundamental principles of Design, geared toward graduate students involved and invested in innovation and design thinking. Core concepts include Contrast, Color, Materiality, Form, Proportion, Transitions, and more. Students will be introduced to the major philosophical concepts of design in readings and in class, and will practice techniques in class and via weekly hands-on projects out of class, culminating in a final personal project. Students will also be introduced to many hands-on prototyping and making skills via access to the Product Realization Lab and Room 36 (webshop.stanford.edu).

**ME 320. Introduction to Robotics. 3 Units.**

Robotics foundations in modeling, design, planning, and control. Class covers relevant results from geometry, kinematics, statics, dynamics, motion planning, and control, providing the basic methodologies and tools in robotics research and applications. Concepts and models are illustrated through physical robot platforms, interactive robot simulations, and video segments relevant to historical research developments or to emerging application areas in the field. Recommended: matrix algebra.

Same as: CS 223A.

**ME 321. Optofluidics: Interplay of Light and Fluids at the Micro and Nanoscale. 3 Units.**

Many optical systems in biology have sophisticated designs with functions that conventional optics cannot achieve: no synthetic materials, for example, can provide the camouflage capability exhibited by some animals. This course overviews recent efforts--some inspired by examples in biology--in using fluids, soft materials and nanostructures to create new functions in optics. Topics include electrowetting lenses, electronic inks, colloidal photonic crystals, bioinspired optical nanostructures, nanophotonic biosensors, lens-less optofluidic microscopes. The use of optics to control fluids is also discussed: optoelectronic tweezers, particle trapping and transport, microrheology, optofluidic sorters, fabrication and self-assembly of novel micro and nanostructures.

**ME 323. Modeling and Identification of Mechanical Systems for Control. 3 Units.**

Lecture/Lab. The art and science behind developing mathematical models for control system design. Theoretical and practical system modeling and parameter identification. Frequency domain identification, parametric modeling, and black-box identification. Analytical work and laboratory experience with identification, controller implementation, and the implications of unmodeled dynamics and non-linearities. Prerequisites: linear algebra and system simulation with MATLAB/SIMULINK; ENGR 105.

**ME 324. Precision Engineering. 4 Units.**

Advances in engineering are often enabled by more accurate control of manufacturing and measuring tolerances. Concepts and technology enable precision such that the ratio of overall dimensions to uncertainty of measurement is large relative to normal engineering practice. Typical application areas: non-spherical optics, computer information storage devices, and manufacturing metrology systems. Application experience through design and manufacture of a precision engineering project, emphasizing the principles of precision engineering. Structured labs; field trips. Prerequisite: consent of instructors.

**ME 327. Design and Control of Haptic Systems. 3 Units.**

Study of the design and control of haptic systems, which provide touch feedback to human users interacting with virtual environments and teleoperated robots. Focus is on device modeling (kinematics and dynamics), synthesis and analysis of control systems, design and implementation, and human interaction with haptic systems. Coursework includes homework/laboratory assignments and a research-oriented project. Directed toward graduate students and advanced undergraduates in engineering and computer science. Prerequisites: dynamic systems and MATLAB programming. Suggested experience with C/C++ programming and feedback control design.

**ME 328. Medical Robotics. 3 Units.**

Study of the design and control of robots for medical applications. Focus is on robotics in surgery and interventional radiology, with introduction to other healthcare robots. Delivery is through instructor lectures and weekly guest speakers. Coursework includes homework and laboratory assignments, an exam, and a research-oriented project. Directed toward graduate students and advanced undergraduates in engineering and computer science; no medical background required. Prerequisites: dynamic systems and MATLAB programming. Suggested experience with C/C++ programming, feedback control design, and linear systems. Cannot be taken concurrently with CS 571.

**ME 331A. Advanced Dynamics & Computation. 3 Units.**

Newton, Euler, momentum, and road-map methods and computational tools for 3-D force and motion analysis of multibody systems. Power, work, and energy. Numerical solutions (e.g., MATLAB, etc.) of nonlinear algebraic and differential equations governing the static and dynamic behavior of multiple degree of freedom systems.

**ME 331B. Advanced Dynamics, Simulation & Control. 3 Units.**

Advanced methods and computational tools for the efficient formulation of equations of motion for multibody systems. D'Alembert principle. Power, work, and energy. Kane's method. Lagrange's method. Computed torque control. Systems with constraints. Quaternions Numerical solutions of nonlinear algebraic and differential equations governing the behavior of multiple degree of freedom systems.

**ME 333. Mechanics. 3 Units.**

Goal is a common basis for advanced mechanics courses. Introduction to variation calculus. Formulation of the governing equations from a Lagrangian perspective for finite and infinite dimensional mechanical systems. Examples include systems of particles and linear elastic solids. Introduction to tensors. Definition and interpretation of Cauchy stress tensor.

**ME 335A. Finite Element Analysis. 3 Units.**

Fundamental concepts and techniques of primal finite element methods. Method of weighted residuals, Galerkin's method and variational equations. Linear elliptic boundary value problems in one, two and three space dimensions; applications in structural, solid and fluid mechanics and heat transfer. Properties of standard element families and numerically integrated elements. Implementation of the finite element method using Matlab, assembly of equations, and element routines. Lagrange multiplier and penalty methods for treatment of constraints. The mathematical theory of finite elements.

**ME 335B. Finite Element Analysis. 3 Units.**

Finite element methods for linear dynamic analysis. Eigenvalue, parabolic, and hyperbolic problems. Mathematical properties of semi-discrete (t-continuous) Galerkin approximations. Modal decomposition and direct spectral truncation techniques. Stability, consistency, convergence, and accuracy of ordinary differential equation solvers. Asymptotic stability, over-shoot, and conservation laws for discrete algorithms. Mass reduction. Applications in heat conduction, structural vibrations, and elastic wave propagation. Computer implementation of finite element methods in linear dynamics. Implicit, explicit, and implicit-explicit algorithms and code architectures.

**ME 335C. Finite Element Analysis. 3 Units.**

Variational formulation of nonlinear elliptic, parabolic and hyperbolic problems. Newton's method for solving nonlinear algebraic systems; load-stepping, convergence, divergence and bifurcation. Enhancement of Newton's method including line-search, quasi-Newton and arc-length methods. Finite element approximation and consistent linearization; definition of the tangent operator and residual vector. Data structures for nonlinear finite element analysis. Examples drawn from nonlinear (rigid) heat conduction, nonlinear elasticity and contact mechanics.



**ME 336. Crystalline Anisotropy. 3 Units.**

Matrix and tensor analysis with applications to the effects of crystal symmetry on elastic deformation, thermal expansion, diffusion, piezoelectricity, magnetism, thermodynamics, and optical properties of solids, on the level of J. F. Nye's *Physical Properties of Crystals*. Homework sets use Mathematica.  
Same as: MATSCI 359.

**ME 337. Mechanics of Growth. 3 Units.**

Introduction to continuum theory and computational simulation of living matter. Kinematics of finite growth. Balance equations in open system thermodynamics. Constitutive equations for living systems. Custom-designed finite element solution strategies. Analytical solutions for simple model problems. Numerical solutions for clinically relevant problems such as: bone remodeling; wound healing; tumor growth; atherosclerosis; heart failure; tissue expansion; and high performance training.

**ME 338. Continuum Mechanics. 3 Units.**

Linear and nonlinear continuum mechanics for solids. Introduction to tensor algebra and tensor analysis. Kinematics of motion. Balance equations of mass, linear and angular momentum, energy, and entropy. Constitutive equations of isotropic and anisotropic hyperelasticity. Recommended as prerequisite for Finite Element Methods.

**ME 338B. Continuum Mechanics. 3 Units.**

Constitutive theory; equilibrium constitutive relations; material frame indifference and material symmetry; finite elasticity; formulation of the boundary value problem; linearization and well-posedness; symmetries and configurational forces; numerical considerations.

**ME 339. Introduction to parallel computing using MPI, openMP, and CUDA. 3 Units.**

This class will give hands on experience with programming multicore processors, graphics processing units (GPU), and parallel computers. Focus will be on the message passing interface (MPI, parallel clusters) and the compute unified device architecture (CUDA, GPU). Topics will include: network topologies, modeling communication times, collective communication operations, parallel efficiency, MPI, dense linear algebra using MPI. Symmetric multiprocessing (SMP), pthreads, openMP. CUDA, combining MPI and CUDA, dense linear algebra using CUDA, sort, reduce and scan using CUDA. Pre-requisites include: C programming language and numerical algorithms (solution of differential equations, linear algebra, Fourier transforms).  
Same as: CME 213.

**ME 340. Theory and Applications of Elasticity. 3 Units.**

This course provides an introduction to the elasticity theory and its application to material structures at microscale. The basic theory includes the definition of stress, strain and elastic energy; equilibrium and compatibility conditions; and the formulation of boundary value problems. We will mainly discuss the stress function method to solve 2D problems and will briefly discuss the Green's function approach for 3D problems. The theory and solution methods are then applied to contact problems as well as microscopic defects in solids, such as voids, inclusions, cracks, and dislocations. Computer programming in Matlab is used to aid analytic derivation and numerical solutions of elasticity problems.

**ME 342. Theory and Application of Inelasticity. 3 Units.**

Theories of plasticity and fracture phenomena from both phenomenological and micromechanical viewpoints. Yield surface, flow rules, strain hardening models, and applications to creep. Plastic zone near crack tip. Linear fracture mechanics and other criteria for crack initiation and growth. Application to fatigue. Classical analytic solutions will be discussed together with numerical solutions of plane elastoplastic problems by Matlab.

**ME 342A. MEMS Laboratory. 3-4 Units.**

Practice and theory of MEMS device design and fabrication, orientation to fabrication facilities, and introduction to techniques for design and evaluation of MEMS devices in the context of designed projects. Emphasis on MEMS design (need finding, brainstorming, evaluation, and design methodology), characterization, and fabrication, including photolithography, etching, oxidation, diffusion, and ion implantation. Limited enrollment. Prerequisite: engineering or science background and consent of instructor.

**ME 342D. MEMS Laboratory Assignments. 1-3 Units.**

Prerequisite: consent of instructor.

**ME 345. Fatigue Design and Analysis. 3 Units.**

The mechanism and occurrences of fatigue in service. Methods for predicting fatigue life and for protecting against premature fatigue failure. Use of elastic stress and inelastic strain analyses to predict crack initiation life. Use of linear elastic fracture mechanics to predict crack propagation life. Effects of stress concentrations, manufacturing processes, load sequence, irregular loading, multi-axial loading. Subject is treated from the viewpoints of the engineer seeking up-to-date methods of life prediction and the researcher interested in improving understanding of fatigue behavior. Prerequisite: undergraduate mechanics of materials.

**ME 346A. Introduction to Statistical Mechanics. 3 Units.**

The main purpose of this course is to provide students with enough statistical mechanics background to the Molecular Simulations classes (ME 346B,C), including the fundamental concepts such as ensemble, entropy, and free energy, etc. The main theme of this course is how the laws at the macroscale (thermodynamics) can be obtained by analyzing the spontaneous fluctuations at the microscale (dynamics of molecules). Topics include thermodynamics, probability theory, information entropy, statistical ensembles, phase transition and phase equilibrium. Recommended: PHYSICS 110 or equivalent.

**ME 346B. Introduction to Molecular Simulations. 3 Units.**

Algorithms of molecular simulations and underlying theories. Molecular dynamics, time integrators, modeling thermodynamic ensembles (NPT, NVT), free energy, constraints. Monte Carlo simulations, parallel tempering. Stochastic equations, Langevin and Brownian dynamics. Applications in solids, liquids, and biomolecules (proteins). Programming in Matlab.

**ME 346C. Advanced Techniques for Molecular Simulations. 3 Units.**

Advanced methods for computer simulations of solids and molecules. Methods for long-range force calculation, including Ewald methods and fast multipole method. Methods for free energy calculation, such as thermodynamic integration. Methods for predicting rates of rare events (e.g. nucleation), including nudged elastic band method and umbrella sampling method. Students will work on projects in teams.

**ME 347. Mathematical Theory of Dislocations. 3 Units.**

The mathematical theory of straight and curvilinear dislocations in linear elastic solids. Stress fields, energies, and Peach-Koehler forces associated with these line imperfections. Anisotropic effects, Green's function methods, and the geometrical techniques of Brown and Indenbom-Orlov for computing dislocation fields and for studying dislocation interactions. Continuously distributed dislocations and cracks and inclusions.

**ME 348. Experimental Stress Analysis. 3 Units.**

Theory and applications of photoelasticity, strain gages, and holographic interferometry. Comparison of test results with theoretical predictions of stress and strain. Discussion of other methods of stress and strain determination (optical fiber strain sensors, acoustoelasticity, thermoelasticity, brittle coating, Moire interferometry, residual stress determination). Six labs plus mini-project. Limited enrollment. Lab fee.

**ME 349. Variational Methods in Elasticity and Plate Theory. 3 Units.**

An introduction to variational calculus methods and their applications to the theories of elasticity and plates.

**ME 351A. Fluid Mechanics. 3 Units.**

Exact and approximate analysis of fluid flow covering kinematics, global and differential equations of mass, momentum, and energy conservation. Forces and stresses in fluids. Euler's equations and the Bernoulli theorem applied to inviscid flows. Vorticity dynamics. Topics in irrotational flow: stream function and velocity potential for exact and approximate solutions; superposition of solutions; complex potential function; circulation and lift. Some boundary layer concepts.

**ME 351B. Fluid Mechanics. 3 Units.**

Laminar viscous fluid flow. Governing equations, boundary conditions, and constitutive laws. Exact solutions for parallel flows. Creeping flow limit, lubrication theory, and boundary layer theory including free-shear layers and approximate methods of solution; boundary layer separation. Introduction to stability theory and transition to turbulence, and turbulent boundary layers. Prerequisite: 351A.

**ME 352A. Radiative Heat Transfer. 3 Units.**

The fundamentals of thermal radiation heat transfer; blackbody radiation laws; radiative properties of non-black surfaces; analysis of radiative exchange between surfaces and in enclosures; combined radiation, conduction, and convection; radiative transfer in absorbing, emitting, and scattering media. Advanced material for students with interests in heat transfer, as applied in high-temperature energy conversion systems. Take 352B,C for depth in heat transfer. Prerequisites: graduate standing and undergraduate course in heat transfer. Recommended: computer skills.

**ME 352B. Fundamentals of Heat Conduction. 3 Units.**

Physical description of heat conduction in solids, liquids, and gases. The heat diffusion equation and its solution using analytical and numerical techniques. Data and microscopic models for the thermal conductivity of solids, liquids, and gases, and for the thermal resistance at solid-solid and solid-liquid boundaries. Introduction to the kinetic theory of heat transport, focusing on applications for composite materials, semiconductor devices, micromachined sensors and actuators, and rarefied gases. Prerequisite: consent of instructor.

**ME 352C. Convective Heat Transfer. 3 Units.**

Prediction of heat and mass transfer rates based on analytical and numerical solutions of the governing partial differential equations. Heat transfer in fully developed pipe and channel flow, pipe entrance flow, laminar boundary layers, and turbulent boundary layers. Superposition methods for handling non-uniform wall boundary conditions. Approximate models for turbulent flows. Comparison of exact and approximate analyses to modern experimental results. General introduction to heat transfer in complex flows. Prerequisite: 351B or equivalent.

**ME 354. Experimental Methods in Fluid Mechanics. 4 Units.**

Experimental methods associated with the interfacing of laboratory instruments, experimental control, sampling strategies, data analysis, and introductory image processing. Instrumentation including point-wise anemometers and particle image tracking systems. Lab. Prerequisites: previous experience with computer programming and consent of instructor. Limited enrollment.

**ME 355. Compressible Flow. 3 Units.**

Topics include quasi-one-dimensional isentropic flow in variable area ducts, normal shock waves, oblique shock and expansion waves, flow in ducts with friction and heat transfer, unsteady one-dimensional flow, and steady two-dimensional supersonic flow.

**ME 357. Turbine and Internal Combustion Engines. 3 Units.**

Principles of design analysis for aircraft gas turbines and automotive piston engines. Analysis for aircraft engines performed for Airbus A380 type aircraft. Design parameters determined considering aircraft aerodynamics, gas turbine thermodynamics, compressible flow physics, and material limitations. Additional topics include characteristics of main engine components, off-design analysis, and component matching. Performance of automotive piston engines including novel engine concepts in terms of engine thermodynamics, intake and exhaust flows, and in-cylinder flow. Same as: ME 257.

**ME 358. Heat Transfer in Microdevices. 3 Units.**

Application-driven introduction to the thermal design of electronic circuits, sensors, and actuators that have dimensions comparable to or smaller than one micrometer. The impact of thin-layer boundaries on thermal conduction and radiation. Convection in microchannels and microscopic heat pipes. Thermal property measurements for microdevices. Emphasis is on Si and GaAs semiconductor devices and layers of unusual, technically-promising materials such as chemical-vapor-deposited (CVD) diamond. Final project based on student research interests. Prerequisite: consent of instructor.

**ME 359A. Advanced Design and Engineering of Space Systems I. 4 Units.**

The application of advanced theory and concepts to the development of spacecraft and missile subsystems; taught by experts in their fields. Practical aspects of design and integration. Mission analysis, systems design and verification, radiation and space environments, orbital mechanics, space propulsion, electrical power and avionics subsystems, payload communications, and attitude control. Subsystem-oriented design problems focused around a mission to be completed in groups. Tours of Lockheed Martin facilities. Limited enrollment. Prerequisites: undergraduate degree in related engineering field or consent of instructor.

**ME 359B. Advanced Design and Engineering of Space Systems II. 4 Units.**

Continuation of 359A. Topics include aerospace materials, mechanical environments, structural analysis and design, finite element analysis, mechanisms, thermal control, probability and statistics. Tours of Lockheed Martin facilities. Limited enrollment. Prerequisites: undergraduate degree in related field, or consent of instructor.

**ME 361. Turbulence. 3 Units.**

The nature of turbulent flows, statistical and spectral description of turbulence, coherent structures, spatial and temporal scales of turbulent flows. Averaging, two-point correlations and governing equations. Reynolds averaged equations and stresses. Free shear flows, turbulent jet, turbulent kinetic energy and kinetic energy dissipation, and kinetic energy budget. Kolmogorov's hypothesis and energy spectrum. Wall bounded flows, viscous scales, and law of the wall. Turbulence closure modeling for Reynolds averaged Navier Stokes equations. Direct and large eddy simulation of turbulent flows. Subgrid scale modeling.

**ME 362A. Physical Gas Dynamics. 3 Units.**

Concepts and techniques for description of high-temperature and chemically reacting gases from a molecular point of view. Introductory kinetic theory, chemical thermodynamics, and statistical mechanics as applied to properties of gases and gas mixtures. Transport and thermodynamic properties, law of mass action, and equilibrium chemical composition. Maxwellian and Boltzmann distributions of velocity and molecular energy. Examples and applications from areas of current interest such as combustion and materials processing.

**ME 362B. Nonequilibrium Processes in High-Temperature Gases. 3 Units.**

Chemical kinetics and energy transfer in high-temperature gases. Collision theory, transition state theory, and unimolecular reaction theory. Prerequisite: 362A or consent of instructor.

**ME 366. Creative Gym: A Design Thinking Skills Studio. 1 Units.**  
Build your creative confidence and sharpen your design thinking skills. Train your intuition and expand the design context from which you operate every day. This experimental studio will introduce the d.school to fast-paced experimental exercises that lay the mental and physical foundation for a potent bias toward action, and a deeper knowledge of the personal skills that expert design thinkers utilize in all phases of their process. Exercises will be offered by a number of the d.school's most creatively confident design thinkers. Apply at the first day of class.

**ME 367. Optical Diagnostics and Spectroscopy Laboratory. 4 Units.**  
Principles, procedures, and instrumentation associated with optical measurements in gases and plasmas. Absorption, fluorescence and emission, and light-scattering methods. Measurements of temperature, species concentration, and molecular properties. Lab. Enrollment limited to 16. Prerequisite: 362A or 364.

**ME 368. d.Leadership: Design Process Leadership. 1-3 Units.**  
d.Leadership is a course that teaches the coaching and leadership skills needed to drive good design process in groups. Preference given to students who have taken other Design Group or d.school classes. d.leaders will work on real projects driving design projects within organizations outside campus, and gain real world skills to lead innovation in groups. Take this course if you are inspired by past design classes and want skills to lead design projects beyond Stanford.

**ME 368A. Biodesign Innovation: Needs Finding and Concept Creation. 4 Units.**

(Same as OIT 384) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations.  
Same as: BIOE 374A, MED 272A.

**ME 368B. Biodesign Innovation: Concept Development and Implementation. 4 Units.**

(Same as OIT 385) Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. Prerequisite: MED 272A, ME368A, OIT 384 or BIOE 374A.  
Same as: BIOE 374B, MED 272B.

**ME 369. Cracks, Dislocations, and Waves. 3 Units.**

The 6-dimensional formalism of A. N. Stroh will be developed to treat two-dimensional problems in elastically anisotropic media. Stress fields of straight dislocations will be developed, from which the elastic fields of line cracks (treated as continuous distributions of straight dislocations) will be obtained along with stress intensity factors and energy release rates. Steady waves including plane waves, Rayleigh waves, and Stoneley waves will be treated along with problems of reflection and refraction of incident plane waves in joined anisotropic half-spaces. Anisotropic boundary element methods will be discussed. Assignments will include both analytical and semi-analytical work as well as simple numerical methods to implement Stroh's formalism. Class notes and readings will be provided.

**ME 370A. Energy Systems I: Thermodynamics. 3 Units.**

Thermodynamic analysis of energy systems emphasizing systematic methodology for and application of basic principles to generate quantitative understanding. Availability, mixtures, reacting systems, phase equilibrium, chemical availability, and modern computational methods for analysis. Prerequisites: undergraduate engineering thermodynamics and computer skills such as Matlab.

**ME 370B. Energy Systems II: Modeling and Advanced Concepts. 4 Units.**

Development of quantitative device models for complex energy systems, including fuel cells, reformers, combustion engines, and electrolyzers, using thermodynamic and transport analysis. Student groups work on energy systems to develop conceptual understanding, and high-level, quantitative and refined models. Advanced topics in thermodynamics and special topics associated with devices under study. Prerequisite: 370A.

**ME 371. Combustion Fundamentals. 3 Units.**

Heat of reaction, adiabatic flame temperature, and chemical composition of products of combustion; kinetics of combustion and pollutant formation reactions; conservation equations for multi-component reacting flows; propagation of laminar premixed flames and detonations. Prerequisite: 362A or 370A, or consent of instructor.

**ME 372. Combustion Applications. 3 Units.**

The role of chemical and physical processes in combustion; ignition, flammability, and quenching of combustible gas mixtures; premixed turbulent flames; laminar and turbulent diffusion flames; combustion of fuel droplets and sprays. Prerequisite: 371.

**ME 373. Nanomaterials Synthesis and Applications for Mechanical Engineers. 3 Units.**

This course provides an introduction to both combustion synthesis of functional nanomaterials and nanotechnology. The first part of the course will introduce basic principles, synthesis/fabrication techniques and application of nanoscience and nanotechnology. The second part of the course will discuss combustion synthesis of nanostructures in zero-, one-, two- and three- dimensions, their characterization methods, physical and chemical properties, and applications in energy conversion systems.

**ME 375A. StoryViz: Storytelling and Visual. 2-3 Units.**

StoryViz is about creating authentic & compelling communication in many media: this year's topics include sketching, video, visual design & performance. Fantastic guests and a bevy of assignments will prepare students to communicate their work and ideas genuinely, concisely, and with a keen sense of wit. Limited enrollment; application required; see <http://dschool.stanford.edu/classes>. Please see notes.

**ME 377. Design Thinking Bootcamp: Experiences in Innovation and Design. 3-4 Units.**

Bootcamp is a fast-paced immersive experience in design thinking. You'll progress through four full cycles of the process, working with a diverse team to solve real world challenges. Field work and deep collaboration with teammates are required of all students. Tenets of design thinking including being human-centered, prototype-driven, and mindful of process. Topics include design processes, innovation methodologies, need finding, human factors, visualization, rapid prototyping, team dynamics, storytelling, and project leadership. Limited enrollment. APPLICATION REQUIRED by 9/19/12. See <http://bit.ly/dbootcamp>.

**ME 378. Tell, Make, Engage: Action Stories for Entrepreneurship. 1-3 Units.**

Guest discussion leaders with entrepreneurship experience give the course an evolving framework of evaluative methods, formed and reformed by collaborative development within the class. Stories attached to an idea or a discovery, are considered through practice exercises, artifacts, design challenges, short papers, and presentations.

**ME 380. Collaborating with the Future: Launching Large Scale Sustainable Transformations. 3-4 Units.**

This project-based d.school class combines Design Thinking Processes, Behavioral Sciences, and elements of Diffusion Theory. Tools and theories introduced in class will be used to structure large-scale transformations that simultaneously create value on environmental, societal, and economic fronts. We encourage students to use this class as a launching pad for real initiatives. Primarily meant for Graduate Students. (Especially qualified/motivated Seniors will be considered). Admission to the class is through an application process which ends on March 3. Please find instructions and applications at <https://dschool.stanford.edu/groups/largetransformations/>. Same as: ENVRES 380, PSYCH 380.

**ME 381. Orthopaedic Bioengineering. 3 Units.**

Engineering approaches applied to the musculoskeletal system in the context of surgical and medical care. Fundamental anatomy and physiology. Material and structural characteristics of hard and soft connective tissues and organ systems, and the role of mechanics in normal development and pathogenesis. Engineering methods used in the evaluation and planning of orthopaedic procedures, surgery, and devices. Same as: BIOE 381.

**ME 382. Biomedical Engineering in Research and Development. 4 Units.**

This project based course will cover the application of engineering methods to real world biomedical problems ranging from translational biomedical research to medical device design. Topics will include the emerging importance of preventative strategies, and the biomedical challenges of an aging population. A key element of the course will be the identification of the underlying scientific principles (computational and/or experimental) for solving biomedical problems. The students will gain experience in the formation of project teams; interdisciplinary communication skills; forming testable hypothesis with biological, anatomical, and physiological considerations; testing standards for medical devices; regulatory issues; and intellectual property.

**ME 382A. Biomedical Engineering in Research and Development. 4 Units.**

This project based course will cover the application of engineering methods to real world biomedical problems ranging from translational biomedical research to medical device design. Topics will include the emerging importance of preventative strategies, and the biomedical challenges of an aging population. A key element of the course will be the identification of the underlying scientific principles (computational and/or experimental) for solving biomedical problems. The students will gain experience in the formation of project teams; interdisciplinary communication skills; forming testable hypothesis with biological, anatomical, and physiological considerations; testing standards for medical devices; regulatory issues; and intellectual property.

**ME 382B. Medical Device Design. 4 Units.**

Continuation of the projects from 382A. With the assistance of faculty and expert consultants, students finalize research projects or device designs. Strategies for funding biomedical research and new medical ventures will also be covered.

**ME 385. Tissue Engineering Lab. 1-2 Units.**

Hands-on experience in the fabrication of living engineered tissues. Techniques include sterile technique, culture of mammalian cells, creation of cell-seeded scaffolds, and the effects of mechanical loading on the metabolism of living engineered tissues. Theory, background, and practical demonstration for each technique. Lab.

**ME 387. Soft Tissue Mechanics. 3 Units.**

Structure/function relationships and mechanical properties of soft tissues, including nonlinear elasticity, viscoelasticity, and poroelasticity.

**ME 388. Transport Modeling for Biological Systems. 3 Units.**

Introduction to electric fields, fluid flows, transport phenomena and their application to biological systems. Maxwell's equations, electrostatics, electro-chemical-mechanical driving forces in physiological systems. Ionic diffusion in electrolytes and membrane transport. Fluid and solid continua theory for porous, hydrated biological tissues. Applications include ionic and molecular transport in tissues and cells, electrophoresis, electromechanical and physicochemical interactions in cells and the extracellular matrix of connective tissue.

**ME 389. Biomechanical Research Symposium. 1 Unitss.**

Guest speakers present contemporary research on experimental and theoretical aspects of biomechanical engineering and bioengineering. May be repeated for credit.

**ME 390. Thermosciences Research Project Seminar. 1 Unitss.**

Review of work in a particular research program and presentations of other related work.

**ME 390A. High Temperature Gasdynamics Laboratory Research Project Seminar. 1 Unitss.**

Review of work in a particular research program and presentations of other related work.

**ME 391. Engineering Problems. 1-10 Units.**

Directed study for graduate engineering students on subjects of mutual interest to student and staff member. May be used to prepare for experimental research during a later quarter under 392. Faculty sponsor required.

**ME 392. Experimental Investigation of Engineering Problems. 1-10 Units.**

Graduate engineering students undertake experimental investigation under guidance of staff member. Previous work under 391 may be required to provide background for experimental program. Faculty sponsor required.

**ME 395. Seminar in Solid Mechanics. 1 Unitss.**

Required of Ph.D. candidates in solid mechanics. Guest speakers present research topics related to mechanics theory, computational methods, and applications in science and engineering. May be repeated for credit. See <http://mc.stanford.edu>.

**ME 396. Design and Manufacturing Forum. 1 Unitss.**

Invited speakers address issues of interest to design and manufacturing engineering and business students. Sponsored by the Product Realization Laboratory at Stanford. Same as: ME 196.

**ME 397. Design Theory and Methodology Seminar. 1-3 Units.**

What do designers do when they do design? How can their performance be improved? Topics change each quarter. May be repeated for credit.

**ME 399. Fuel Cell Seminar. 1 Unitss.**

Interdisciplinary research in engineering, chemistry, and physics. Talks on fundamentals of fuel cells by speakers from Stanford, other academic and research institutions, and industry. The potential to provide high efficiency and zero emissions energy conversion for transportation and electrical power generation.

**ME 400. Thesis. 2-15 Units.**

Investigation of some engineering problems. Required of Engineer degree candidates. Same as: Engineer Degree.

**ME 405. Asymptotic Methods in Computational Engineering. 3 Units.**  
This course is not a standard teaching of asymptotic methods as thought in the applied math programs. Nor does it involve such elaborate algebra and analytical derivations. Instead, the class relies on students' numerical programming skills and introduces improvements on numerical methods using standard asymptotic and scaling ideas. The main objective of the course is to bring physical insight into numerical programming. Majority of the problems to be explored involve one- and two-dimensional transient partial differential equations. Topics include: 1-Review of numerical discretization and numerical stability, 2-Implicit versus explicit methods, 3-Introduction to regular and singular perturbation problems, 4-Method of matched asymptotic expansions, 5-Stationary thin interfaces: boundary layers, Debye layers, 6-Moving thin interfaces: shocks, phase-interfaces, 7-Reaction-diffusion problems, 8-Directional equilibrium and lubrication theory.

**ME 406. Turbulence Physics and Modeling Using Numerical Simulation Data. 2 Units.**  
Prerequisite: consent of instructor.

**ME 408. Spectral Methods in Computational Physics. 3 Units.**  
Data analysis, spectra and correlations, sampling theorem, nonperiodic data, and windowing; spectral methods for numerical solution of partial differential equations; accuracy and computational cost; fast Fourier transform, Galerkin, collocation, and Tau methods; spectral and pseudospectral methods based on Fourier series and eigenfunctions of singular Sturm-Liouville problems; Chebyshev, Legendre, and Laguerre representations; convergence of eigenfunction expansions; discontinuities and Gibbs phenomenon; aliasing errors and control; efficient implementation of spectral methods; spectral methods for complicated domains; time differencing and numerical stability.  
Same as: CME 322.

**ME 410A. Foresight and Innovation. 3-5 Units.**  
Three quarter sequence. Learn how to develop technology-based visions and make them succeed. This course provides an intensive and hands-on approach to multiple foresight and strategy methods that teach you how to develop radical innovation. Students build an innovation model and prototype. Prerequisite: consent of instructor.

**ME 410B. Foresight and Innovation. 1-5 Units.**  
Continuation of ME410A. With model prototype in hand, students have the opportunity to further develop their innovation.

**ME 410C. Foresight and Innovation. 1-5 Units.**  
Continuation of ME410B. With model prototype in hand, students have the opportunity to further develop their innovation.

**ME 411. Advanced Topics in Computational Solid Mechanics. 3 Units.**  
Discussion of the use of computational simulation methods for analyzing and optimizing production processes and for developing new products, based on real industrial applications in the metal forming industry. Brief review of linear and nonlinear continuum mechanics and the use of finite element methods to model solid mechanics problems, constitutive relations for metals, coupled thermo-elasto-plastic (viscoplastic) problems, modeling metal production processes: bulk metal forming processes using rigid/viscoplastic material models, application examples: hot rolling of plates and the Mannesmann piercing processes and modeling the service behavior of steel pipes. Prerequisites: ME 338A, ME 335A,B,C, or consent of instructor.

**ME 412. Engineering Functional Analysis and Finite Elements. 3 Units.**  
Concepts in functional analysis to understand models and methods used in simulation and design. Topology, measure, and integration theory to introduce Sobolev spaces. Convergence analysis of finite elements for the generalized Poisson problem. Extensions to convection-diffusion-reaction equations and elasticity. Upwinding. Mixed methods and LBB conditions. Analysis of nonlinear and evolution problems. Prerequisites: 335A,B, CME 200, CME 204, or consent of instructor. Recommended: 333, MATH 171. Same as: CME 356.

**ME 414. Solid State Physics Issues for Mechanical Engineering Experiments. 3 Units.**  
Introductory overview of principles of statistical mechanics, quantum mechanics and solid-state physics. Provides graduate Mechanical Engineering students with the understanding needed to work on devices or technologies which rely on solid-state physics. (Alternate years, not offered summer 2012).

**ME 417. Total Product Integration Engineering. 4 Units.**  
For students aspiring to be product development executives and leaders in research and education. Advanced methods and tools beyond the material covered in 217: quality design across global supply chain, robust product architecture for market variety and technology advances, product development risk management. Small teams or individuals conduct a practical project that produces a case study or enhancement to produce development methods and tools. Enrollment limited to 12. Prerequisites: 317A,B.

**ME 420. Applied Electrochemistry at Micro- and Nanoscale. 3 Units.**  
The class is an introduction to applied electrochemistry with focus on micro- and nanoscale applications. Basic concepts of physical chemistry are presented, of which the fundamentals of electrochemistry are built. Theory of electrochemical methods for material analyses and material modifications are discussed with emphasis on the scaling behaviors. This year electrochemical energy generation/storage devices with focus on batteries will be discussed in class. Journals articles are reviewed within the framework of the course with focus on current problems and needs in and energy conversion and storage.

**ME 421. European Entrepreneurship and Innovation Thought Leaders Seminar. 1 Unit.**  
Lessons from real-world experiences and challenges in European startups, corporations, universities, non-profit research institutes and venture finance organizations. Speakers include entrepreneurs, leaders from global technology companies, university researchers, venture capitalists, legal experts, senior policy makers and other guests from selected European countries and regions. Geographic scope encompasses Ireland to Russia, and Scandinavia to the Mediterranean region. Enrollment open to undergraduates and graduates in any school or department at Stanford.

**ME 423. D.HEALTH: Design Thinking for Health. 3 Units.**  
In the U.S., 75% of medical expenditures are for illnesses that are lifestyle related such as diabetes and heart disease. If patients could change their lifestyles, medical problems could be avoided and a healthier and happier life achieved. Class employs design thinking in teams. Individual projects and small and large team projects with multiple milestones. Students work in the field, and present in class. Design Institute class; see <http://dschool.stanford.edu>.

**ME 429. COMMERCIAL MEMS DESIGN. 3 Units.**

This course, taught by Dr. Gary O'Brien of the Bosch RTC, will provide insight into the issues and challenges in designing MEMS device for commercial and automotive applications. Topics to be covered in the class will include device simulation and design, design of experiments, compensation for cross-wafer and wafer-to-wafer fabrication variations, design for extreme environments, analysis and management of reliability issues including package stress, shock, drift, cost analysis of manufacturing processes, and some discussion of the unique challenges for consumer and automotive customers and markets. Student teams will develop a device design, fabrication process, and manufacturing analysis in response to a specification.

**ME 450. Advances in Biotechnology. 3 Units.**

Guest academic and industrial speakers. Latest developments in fields such as bioenergy, green process technology, production of industrial chemicals from renewable resources, protein pharmaceutical production, industrial enzyme production, stem cell applications, medical diagnostics, and medical imaging. Biotechnology ethics, business and patenting issues, and entrepreneurship in biotechnology.

**ME 451B. Advanced Fluid Mechanics. 3 Units.**

Waves in fluids: surface waves, internal waves, inertial and acoustic waves, dispersion and group velocity, wave trains, transport due to waves, propagation in slowly varying medium, wave steepening, solitons and solitary waves, shock waves. Instability of fluid motion: dynamical systems, bifurcations, Kelvin-Helmholtz instability, Rayleigh-Benard convection, energy method, global stability, linear stability of parallel flows, necessary and sufficient conditions for stability, viscosity as a destabilizing factor, convective and absolute instability. Focus is on flow instabilities. Prerequisites: graduate courses in compressible and viscous flow.

**ME 451C. Advanced Fluid Mechanics. 3 Units.**

Compressible flow: governing equations, Crocco-Vazsonyi's equations, creation and destruction of vorticity by compressibility effects, shock waves. Modal decomposition of compressible flow, linear and nonlinear modal interactions, interaction of turbulence with shock waves. Energetics of compressible turbulence, effects of compressibility on free-shear flows, turbulent boundary layers, Van Driest transformation, recovery temperature, and shock/boundary layer interaction. Strong Reynolds analogy, modeling compressible turbulent flows. Prerequisites: 355, 361A, or equivalents.

**ME 451D. Microhydrodynamics. 3 Units.**

Transport phenomena on small-length scales appropriate to applications in microfluidics, complex fluids, and biology. The basic equations of mass, momentum, and energy, derived for incompressible fluids and simplified to the slow-flow limit. Topics: solution techniques utilizing expansions of harmonic and Green's functions; singularity solutions; flows involving rigid particles and fluid droplets; applications to suspensions; lubrication theory for flows in confined geometries; slender body theory; and capillarity and wetting. Prerequisites: 120A,B, 300, or equivalents. Same as: CHEMENG 310.

**ME 453A. Finite Element-Based Modeling and Simulation of Linear Fluid/Structure Interaction Problems. 3 Units.**

Basic physics behind many fluid/structure interaction phenomena. Finite element-based computational approaches for linear modeling and simulation in the frequency domain. Vibrations of elastic structures. Linearized equations of small movements of inviscid fluids. Sloshing modes. Hydroelastic vibrations. Acoustic cavity modes. Structural-acoustic vibrations. Applications to liquid containers and underwater signatures. Prerequisite: graduate course in the finite element method or consent of instructor.

**ME 453B. Computational Fluid Dynamics Based Modeling of Nonlinear Fluid/Structure Interaction Problems. 3 Units.**

Basic physics behind many high-speed flow/structure interaction phenomena. Modern computational approaches for nonlinear modeling and simulation in the time domain. Dynamic equilibrium of restrained and unrestrained elastic structures. Corotational formulation for large structural displacements and rotations. Arbitrary Lagrangian-Eulerian description of inviscid and viscous flows. Time-accurate CFD on moving and deforming grids. Discrete geometric conservation laws. Discretization of transmission conditions on non-matching discrete fluid/structure interfaces. Coupled fluid/mesh-motion/structure time integration schemes. Application to divergence, flutter, and buffeting. Prerequisites: graduate course in the finite element method, and in computational fluid dynamics.

**ME 455. Complex Fluids and Non-Newtonian Flows. 3 Units.**

Definition of a complex liquid and microrheology. Division of complex fluids into suspensions, solutions, and melts. Suspensions as colloidal and non-colloidal. Extra stress and relation to the stresslet. Suspension rheology including Brownian and non-Brownian fibers. Microhydrodynamics and the Fokker-Planck equation. Linear viscoelasticity and the weak flow limit. Polymer solutions including single mode (dumbbell) and multimode models. Nonlinear viscoelasticity. Intermolecular effects in nondilute solutions and melts and the concept of reptation. Prerequisites: low Reynolds number hydrodynamics or consent of instructor. Same as: CHEMENG 462.

**ME 457. Fluid Flow in Microdevices. 3 Units.**

Physico-chemical hydrodynamics. Creeping flow, electric double layers, and electrochemical transport such as Nernst-Planck equation; hydrodynamics of solutions of charged and uncharged particles. Device applications include microsystems that perform capillary electrophoresis, drug dispersion, and hybridization assays. Emphasis is on bioanalytical applications where electrophoresis, electro-osmosis, and diffusion are important. Prerequisite: consent of instructor.

**ME 458. Advanced Topics in Electrokinetics. 3-5 Units.**

Electrokinetic theory and electrokinetic separation assays. Electroneutrality approximation and weak electrolyte electrophoresis theory. Capillary zone electrophoresis, field amplified sample stacking, isoelectric focusing, and isotachopheresis. Introduction to general electrohydrodynamics (EHD) theory including the leaky dielectric concept, the Ohmic model formulation, and electrokinetic flow instabilities. Prerequisite: ME 457.

**ME 463. Advanced Topics in Plasma Science and Engineering. 3 Units.**

Research areas such as plasma diagnostics, plasma transport, waves and instabilities, and engineering applications.

**ME 468. Experimental Research in Advanced User Interfaces. 1-5 Units.**

Project-based course involves small (3-4) person teams going through all parts of the experimental process: question generation, experiment design, running, and data analysis. Each team creates an original, publishable project that represents a contribution to the research and practicum literatures. All experiments involve interaction between people and technology, including cars, mobile phones, websites, etc. Prerequisite: consent of instructor.

Same as: COMM 168, COMM 268, COMM 368.

**ME 469. Computational Methods in Fluid Mechanics. 3 Units.**

The last two decades have seen the widespread use of Computational Fluid Dynamics (CFD) for analysis and design of thermal-fluids systems in a wide variety of engineering fields. Numerical methods used in CFD have reached a high degree of sophistication and accuracy. The objective of this course is to introduce classical approaches and algorithms used for the numerical simulations of incompressible flows. In addition, some of the more recent developments are described, in particular as they pertain to unstructured meshes and parallel computers. An in-depth analysis of the procedures required to certify numerical codes and results will conclude the course.

**ME 469B. Computational Methods in Fluid Mechanics. 3 Units.**

Advanced CFD codes. Geometry modeling, CAD-CFD conversion. Structured and unstructured mesh generation. Solution methods for steady and unsteady incompressible Navier-Stokes equations. Turbulence modeling. Conjugate (solid/fluid) heat transfer problems. Development of customized physical models. Batch execution for parametric studies. Final project involving solution of a problem of student's choosing. Prerequisite: ME 300C/CME 206.

**ME 470. Uncertainty Quantification. 3 Units.**

Uncertainty analysis in computational science. Probabilistic data representation, propagation techniques and validation under uncertainty. Mathematical and statistical foundations of random variables and processes for uncertainty modeling. Focus is on state-of-the-art propagation schemes, sampling techniques, and stochastic Galerkin methods. The concept of model validation under uncertainty and the determination of confidence bounds estimates. Prerequisite: basic probability and statistics at the level of CME 106 or equivalent.

**ME 471. Turbulent Combustion. 3 Units.**

Basis of turbulent combustion models. Assumption of scale separation between turbulence and combustion, resulting in Reynolds number independence of combustion models. Level-set approach for premixed combustion. Different regimes of premixed turbulent combustion with either kinematic or diffusive flow/chemistry interaction leading to different scaling laws and unified expression for turbulent velocity in both regimes. Models for non-premixed turbulent combustion based on mixture fraction concept. Analytical predictions for flame length of turbulent jets and NOx formation. Partially premixed combustion. Analytical scaling for lift-off heights of lifted diffusion.

**ME 484. Computational Methods in Cardiovascular Bioengineering. 3 Units.**

Lumped parameter, one-dimensional nonlinear and linear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system and evaluate the performance of cardiovascular devices. Construction of anatomic models and extraction of physiologic quantities from medical imaging data. Problems in blood flow within the context of disease research, device design, and surgical planning. Same as: BIOE 484.

**ME 485. Modeling and Simulation of Human Movement. 3 Units.**

Direct experience with the computational tools used to create simulations of human movement. Lecture/labs on animation of movement; kinematic models of joints; forward dynamic simulation; computational models of muscles, tendons, and ligaments; creation of models from medical images; control of dynamic simulations; collision detection and contact models. Prerequisite: 281, 331A,B, or equivalent. Same as: BIOE 485.

**ME 491. Ph.D. Teaching Experience. 3 Units.**

Required of Ph.D. students. May be repeated for credit.

**ME 492. Mechanical Engineering Teaching Assistance Training. 1 Unitss.****ME 495A. ME Seminar Series: Theoretical and Computational Fluid Dynamics. 1 Unitss.**

Seminars will feature early career mechanical engineers working on leading edge problems in theoretical and computational fluid mechanics and related disciplines. Guest speakers will come from top universities within the U.S. and internationally and will discuss both their past research and plans for building a research program in the future.

**ME 495B. ME Seminar Series: At the Interface between Mechanical Engineering and Biology. 1 Unitss.**

Seminars will feature early career mechanical engineers working on leading edge problems in biomechanical engineering. Topics include mechanobiology, cell mechanics, transport phenomena in biological systems, bio-inspired design, design and analysis of biodevices or bioinstrumentation, biomaterials, and modeling of physiological systems. Guest speakers will come from top universities within the U.S. and internationally, and will discuss both their past research and plans for building a research program in the future.

**ME 500. Thesis. 1-15 Units.**

Same as: Ph.D.

**ME 571. Surgical Robotics Seminar. 1 Unitss.**

Surgical robots developed and implemented clinically on varying scales. Seminar goal is to expose students from engineering, medicine, and business to guest lecturers from academia and industry. engineering and clinical aspects connected to design and use of surgical robots, varying in degree of complexity and procedural role. May be repeated for credit. Same as: CS 571.

**ME 801. TGR Project. 0 Unit.****ME 802. TGR Dissertation. 0 Unit.**

## Medicine Courses

**MED 1A. Leadership in Multicultural Health. 2 Units.**

Designed for undergraduates serving as staff for the Stanford Medical Youth Science Summer Residential Program (SRP). Structured opportunities to learn, observe, participate in, and evaluate leadership development, multicultural health theories and practices, and social advocacy. Utilizes service learning as a pedagogical approach to developing an understanding of the intersections between identity, power and privilege and disparities (health, education, environment), fostering knowledge and skills to become social advocates to address forms of inequities. Students explore approaches for identifying and tackling issues of equity (health and education) as well as learn fundamental skills necessary to implement activities for the Summer Residential Program.

**MED 1B. Identity, Power and Privilege in Multicultural Health. 1 Unitss.**

An independent study service learning course designed to develop students' understanding of the intersection between identity, power, privilege, and disparities (health, education, environment). Students submit a written reflective term paper based on their experience as staff for the Summer Residential Program as well as their understanding of how constructs of identity, power and privilege impact low-income and underrepresented students in their pursuit of higher education. Prerequisite MED 1A.

**MED 70Q. Cancer and the Immune System. 2 Units.**

Preference to sophomores. Myths and facts surrounding the idea that the immune system is capable of recognizing malignant cells. The biological basis and function of effector arms of the immune system; how these mechanisms may be used to investigate the biological basis and potential therapy of cancer. How the immune system functions.

**MED 71Q. Hormones in a Performance-Enhanced Society. 3 Units.**  
(Formerly 117Q) Preference to freshmen. Explores how the availability of hormone therapy has affected various aspects of daily lives. Topics include the controversies concerning menopause and its treatment; use of hormones in athletics; cosmetic use of hormones to enhance growth, strength, and libido; use of hormones as anti-aging drugs; and how the hormone system has influenced our notions of gender. Includes the biochemistry and physiology of the human endocrine system; how hormones influence behavior, and how to read a scientific paper.

**MED 87Q. Women and Aging. 5 Units.**  
Preference to sophomores. Biology, clinical issues, social and health policies of aging; relationships, lifestyles, and sexuality; wise women and grandmothers. Sources include scientific articles, essays, poetry, art, and film. Service-learning experience with older women. Service Learning Course (certified by Haas Center).  
Same as: HUMBIO 87Q.

**MED 88Q. Dilemmas in Current Medical Practice. 3 Units.**  
Preference to sophomores. Social, political, scientific, and economic forces influencing medical practice. Spiraling costs, impaired access to health care, and disillusionment toward the health care system. Attempts by government and medical insurers to control costs through managed care and health maintenance organizations. Medical education and how it has affected the practice of medicine. Alternative health care, preventive medicine, and the doctor-patient relationship. The paradox of health in America: why do so many people who are healthy feel unhealthy? Mandatory observation of instructors in their medical practices.

**MED 108Q. Human Rights and Health. 3 Units.**  
Preference to sophomores. History of human-rights law. International conventions and treaties on human rights as background for social and political changes that could improve the health of groups and individuals. Topics such as: regional conflict and health, the health status of refugees and internally displaced persons; child labor; trafficking in women and children; HIV/AIDS; torture; poverty, the environment and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. Possible optional opportunities to observe at community sites where human rights and health are issues. Guest speakers from national and international NGOs including Doctors Without Borders; McMaster University Institute for Peace Studies; UC Berkeley Human Rights Center; Kiva. PowerPoint presentation on topic of choice required.

**MED 130. YES+Empowerment Course. 1 Unit.**  
Adapted for Residential Education from the national YES+ workshop program, an innovative, dynamic, and fun life skills program which empowers students with tools to eliminate stress, increase energy, handle negative emotions, increase mental focus, heighten awareness, and develop strong social and leadership skills. Students learn a set of powerful breath-based meditation techniques which clear the mind and enhance success in school, work, and interpersonal relationships. See <http://us.yesplus.org/> for further insight into the program. Enrollment limited; priority to residents of Castano Hall; others selected by application.

**MED 143A. Patient Health Education in Community Clinics. 2 Units.**  
Open to undergraduate, graduate, and medical students. Principles of health education, theories of behavior change, methods for risk reduction. Presentations of health education modules, focusing on topics prevalent among underserved populations. Students apply theoretical frameworks to health education activities in the Cardinal Free Clinics. Application required. Contact [evelynh@stanford.edu](mailto:evelynh@stanford.edu)  
Same as: MED 243A.

**MED 143B. Patient Health Education in Community Clinics - Practicum. 2 Units.**  
Open to undergraduate, graduate, and medical students. For students who have completed MED 143A/243A and currently volunteer in one of the course-affiliated clinic sites. Objective is to expand health education skills, discuss more complex health education topics, and reflect upon experiences in the clinic. Includes readings and online reflections. Prerequisite: successful completion of MED 143A/243A.  
Same as: MED 243B.

**MED 143C. Patient Health Education in Community Clinics - Practicum. 2 Units.**  
Open to undergraduate, graduate, and medical students. For students currently volunteering in one of the course-affiliated clinic sites. Objective is to expand health education skills, discuss more complex health education topics, and reflect upon experiences in the clinic. Includes readings and online reflections. Pre-requisites: MED 143A/243A, Med 143B/243B.  
Same as: MED 243C.

**MED 147. Methods in Community Assessment, Evaluation, and Research. 3 Units.**  
Development of pragmatic skills for design, implementation, and analysis of structured interviews, focus groups, survey questionnaires, and field observations. Topics include: principles of community-based participatory research, including importance of dissemination; strengths and limitations of different study designs; validity and reliability; construction of interview and focus group questions; techniques for moderating focus groups; content analysis of qualitative data; survey questionnaire design; and interpretation of commonly-used statistical analyses.  
Same as: MED 247.

**MED 149A. Medical Interpreting at the Cardinal Free Clinics. 2 Units.**  
The quality of health care often depends as much on the interpreter as the provider. This foundation course prepares bilingual individuals to work as medical interpreters in hospital and clinic settings. Students learn basic interpreting skills; ethics; communication techniques; medical vocabulary; key healthcare information; communication skills for advocacy; how to draft practical, working solutions, and professional development. By application only; must be an accepted Cardinal Free Clinic interpreter volunteer. Contact [evelynh@stanford.edu](mailto:evelynh@stanford.edu). Students registering for 2 units are required to interpret at the clinic a minimum of 3 weekend sessions; those registering for 1 unit are required to interpret for 1 weekend session.

**MED 149B. Medical Interpreting at the Cardinal Free Clinics. 1 Unit.**  
For students who have completed MED 149A and currently volunteer in one of the course-affiliated clinic sites. The quality of health care often depends as much on the interpreter as the provider. This practicum prepares bilingual individuals to work as medical interpreters in hospital and clinic settings. Students apply medical interpreting skills at the Cardinal Free Clinics, discuss more complex topics, and reflect upon experiences in the clinic. Includes language labs and shadowing at Stanford Hospital. Limited enrollment; must be an accepted Cardinal Free Clinic interpreter volunteer. Contact [evelynh@stanford.edu](mailto:evelynh@stanford.edu). Students registering for one unit complete 2 CFC shifts; three shifts for two units. Students must confirm with CFC managers the unit value for which they should enroll.

**MED 149C. Medical Interpreting at the Cardinal Free Clinics. 1 Unit.**  
For students who have completed MED 149A and currently volunteer in one of the course-affiliated clinic sites. The quality of health care often depends as much on the interpreter as the provider. This practicum course prepares bilingual individuals to work as medical interpreters in hospital and clinic settings. Students apply medical interpreting skills at the Cardinal Free Clinics, discuss more complex topics, and reflect upon experiences in the clinic. Includes readings and online reflection. Limited enrollment; must be an accepted Cardinal Free Clinic interpreter volunteer. Contact [evelynh@stanford.edu](mailto:evelynh@stanford.edu).



**MED 157. Foundations for Community Health Engagement. 3 Units.**

Open to undergraduate, graduate, and MD students. Examination and exploration of community health principles and their application at the local level. Designed to prepare students to make substantive contributions in a variety of community health settings (e.g. clinics, government agencies, non-profit organization, advocacy groups). Topics include community health assessment; health disparities; health promotion and disease prevention; strategies for working with diverse, low-income, and underserved populations; and principles of ethical and effective community engagement.

**MED 159A. Service-Learning in Migrant Health. 2 Units.**

Examines the intersection of migration, poverty and health; provides opportunities for engagement directly with community partners working with Bay Area Mexican migrant populations. Weekly knowledge and skills-building sessions covering the process of migration; the demographic characteristics of the local migrant population; the health and socioeconomic status of local migrant populations; current initiatives to improve their quality of life and well-being. Service opportunities include participation in community organizing; health education seminars; and health screening activities. Prerequisite: intermediate/advanced level of Spanish language proficiency.

**MED 159B. Service-Learning in Migrant Health. 2 Units.**

Second quarter of two-quarter series. Examines the intersection of migration, poverty and health; provides opportunities for engagement directly with community partners working with Bay Area Mexican migrant populations. Weekly knowledge and skills-building sessions covering the process of migration; the demographic characteristics of the local migrant population; the health and socioeconomic status of local migrant populations; current initiatives to improve their quality of life and well-being. Service opportunities include participation in community organizing; health education seminars; and health screening activities. Prerequisites: intermediate/advanced level of Spanish language proficiency, MED 159A.

**MED 160. Physician Shadowing: Stanford Immersion in Medicine Series. 1 Unitss.**

Undergraduates are paired with a physician mentor at Stanford Hospital and Clinics, Lucile Packard Children's Hospital, or the Veteran's Administration Hospital. May be repeated for credit. Prerequisite: Application and acceptance to the SIMS program. Same as: SIMS.

**MED 176. Impact of Infectious Diseases on Human History. 3 Units.**

Impact of infectious diseases on human society. Some topics include: Plague of Justinian and 14th century; impact on exploration, trade and conquest; how slavery, malaria and yellow fever conspired to alter the New World; Microbes and war; diseases of poverty, tuberculosis and others; Cholera and public health; pandemic influenza; diseases of human progress. Students give a 30 minute presentation on a topic of their choosing that exemplifies an aspect of the impact of politics, societal influences, religion or other forces on infectious diseases. Same as: HUMBIO 176.

**MED 182. Early Clinical Experience at the Cardinal Free Clinics. 1-2 Units.**

Students provide health care in a student-run clinic for the homeless and uninsured. Student volunteers are guided in the practice of medical interviews, history-taking and physical examinations as appropriate. Clinical students and attending physicians provide support and guidance as the team arrives at a diagnosis and management plan. One unit for students who volunteer a minimum of twice a month. Two units of credit for students whose volunteer commitment is greater than twice a month. By application only. Visit <http://cfc.stanford.edu> for more information. Same as: MED 282.

**MED 184. Leadership in the Cardinal Free Clinics. 1 Unitss.**

Open to Steering Committee and Managers of Cardinal Free Clinics. Introduction to skills for effective leadership, including: conflict resolution, team dynamics, leadership styles, personality types, giving and receiving feedback, and group decision-making. Utilizes hands-on-activities and real-life clinic scenarios. Applied learning through shifts at the Cardinal Free Clinics and related project work. Same as: MED 284.

**MED 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**MED 201. Internal Medicine: Body as Text. 1 Unitss.**

Body as Text refers to the idea that every patient's body tells a story. The narrative includes the past and present of a person's social and medical condition; it is a demonstration of the phenotype. The art of reading the body as text was at its peak in the first half of the 20th century, but as technology has become ascendant, bedside skills and the ability to read the text have faded. Beyond scientific knowledge and medical facts, it is this often forgotten craft which is at the heart of the excitement of being an internist. This course introduces students to the art of the clinical exam, to developing a clinical eye, and learning to see the body in a completely different way.

**MED 202. Alternative Spring Break: Rural and American Indian Health Disparities. 3 Units.**

Open to MD, graduate, and undergraduate students. Classroom preparation followed by a one week spring break service learning experience on a reservation in South Dakota. Introduces students to the challenges and promise of Native American and rural health care, and the role of communities as leaders and problem solvers. Includes lectures, discussion and readings pertaining to Native American culture, current research in Native American health, and the methods and practice of community based participatory research. Culminates in formulation of a plan for communicating with and engaging community partners in South Dakota: Indian Health Services, Habitat for Humanity, Porcupine Clinic, Teach for America, and Sinte Gleska University.

**MED 204. Access and Delivery of Essential Medicines to Poor and Underserved Communities. 1 Unitss.**

Student initiated lecture series. Guest speakers. Topics include: neglected diseases, underserved and impoverished markets, disease profiles of lower and middle income countries, pricing and distribution of biomedical end products, intellectual property in medicine and its effect on delivery of healthcare.

**MED 206. Meta-research: Appraising Research Findings, Bias, and Meta-analysis. 3 Units.**

Open to graduate, medical, and undergraduate students. Appraisal of the quality and credibility of research findings; evaluation of sources of bias. Meta-analysis as a quantitative (statistical) method for combining results of independent studies. Examples from medicine, epidemiology, genomics, ecology, social/behavioral sciences, education. Collaborative analyses. Project involving generation of a meta-research project or reworking and evaluation of an existing published meta-analysis. Prerequisite: knowledge of basic statistics. Same as: HRP 206, STATS 211.

**MED 207. History of Medicine. 1 Unitss.**

Begins with studying Shamanistic medicine, practiced by humans throughout the globe, for millennia. Covers magico-religious medicine developed in ancient Egypt, Mesopotamia and Greece; the 4th Century BC with Hippocrates beginning to separate medicine from religion and magic; the slow progress in ancient Rome, the medieval period, and during the Renaissance; and the acceleration in the pace of discoveries in the last few hundred years as medicine became more scientific, complex, and specialized ( Pasteur developed the germ theory of disease, Darwin and Mendel publications begin the development of Genetics, Watson and Crick solved the mystery of DNA structure, organ transplants began, and imaging procedures such as CT and MRI came into being). Lectures are profusely illustrated, and, for the sake of comparison, two equally ancient systems of medicine, the traditional Chinese and the Vedic, are briefly reviewed.

**MED 217. Technological Frontiers in Digestive Diseases. 1 Unitss.**

Focused on introducing engineering, bioengineering, and physical sciences students to technologies used in the clinical setting. Topics include: endoscopes to detect and remove cancer; minimally invasive surgery to treat obesity; measurements of propulsion through the intestine; and technologies to detect and stop internal bleeding. Observations in the clinical setting; visits to laboratories engaged in the development of new technologies.

**MED 223. Cardiovascular and Pulmonary Sciences Seminar. 2 Units.**

Weekly modified journal club primarily for CVP Scholarly Application students, Cardiovascular Institute graduate students, clinical and research fellows, and faculty. Open to other graduate students and medical students (Advanced undergraduate students with permission of instructor). Each meeting begins with an overview of a particular area by a faculty member, followed by presentation of a seminal paper in that area by a postdoctoral fellow or a graduate student. Discussion follows the presentation, after which the faculty moderator meets separately with the students for further questions and discussion.

**MED 227. Bedside Ultrasound. 1-2 Units.**

For pre-clinical or clinical medical students, and others with permission. Introduces students to diagnostic ultrasound at the bedside. The normal anatomy of the heart, abdomen, and pelvis pertinent to ultrasound is taught. Some pathology involving these areas is also introduced. As the students' proficiency increases, those electing to can visit the Pacific Free Clinic to be introduced to scanning patients. 1 unit for class attendance only; 2 units for class attendance and participation in the Pacific Free Clinic.

**MED 228. Physicians and Social Responsibility. 1 Unitss.**

Social and political context of the roles of physicians and health professionals in social change; policy, advocacy, and shaping public attitudes. How physicians have influenced governmental policy on nuclear arms proliferation; environmental health concerns; physicians in government; activism through research; the effects of poverty on health; homelessness; and gun violence. Guest speakers from national and international NGOs.

**MED 229. Introduction to Global Health. 1 Unitss.**

Provides an overview of global health and how it is similar to and different from public health and tropical medicine. Topics include the evolution, economics, politics of global health, major players in global health, and issues of geography, politics, humanitarianism, human rights, science, research, culture and disease.

**MED 231. Measuring Global Health. 4 Units.**

Open to MD, graduate, and undergraduate students. Assessing the global burden of disease, its distribution among and within countries, its causes, and appropriate interventions requires rigorous quantitative approaches. This course develops skills in these areas by critically examining questions like: How do we know who is sick and where? How are risk factors incorporated into our projections of future disease trends? How do we combine mortality and morbidity in a meaningful way? What works for improving health efficiently? Workshops build familiarity with relevant data and their analysis. Prerequisite: coursework in statistics, biostatistics, quantitative epidemiology, econometrics, or equivalent. Same as: HRP 241, HUMBIO 129M.

**MED 232. Discussions in Global Health. 2 Units.**

The goal of this interactive series is to encourage students to think broadly about the variety of activities encompassed within global health and the roles of various entities, including NGOs, governments, and healthcare providers, in responding to large-scale health crises, building health systems, and caring for patients in developing countries. Examines challenges in global health such as organizing medical responses to natural disasters, providing healthcare to societies in conflict, and integrating traditional and modern approaches to healing. Case studies are used to critique strategies employed by organizations that work to improve medical care in poor settings.

**MED 240. Sex and Gender Differences in Human Physiology and Disease. 2-3 Units.**

Chromosomal and hormonal influences on cells, tissues, and organs that underlie the development of reproductive organs and sexual dimorphism of the neuroendocrine system. Effects of endogenous and exogenous sex hormones and environmental factors that differ between men and women on the musculoskeletal, neurological, cardiovascular, and immunological systems over the lifecourse, from conception to puberty, through reproductive phases (including changes during the menstrual cycle up to and beyond menopause in women and with aging in men). Transgender health issues. Guest lecturers. Prerequisite: Human Biology core or equivalent, or consent of instructor. Same as: HUMBIO 140, OBGYN 240.

**MED 241. Context and Practice of Health Care in Free Clinics. 1 Unitss.**

Preparation for working in free clinics, awareness of health care context and health disparities among underinsured patients, and introduction to key skills for patient care. Topics include: patient history, screening tests, health insurance, cultural sensitivity, role of interpreters, and tuberculosis testing. Meets at either Arbor or Pacific free clinic to increase familiarity with free clinic operations and environment. Integrates with concurrent Practice of Medicine course.

**MED 242. Physicians and Human Rights. 1 Unitss.**

Weekly lectures on how human rights violations affect health. Topics include: regional conflict and health, the health status of refugees and internally displaced persons; child labor; trafficking in women and children; HIV/AIDS; torture; poverty, the environment and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. Guest speakers from national and international NGOs including Doctors Without Borders; McMaster University Institute for Peace Studies; UC Berkeley Human Rights Center; Kiva.

**MED 243A. Patient Health Education in Community Clinics. 2 Units.**

Open to undergraduate, graduate, and medical students. Principles of health education, theories of behavior change, methods for risk reduction. Presentations of health education modules, focusing on topics prevalent among underserved populations. Students apply theoretical frameworks to health education activities in the Cardinal Free Clinics. Application required. Contact evelynh@stanford.edu. Same as: MED 143A.

**MED 243B. Patient Health Education in Community Clinics - Practicum. 2 Units.**

Open to undergraduate, graduate, and medical students. For students who have completed MED 143A/243A and currently volunteer in one of the course-affiliated clinic sites. Objective is to expand health education skills, discuss more complex health education topics, and reflect upon experiences in the clinic. Includes readings and online reflections. Prerequisite: successful completion of MED 143A/243A.

Same as: MED 143B.

**MED 243C. Patient Health Education in Community Clinics - Practicum. 2 Units.**

Open to undergraduate, graduate, and medical students. For students currently volunteering in one of the course-affiliated clinic sites. Objective is to expand health education skills, discuss more complex health education topics, and reflect upon experiences in the clinic. Includes readings and online reflections. Pre-requisites: MED 143A/243A, Med 143B/243B.

Same as: MED 143C.

**MED 246. The Medical Interview for Spanish Speakers. 1 Unitss.**

Student led forum for practicing and learning medical Spanish related specifically to the medical interview. Prepares clinical students to interact more effectively with Spanish speaking patients in clinics. Classes are topical; each class includes a demonstration, medical vocabulary practice, and conversational practice on the topic of the day.

**MED 247. Methods in Community Assessment, Evaluation, and Research. 3 Units.**

Development of pragmatic skills for design, implementation, and analysis of structured interviews, focus groups, survey questionnaires, and field observations. Topics include: principles of community-based participatory research, including importance of dissemination; strengths and limitations of different study designs; validity and reliability; construction of interview and focus group questions; techniques for moderating focus groups; content analysis of qualitative data; survey questionnaire design; and interpretation of commonly-used statistical analyses.

Same as: MED 147.

**MED 248. Student Rounds. 1 Unitss.**

Teams of preclinical students meet weekly with a clinical student to hear the history and physical of a recent case the clinical student encountered on the wards. Following the presentation, the preclinical students work together under the guidance of the clinical student to develop a problem list and plan, which are then compared with the problem list, plan, and orders made by the actual admitting team. In the course of presenting the cases, the clinical student describes personal experiences and practical components of ward work and daily clinical routine.

**MED 253. Applied Grant-Writing Skills for Community and Clinical Research. 2 Units.**

Skill-building in writing scientific research proposals. Topics include: grant proposal preparation; scientific literature review; developing research aims; decision-making on study design & methodology; planning statistical analyses; determining research compliances, timelines and resources. Students develop drafts of potential projects, peer-review and critique writing samples, and receive detailed feedback from instructor on all aspects of research projects.

**MED 255. The Responsible Conduct of Research. 1 Unitss.**

Forum. How to identify and approach ethical dilemmas that commonly arise in biomedical research. Issues in the practice of research such as in publication and interpretation of data, and issues raised by academic/industry ties. Contemporary debates at the interface of biomedical science and society regarding research on stem cells, bioweapons, genetic testing, human subjects, and vertebrate animals. Completion fulfills NIH/ADAMHA requirement for instruction in the ethical conduct of research. Prerequisite: research experience recommended.

**MED 255C. The Responsible Conduct of Research for Clinical Researchers. 1 Unitss.**

Engages clinical researchers in discussions about ethical issues commonly encountered during their clinical research careers and addresses contemporary debates at the interface of biomedical science and society. Graduate students required to take RCR who are or will be conducting clinical research are encouraged to enroll in this version of the course. Prerequisite: research experience recommended.

**MED 256. Global HIV/AIDS. 3 Units.**

Public health, policy, and research issues. Identify resources at Stanford, and from government, NGOs, and pharmaceutical, advocacy, and international organizations. Sources include biomedical, social, and behavioral sciences. Emphasis on student projects which feature methodologies in the development and design of Operational Research and Implementation Science in AIDS/TB and Malaria in response to PEPFAR and Global Fund programs. Guest lectures. Prerequisite: Human Biology core or equivalent, or consent of instructor.

Same as: HUMBIO 156.

**MED 257A. Community Health Advocacy. 2 Units.**

A three quarter service-learning practicum designed to provide students with concrete skills for working in community-based clinics and to broaden and deepen their understanding of the context of this work and the populations being served. The social role of physicians is a central theme. Students must make a commitment to weekly shifts in one of the course-affiliated clinic sites throughout the academic year and must take responsibility for integrating clinic and classroom experiences. Full participation in the classroom is required; students must come to class prepared to reflect on clinic shifts and to practice skills through role-playing and other exercises. Pre-or co-requisite: MED 157; application required prior to start of autumn quarter. Contact cburks@stanford.edu. Service Learning Course (certified by Haas Center).

**MED 257B. Community Health Advocacy. 3-4 Units.**

Second quarter of a three quarter service-learning practicum designed to provide students with concrete skills for working in community-based clinics and to broaden and deepen their understanding of the context of this work and the populations being served. The social role of physicians is a central theme. Students must make a commitment to weekly shifts in one of the course-affiliated clinic sites throughout the academic year and must take responsibility for integrating clinic and classroom experiences. Full participation in the classroom is required; students must come to class prepared to reflect on clinic shifts and to practice skills through role-playing and other exercises. Students who complete a clinic-identified service project are required to enroll for 4 units. Prerequisites: MED 257A, and instructor approval. Service Learning Course (certified by Haas Center).

**MED 257C. Community Health Advocacy. 3-4 Units.**

Third quarter of a three quarter service-learning practicum designed to provide students with concrete skills for working in community-based clinics and to broaden and deepen their understanding of the context of this work and the populations being served. The social role of physicians is a central theme. Students must make a commitment to weekly shifts in one of the course-affiliated clinic sites throughout the academic year and must take responsibility for integrating clinic and classroom experiences. Full participation in the classroom is required; students must come to class prepared to reflect on clinic shifts and to practice skills through role-playing and other exercises. Students who complete a clinic-identified service project are required to enroll for 4 units. Prerequisites: MED 257A,B and instructor approval. Service Learning Course (certified by Haas Center).

**MED 258A. Advanced Community Health Advocacy. 2-3 Units.**

A three quarter course for students who have completed at least one full year in the Community Health Advocacy Program (MED 257A,B,C); designed to augment the individual- and systems-level advocacy skills developed in the MED 257 series, with a focus on policy and media advocacy. The course also provides a forum for leadership development and continued growth in the clinic-based community advocate role. Students are expected to assist in the training and mentoring of MED 257 students at partner sites, and to act as a liaison between the clinic partner and the course directors. Equal dedication to both advocacy skills development and program leadership role fulfillment is expected. Class time includes guest speakers, discussions on current events related to community health, case studies of clinical experiences, and coordinator check-ins. Service Learning Course (certified by Haas Center). Unit value based on extent of clinic participation. Prerequisite: MED 257A,B,C.

**MED 258B. Advanced Community Health Advocacy. 2-3 Units.**

Second quarter of a three quarter course for students who have completed at least one full year in the Community Health Advocacy Program (MED 257A,B,C); designed to augment the individual- and systems-level advocacy skills developed in the MED 257 series, with a focus on policy and media advocacy. The course also provides a forum for leadership development and continued growth in the clinic-based community advocate role. Students are expected to assist in the training and mentoring of MED 257 students at partner sites, and to act as a liaison between the clinic partner and the course directors. Equal dedication to both advocacy skills development and program leadership role fulfillment is expected. Class time includes guest speakers, discussions on current events related to community health, case studies of clinical experiences, and coordinator check-ins. Service Learning Course (certified by Haas Center). Unit value based on extent of clinic participation. Prerequisite: MED 257A,B,C; MED 258A.

**MED 258C. Advanced Community Health Advocacy. 2-3 Units.**

Third quarter of a three quarter course for students who have completed at least one full year in the Community Health Advocacy Program (MED 257A,B,C); designed to augment the individual- and systems-level advocacy skills developed in the MED 257 series, with a focus on policy and media advocacy. The course also provides a forum for leadership development and continued growth in the clinic-based community advocate role. Students are expected to assist in the training and mentoring of MED 257 students at partner sites, and to act as a liaison between the clinic partner and the course directors. Equal dedication to both advocacy skills development and program leadership role fulfillment is expected. Class time includes guest speakers, discussions on current events related to community health, case studies of clinical experiences, and coordinator check-ins. Service Learning Course (certified by Haas Center). Unit value based on extent of clinic participation. Prerequisite: MED 257A,B,C; MED 258 A,B.

**MED 259. Oaxacan Health on Both Sides of the Border. 2 Units.**

Required for students participating in the Community Health in Oaxaca summer program. Introduction to the health literacy and health-seeking behaviors of Oaxacan and other Mexican migrants; the health challenges these groups face. Through discussion and reflection, students prepare for clinical work and community engagement in Oaxaca, while also gaining knowledge and insight to make connections between their experiences in Mexico and their health-related work with Mexican immigrants in the Bay Area. Service Learning Course (certified by Haas Center). Prerequisite: application and acceptance into the Community Health in Oaxaca Summer Program (<http://och.stanford.edu/oaxaca.html>).

**MED 260. HIV: The Virus, the Disease, the Research. 3-4 Units.**

Open to medical students, graduate students in biological sciences, undergraduates with strong biological background. Topics: immunopathogenesis immune deficits, opportunistic infections including TB, and malignancies; genomics viral genetic analyses that have traced the origin of HIV-1 and HIV-2 to primates, dated the spread of infection in humans, and characterized the evolution of the virus within infected individuals; antiretroviral drug development identification of drug targets, structure-based drug design, overcoming drug resistance, pivotal clinical trials, and role of community activism; clinical management solutions in high- and low-income countries; vaccine development learning from past failures and the future of engineering the human immune response. 4 units includes a final project assigned in consultation with the instructor to fit the individual student's background and area of HIV interest. Same as: IMMUNOL 260.

**MED 262. Economics of Health Improvement in Developing Countries. 5 Units.**

Application of economic paradigms and empirical methods to health improvement in developing countries. Emphasis is on unifying analytic frameworks and evaluation of empirical evidence. How economic views differ from public health, medicine, and epidemiology; analytic paradigms for health and population change; the demand for health; the role of health in international development. Prerequisites: ECON 50 and ECON 102B. Same as: ECON 127.

**MED 263. Advanced Decision Science Methods and Modeling in Health. 3 Units.**

Advanced methods currently used in published model-based cost-effectiveness analyses in medicine and public health, both theory and technical applications. Topics include: Markov and microsimulation models, model calibration and evaluation, and probabilistic sensitivity analyses. Prerequisites: a course in probability, a course in statistics or biostatistics, a course on cost-effectiveness such as HRP 392, a course in economics, and familiarity with decision modeling software such as TreeAge. Same as: HRP 263.

**MED 271. Global Biodesign: Medical Technology in an International Context. 1-2 Units.**

(Same as OIT 587) Seminar examines the development and commercialization of medical technologies in the global setting focusing primarily on Europe, India and China. Faculty and guest speakers from industry and government discuss the status of the industry, as well as opportunities in and challenges to medical technology innovation unique to each geography. Topics related to development of technologies for bottom of the pyramid markets are also addressed. Students enrolling for 2 units are required to write and deliver a final paper. Same as: BIOE 371.

**MED 272A. Biodesign Innovation: Needs Finding and Concept Creation. 4 Units.**

(Same as OIT 384) Two quarter sequence. Inventing new medical devices and instrumentation, including: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping. Guest lecturers and practical demonstrations. Same as: BIOE 374A, ME 368A.

**MED 272B. Biodesign Innovation: Concept Development and Implementation. 4 Units.**

(Same as OIT 385) Two quarter sequence. How to take a medical device invention forward from early concept to technology translation and development. Topics include prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation route (licensing versus start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. Prerequisite: MED 272A, ME368A, OIT 384 or BIOE 374A. Same as: BIOE 374B, ME 368B.

**MED 273. BIODESIGN FOR MOBILE HEALTH. 1 Unitss.**

Examines the emerging Mobile Health industry. Mobile health (mHealth, or, wireless health) is the provision of health services and information via mobile technologies such as mobile phones and wearable sensors. Innovations in this area promise solutions to the need for universal access to affordable and effective health care by enabling consumers to take charge of their health, creating affordable ways to manage aging and chronic conditions, moving care from the hospital into the home, improving treatment options by providing transparency of measurable clinical outcomes, and shifting the focus from sick care to health improvement and prevention. Topics include the driving needs, applications, challenges and incentives that characterize the emerging mobile health landscape, and include an overview of some of the devices and companies that are already transforming the way health care is accessed today. Faculty and guest speakers discuss the status of the industry and research in Mobile Health, as well as opportunities in and challenges to medical technology innovation unique to this area. Issues related to Key Markets/Applications, Consumer/Enterprise Innovation, Policy/Regulatory, Financing, Business Models, Global Initiatives and Entrepreneurship are covered. Same as: BIOE 273.

**MED 274. Design for Service Innovation. 4 Units.**

(Same as OIT 343/01) Open to graduate students from all schools and departments. An experiential project course in which students work in multidisciplinary teams to design new services to address the needs of medically patients. Project teams partner with "safety net" hospitals and clinics to find better ways to deliver care to the low income and uninsured patients these institutions serve. Students learn proven innovation processes from experienced GSB, d. school, and SoM faculty, interface with students from across the university, and have the opportunity to see their ideas translated into improvements in the quality and efficiency of healthcare in the real world. Prerequisite: admission to the course is by application only. Applications available at <http://DesignForService.stanford.edu>. Applications must be submitted by November 16, 2011. Same as: BIOE 372, HRP 274.

**MED 275. Introduction to Biopharmaceutical Innovation. 2-3 Units.**

Open to all students. Biotechnology and the pharmaceutical industry. Topics include the biopharmaceutical industry, historical trends and experiences; research and development; intellectual property; drug approval: regulatory issues and agencies; business development; marketing; manufacturing; capital structure and financing; careers in biopharmaceutical industry. 2-unit option, lectures and weekly assignments, MED or S/NC grading only. 3-unit option, including a group project and final presentation, may be taken for a letter grade. May be repeated for credit.

**MED 276. Careers in Medical Technology. 2-3 Units.**

Career tracks in biomedical technology for medical, life science, engineering, business, and law students of all levels. Industry professionals describe career tracks, current roles, and industry perspectives. 2-unit option, lectures and weekly assignments, MED or S/NC grading only. 3-unit option, including a group project and final presentation, may be taken for a letter grade. May be repeated for credit.

**MED 277. Health and Development at the Food-Water Nexus. 1 Unitss.**

Linkages between water access, smallholder food production, poverty, and infectious disease, with particular emphasis on sub-Saharan Africa. Weekly reading, writing and discussion assignments focused on topics such as water supply, sanitation, and HIV: smallholder production, nutrition, and poverty; and infectious disease and child development. Permission of instructors required.

Same as: CEE 277G, EESS 277G.

**MED 282. Early Clinical Experience at the Cardinal Free Clinics. 1-2 Units.**

Students provide health care in a student-run clinic for the homeless and uninsured. Student volunteers are guided in the practice of medical interviews, history-taking and physical examinations as appropriate. Clinical students and attending physicians provide support and guidance as the team arrives at a diagnosis and management plan. One unit for students who volunteer a minimum of twice a month. Two units of credit for students whose volunteer commitment is greater than twice a month. By application only. Visit <http://cfc.stanford.edu> for more information.

Same as: MED 182.

**MED 284. Leadership in the Cardinal Free Clinics. 1 Unitss.**

Open to Steering Committee and Managers of Cardinal Free Clinics. Introduction to skills for effective leadership, including: conflict resolution, team dynamics, leadership styles, personality types, giving and receiving feedback, and group decision-making. Utilizes hands-on-activities and real-life clinic scenarios. Applied learning through shifts at the Cardinal Free Clinics and related project work.

Same as: MED 184.

**MED 289. Introduction to Bioengineering Research. 2 Units.**

Preference to medical and bioengineering graduate students with first preference given to Bioengineering Scholarly Concentration medical students. Bioengineering is an interdisciplinary field that leverages the disciplines of biology, medicine, and engineering to understand living systems, and engineer biological systems and improve engineering designs and human and environmental health. Students and faculty will make presentations during the course. Students will be expected to make presentations, complete a short paper, read selected articles, and take quizzes on the material.

Same as: BIOE 390.

**MED 295. Advanced Cardiac Life Support. 2 Units.**

(For clinical MD students only) Prepares students to manage the victim of a cardiac arrest. Knowledge and skills necessary for resuscitation of critically ill patients. Clinical scenarios and small group discussions address cardiovascular pharmacology, arrhythmia recognition and therapy, acute coronary syndrome including myocardial infarction, ventricular dysrhythmias and defibrillation, and acute ischemic stroke. Requires pre-course preparation and an intensive two-day session on a Friday and Saturday. Students should get the approval of their Clerkship Coordinator before registering for the course. Recommended prerequisites: Medicine 300A, Pediatrics 300A, or Surgery 300A.

**MED 299. Directed Reading in Medicine. 1-18 Units.**

Prerequisite: consent of instructor.

**MED 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**MED 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

# Medicine Interdisciplinary Courses

## **INDE 200. The Future of Academic Medicine. 1 Unitss.**

Required for and limited to first-year MSTP students. Presentations of research directions and opportunities by chairs of basic science, clinical departments, and PhD programs. Prerequisite: instructor consent.

## **INDE 201. Practice of Medicine I. 11 Units.**

Six quarter series extending throughout the first two years of the MD program, interweaving core skills training in medical interviewing and the physical examination with other major threads addressing the context of medical practice: information literacy, nutrition principles, clinical epidemiology and biostatistics, evidence-based practice, psychiatry, biomedical ethics, health policy, population health. Core clinical skills are acquired through hands-on practice, and evaluated through an extensive program of simulated medical encounters, in which students interview, examine, and manage patients in a mock clinic. The information literacy thread introduces students to informatics and knowledge management, biomedical informatics, and evidence-based medicine searching. Nutrition principles are acquired through interactive, web-based instruction, and reinforced through problem-based learning cases, which run in parallel to the basic science components over the first year. In epidemiology students learn the taxonomy of epidemiological studies, how to critically read a journal article, and how to recognize and understand the concepts behind different clinical study designs. Topics include bias, confounding, diagnostic testing and screening, and "how statistics can lie." Psychiatry introduces students to the unique role of medical students in talking with patients, the difference between process and content in patient communication, how to respond to breaks in the patient-physician relationship, and the relationship between the quality of the patient-physician interaction and health outcomes. Health care policy covers such topics as health insurance, physician payment, health care costs, access, measurement and improvement of quality, regulation and health care reform. Biomedical ethics includes important ethical issues in medical practice, such as confidentiality, privacy, and ethical issues relating to medical students. The population health curriculum exposes students to concepts of public health, community action, and advocacy, and includes a year-long, community-based project. At the end of this quarter students participate in a performance-based assessment of the medical interview skills.

## **INDE 202. Practice of Medicine II. 8 Units.**

Medical interview and physical examination skills, information literacy, nutrition principles, evidence-based practice, health policy, and population health are covered. At the end of this quarter, students participate in a performance-based assessment of their medical interview and physical examination skills. See INDE 201 for a complete description of the Practice of Medicine course series.

## **INDE 203. Practice of Medicine III. 8 Units.**

Medical interview and physical examination skills, biomedical literature retrieval and appraisal, nutrition principles, evidence-based practice, biomedical ethics, and population health are covered. Students begin clinical problem-solving sessions to learn the approach to common and important clinical problems. Cases integrate other course themes of population health, evidence-based practice, clinical ethics, nutrition, health policy, and behavioral medicine. Students begin transition from comprehensive to problem-focused patient encounters. Students also gain exposure to geriatrics, pediatrics, and interprofessional healthcare teams, and practice mental health interview skills. At the end of this quarter, students participate in a performance-based assessment of their medical interview and physical examination skills. See INDE 201 for a complete description of the Practice of Medicine course series.

## **INDE 204. Practice of Medicine IV. 10 Units.**

The second year of the Practice of Medicine series (INDE 204 and 205) emphasizes clinical reasoning, clinical practicum, and clinical procedures. Students continue clinical problem-solving sessions to learn the approach to common and important clinical problems. Cases integrate other course themes of population health, evidence-based practice, clinical ethics, nutrition, health policy, and behavioral medicine. Students spend one-half day per week in a clinical setting, practicing medical interview, physical examination skills, oral presentations, and clinical note-writing under the mentorship of a clinical tutor. In the practicum, students also gain experience with other practical aspects of patient care. The Clinical Procedures segment introduces common and important procedures in clinical practice, including phlebotomy, intravenous line insertion, and electrocardiography.

## **INDE 205. Practice of Medicine V. 8 Units.**

Continued emphasis on clinical reasoning, clinical practicum, and clinical procedures. Students continue clinical problem-solving sessions to learn the approach to common and important clinical problems. Cases integrate other course themes of population health, evidence-based practice, clinical ethics, nutrition, health policy, and behavioral medicine. Students spend one-half day per week in a clinical setting, practicing medical interview, physical examination skills, oral presentations, and clinical note-writing under the mentorship of a clinical tutor. In the practicum, students also gain experience with other practical aspects of patient care. For the Clinical Procedures segment, students will have an opportunity in the Emergency Department to practice performing procedures learned in the previous quarter. At the end of this quarter, students participate in a comprehensive four-station objective structured clinical examination (OSCE) performance-based assessment of their medical interview, physical examination, and clinical problem-solving skills.

## **INDE 206. Practice of Medicine VI. 9 Units.**

This last segment of the Practice of Medicine series is an intensive, four-week learning experience to consolidate clinical skills from prior quarters, and a final preparation for transition to clerkships. An extensive series of workshops covers topics such as dermatology, ophthalmology, advanced clinical reasoning, advanced presentations, bedside skills, ethics, palliative medicine, advanced sexual history, electronic medical record, ekg interpretation, intravenous fluid and electrolyte management. Students practice clinical procedures with task trainers and on a cadaver. This quarter also includes a professionalism series to prepare students for entry into clinical practice. Special clinical practice sessions are held as a capstone to clinical skills preparation.

## **INDE 207A. Medical Mandarin I: Beginning. 2-3 Units.**

Develops conversational communication skills and essential medical vocabularies. Teaches in pinyin pronunciation system, which provides an accessible method of learning basic phrases. The foundations of taking a comprehensive patient history in Mandarin and doing medical interviews at individual hospital divisions, including making introductions, soliciting symptoms, explaining health concepts (e.g. diseases and prescriptions) as well as daily survival conversations. Main goals are to improve rapport with Chinese patients through Mandarin fluency in the medical setting and to promote understanding of Chinese culture in the context of health care as well as daily life. Students registering for 3 units participate in clinic visits and field activities.

## **INDE 207B. Medical Mandarin II: Intermediate. 2-3 Units.**

For students who already have a basic command of spoken Chinese. Conversational communication skills practiced in a more advanced setting, including more sophisticated assessment of patient history and different tasks such as giving medical instructions and doing labs and tests. Builds working vocabulary for organ system, disease assessment to conduct a full physical exam, and to describe treatment modalities for Chinese-speaking patients (diagnostic and therapeutic). Students registering for 3 units participate in clinic visits and field activities. Prerequisite: one year of college-level Chinese or instructor assessment of fluency.

**INDE 207C. Medical Mandarin III: Advanced. 2-3 Units.**

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. Students registering for 3 units participate in clinic visits, field activities or projects. Prerequisite: completion of Medical Mandarin II, or advanced Chinese proficiency.

**INDE 207D. Professional Mandarin I. 2-3 Units.**

Designed for students who seek professional development via Mandarin. Coursework includes lectures, online classes, language partnerships, selected topics, projects and field activities. Goal is to enhance students' language abilities as professionals and facilitate a career. Students choose to enroll for 2 units or 3 units depending upon an agreed- upon workload approved by the instructor. Prerequisite: sound preparation in Mandarin as assessed by the instructor.

**INDE 208A. Medical Mandarin I: Beginning. 2-3 Units.**

Continuation of 207A. See description for 207A. Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

**INDE 208B. Medical Mandarin II: Intermediate. 2-3 Units.**

Continuation of 207B. See description for 207B. Students participating in classroom and online instruction only register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

**INDE 208C. Medical Mandarin III: Advanced. 2-3 Units.**

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. 3 units Includes clinic visits and field activities. Prerequisite: completion of 207C, or advanced Chinese proficiency.

**INDE 208D. Professional Mandarin II. 2-3 Units.**

Continuation of INDE 207D. Designed for students who seek professional development via Mandarin. Coursework includes lectures, online classes, language partnerships, selected topics, projects and field activities. Goal is to enhance students' language abilities as professionals and facilitate a career. Students choose to enroll for 2 units or 3 units depending upon an agreed- upon workload approved by the instructor. Prerequisite: INDE 207D.

**INDE 209A. Medical Mandarin III: Beginning. 2-3 Units.**

Continuation of 207A/208A. See description for 207A. Students participating only in classroom and online instruction register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

**INDE 209B. Medical Mandarin III: Intermediate. 2-3 Units.**

Continuation of 207B/208B. See description for 207B. Students participating only in classroom and online instruction register for 2 units. Students registering for 3 units participate in clinic visits and field activities as well.

**INDE 209C. Medical Mandarin III: Advanced. 2-3 Units.**

Access advanced professional medical vocabulary, conduct medical research, and engage in discussions in Chinese. Aims at a proficiency level of medical interpreting or doing other independent work in Chinese. Students are also assisted in doing a project or projects related to a specific field of medicine. 3 units Includes clinic visits and field activities. Prerequisite: completion of 208C or advanced Chinese proficiency.

**INDE 209D. Professional Mandarin III. 2-3 Units.**

Continuation of INDE 208D. Designed for students who seek professional development via Mandarin. Coursework includes lectures, online classes, language partnerships, selected topics, projects and field activities. Goal is to enhance students' language abilities as professionals and facilitate a career. Students choose to enroll for 2 units or 3 units depending upon an agreed- upon workload approved by the instructor. Prerequisite: INDE 208D.

**INDE 211. Creative Writing. 1 Unitss.**

For medical students - all levels of writing skill. Examines uses of creative writing, including understanding the experience of medical training. May be repeated for credit.

**INDE 212. The Human Condition: Medicine, Arts, and Humanities. 2 Units.**

The interdisciplinary field of medical humanities: the use of the arts and humanities to examine medicine in personal, social, and cultural contexts. Topics include the doctor/patient relationship, the patient perspective, the meaning of doctoring, and the meaning of illness. Sources include visual and performing arts, film, and literary genres such as poetry, fiction, and scholarly writing. Designed for medical students in the Biomedical Ethics and Medical Humanities Scholarly Concentration, but all students are welcome.

**INDE 214. Stanford Medical Student Journal. 1 Unitss.**

Provides an opportunity for editors of all levels to cultivate their skills and assist in preparing pieces submitted by colleagues for publication in the Stanford Medical Student Journal. Students enrolled in the course work closely with student authors as well as other editors. Editors examine multiple categories of writing, including opinion pieces, poetry, memoirs, book reviews, case reports and investigative reports. The Journal is published two to three times per year and highlights the diverse talents of Stanford medical students in both scientific writing and the humanities.

**INDE 215. Queer Health and Medicine. 1 Unitss.**

Explores specific, pertinent, and timely issues impacting the health of the lesbian, gay, bisexual, and transgender community; examines the role of the primary care physician in addressing the health care needs of this community. Guest lecturers provide a gender-sensitive approach to the medical care of the LGBT patient, breaking down homophobic barriers and reaffirming patient diversity. May be repeated for credit.

**INDE 216. Cells to Tissues. 3 Units.**

Focuses on the cell biology and structural organization of human tissues as self-renewing systems. Topics include identification and differentiation of stem cells, regulation of the cell cycle and apoptosis in normal and cancerous cells, cell adhesion and polarity in epithelial tissues, intracellular transport, and cell migration. Histology laboratory sessions examine normal and abnormal samples of blood, epithelia, connective tissue, muscle, bone and cartilage. Patient presentations and small group discussions of current medical literature illustrate how cell biology influences medical practice.

**INDE 220. Human Health and Disease I. 3 Units.**

Establishes the foundation for the Human Health and Disease block which spans Q3 (Spring quarter Year One) through Q5 (Winter quarter Year Two). The Human Health and Disease block presents organ system-based histology, pathology, physiology, pharmacology, and infectious disease in a sequence of interdisciplinary courses. Each organ-specific integrated course includes a review of the anatomy and related histology, normal function of that organ system, how the organ system is affected by and responds to disease including infection, and how diseases of that organ system are treated (therapeutics).

**INDE 221. Human Health and Disease II. 12 Units.**

Structure, function, disease, and therapeutics of the respiratory system and the cardiovascular system. See INDE 220 for a description of the Human Health and Disease block .

**INDE 222. Human Health and Disease III. 15 Units.**

Structure, function, disease, and therapeutics of the renal/genito-urinary system, the gastrointestinal system, the endocrine system, male and female reproductive systems, and women's health. See INDE 220 for a description of the Human Health and Disease block .

**INDE 223. Human Health and Disease IV. 11 Units.**

Structure, function, disease, and therapeutics of the central nervous system, hematologic system and multi-systemic diseases. See INDE 220 for a description of the Human Health and Disease block.

**INDE 225. Popular and Clinical Nutrition: Food Facts, Fads, and Pharmacology. 1 Unitss.**

Designed for medical students and other health care professionals. Lunchtime lectures review the epidemiological and clinical research related to eating patterns and misconceptions of the public, the mechanisms of pharmacological effects of food, and related topics common to patient nutritional concerns. Topics include fad diets, the impact of dietary addiction, longevity associated with caloric restriction, toxins in foods and the action of phytonutrients. Epidemiological, clinical, and biochemical studies are reviewed in the discussion of these and other topics.

**INDE 226. History of Medicine Online. 1 Unitss.**

Via Internet. Topics include: ancient medicine, Egypt and Babylonia, ancient Greece and Rome, Europe in the Middle Ages and the Renaissance, 18th-century schools of thought, and technological medicine. Sources include Kleinman's core clinical functions, and text, pictures, hypertext links, and sound clips. For assistance accessing the course, email: cwpsupport@lists.stanford.edu. Enroll in Axess, then ask cwpsupport to be added to the course site as a student.

**INDE 227. Careers in Medicine: Pathways in the Medical Sciences. 1 Unitss.**

Open to medical students, graduate and undergraduate students. Interactive, seminar-style sessions expose students to diverse career opportunities and the challenges of developing work-life balance in medicine. Recognized experts in clinical medicine and biomedical research who have been innovators in their careers discuss their work, decision-points in their career pathways, and lifestyle aspects of their choices.

**INDE 228. Career Transition Planning: Taking Action Today for a Successful Tomorrow. 1 Unitss.**

Open to School of Medicine MD and graduate students; post-docs and clinical fellows may audit by consent of instructor. How to prioritize career goals and develop an effective job search campaign. Topics: translating scientific and clinical training into a variety of workplace environments, professional network development, professional interest assessment, recruiters' perspectives, credentials development, and creating a marketing plan. Guest speakers from myriad career fields. May be repeated for credit.

**INDE 229. Managing Difficult Conversations. 1 Unitss.**

(Same as GSBGEN 568) Dealing effectively with difficult interpersonal situations in medical contexts. Focus is on improving students' judgment as to how to prepare for and confront difficult discussions in medical situations. Relevant principles of professionalism, leadership, and psychology underlie the course pedagogy. Case-based; student-to-student and student-to-instructor role-playing in actual medical situations. Patient and physician-expert participation as class guests. Enrollment limited to 20 medical students (2nd year and beyond) and 15 2nd year MBA students.

**INDE 230. Topics in Scientific Management. 1 Unitss.**

Designed for postdocs and advanced graduate students. Reviews management skills necessary for successfully assuming leadership roles in scientific research. Addresses some of the most difficult aspects of developing, directing, and managing people and projects and running a research group, especially issues that new faculty have traditionally learned by trial and error over a number of years. Topics include: the faculty job search process and strategies, key elements in starting a lab, basic principles regarding legal dimensions of scientific activity (intellectual property, royalties, links with industry), team science, research ethics, communication and negotiation skills, and writing and securing grants.

**INDE 231. Future Faculty Seminar. 1 Unitss.**

For graduate students from all disciplines who are considering faculty careers. Postdoctoral fellows, TGR students, and research/clinical trainees may audit by consent of instructor. Explores the broad spectrum of duties and opportunities presented through faculty positions beyond the research-related aspects. Develops awareness of resources and skills that lead to faculty success; answers field-specific and related faculty job questions through discussions with representatives of a variety of academic institutions and fellow course participants. Topics include: finding and obtaining faculty positions, negotiating and navigating the first year, and working toward tenure. May be repeated for credit. Same as: CTL 231.

**INDE 232. Introduction to Academic Medicine for Physician-Scientists. 3 Units.**

Open only to accepted MSTP students. Presentations by Stanford faculty on professional development topics, including: choosing a dissertation advisor, giving oral presentations, writing a grant proposal, attending scientific meetings, developing a research career. Substantial writing component.

**INDE 233. Medical Education Seminar Series. 1 Unitss.**

For pre-clinical and clinical medical students. A series of sessions rotating among the following formats: Medical Education journal club; education works-in-progress; topics in medical education design, implementation, and evaluation; teaching M&M; hot topics and controversies in medical education. May be repeated for credit.

**INDE 234. Introduction to Writing Research Proposals. 3 Units.**

Practical instruction in research proposal writing. Suitable for advanced graduate students. Substantial writing component. Enrollment by instructor approval only.

**INDE 235. Wilderness Leadership and Mentorship Skills for Medical Students. 1 Unitss.**

For MD/Master of Medicine wilderness pre-orientation trip (SWEAT) leaders. Training to engage with and prepare incoming first-year medical students for the rigors of medical school. Topics include: fundamentals of wilderness survival, wilderness equipment use, wilderness first aid, camping, outdoor leadership, mentorship, team building, improvisation, risk management, cultural competency, professionalism as a physician, reflection and resiliency, first-year curriculum, stress management and coping. Guest lectures from Stanford faculty, emergency medicine physicians, National Outdoor Leadership School wilderness instructors, learning strategy specialists, and mentorship development specialists.

**INDE 236. Introduction to Teaching and Mentoring. 1 Unitss.**

Enrollment limited to medical students. An introduction to medical education teaching principles and skills. Topics include assessment of current teaching skills, reviews of performance, giving appropriate learner feedback, and best practices for interactive teaching. Also introduces the literature around the value of peer mentoring in the medical setting and how to apply this information. Recommended for medical students interested in or currently serving as teaching assistants or interested in future academic positions.



**INDE 255A. Health Policy, Finance and Economics I. 1 Unitss.**

Open to medical students and resident physicians. Introduction to basic concepts and current issues in health policy, health finance, and health economics. Goals are to promote understanding of the forces that shape healthcare; to integrate medical students with graduate medical education (residents); to motivate participants to pursue further scholarly activity in these subjects through coursework, graduate programs or research. Team taught by world-renowned experts in their respective fields. Prerequisite: instructor consent.

**INDE 255B. Health Policy, Finance and Economics II. 1 Unitss.**

Continuation of INDE 255A. Open to medical students and resident physicians. Introduction to basic concepts and current issues in health policy, health finance, and health economics. Goals are to promote understanding of the forces that shape healthcare; to integrate medical students with graduate medical education (residents); to motivate participants to pursue further scholarly activity in these subjects through coursework, graduate programs or research. Team taught by world-renowned experts in their respective fields. For medical students 255A is not prerequisite to 255B. Prerequisite: instructor consent.

**INDE 297. Reflections, Research, and Advances in Patient Care. 4 Units.**

For clinical MD students. Two-year curriculum designed to provide structured time for students to step back from clerkships, in order to promote reflection on and reinforcement for their learning in the clinical environment. Goals are: to discuss and reflect upon critical experiences in clerkships; to provide continuity of instruction in translational science topics across the curriculum; to reinforce and extend the study of behavioral, cultural, ethical, social and socioeconomic topics introduced in the Practice of Medicine course sequence; to expose students to recent advances in medical discoveries, emphasizing their application to clinical practice (translational medicine); and to develop research and critical thinking skills, acquiring new information in areas related to the Scholarly Concentrations. Components of this curriculum include Doctoring with CARE small groups, the Advances and Reflections in Medicine lecture/seminar series, and Scholarly Concentration breakout groups. The Friday afternoon lecture/seminars explore advances in biomedical sciences with applications to medical practice (translational medicine) as well as faculty career pathways, reflections on doctoring, and the context of medicine in society. All students in clinical clerkships must participate in all aspects of RRAP Days. Prerequisite: Concurrent enrollment in clinical clerkships.

**INDE 298. Women's Health Independent Project. 1 Unitss.**

Required for Women's Health Scholarly Concentration. Students pursue individual projects under the supervision of a faculty member. Prerequisite: consent of instructor.

**Medieval Studies Courses****Microbiology Immunology Courses****MI 19SC. Measles and Sneezles and Things That Go Mumps in the Night. 2 Units.**

A study of measles (until recently one of the leading causes of death in the world and the most contagious disease agent ever studied) and its relatives in the paramyxovirus family, including mumps, respiratory syncytial virus, hendra, and nipah, as well as a number of important animal pathogens. Investigates the nature of viruses using the paramyxoviruses as a paradigm. Topics include: the history of this devastating group of pathogens; basic aspects of paramyxovirus taxonomy and molecular virology; viral epidemiology, emergence, and eradication, including the pioneering studies of Peter Panum; the use, misuse, and abuse of science; the interactions between pathogen and host and how this interplay leads to disease, including the appearance of a bizarre brain complication with 100% mortality; the politics and economics of infection; how a putative link between the measles vaccine and autism entered the public eye, and how it refuses to disappear despite overwhelming evidence to the contrary. Field trips, guest speakers, student presentations. No science background necessary.

**MI 70Q. Photographing Nature. 3 Units.**

Utilizes the idiom of photography to learn about nature, enhance observation, and explore scientific concepts. Builds upon the pioneering photographic work of Eadweard J. Muybridge on human and animal locomotion. A secondary goal is to learn the grammar, syntax, composition, and style of nature photography to enhance the use of this medium as a form of scientific communication and also to explore the themes of change across time and space. Scientific themes to be explored include: taxonomy, habitat preservation, climate change; species diversity; survival and reproductive strategies; ecological niches and coevolution, carrying capacity and sustainability, population densities, predation, and predator-prey relationships, open-space management, the physics of photography. Extensive use of field trips and class critique.

**MI 104. Innate Immunology. 3 Units.**

Innate immune mechanisms as the only defenses used by the majority of multicellular organisms. Topics include Toll signaling, NK cells, complement, antimicrobial peptides, phagocytes, neuroimmunity, community responses to infection, and the role of native flora in immunity. How microbes induce and defeat innate immune reactions, including examples from vertebrates, invertebrates, and plants. Same as: IMMUNOL 204, MI 204.

**MI 115B. The Vaccine Revolution. 6 Units.**

Advanced seminar. Human aspects of viral disease, focusing on recent discoveries in vaccine development and emerging infections. Journal club format: students choose articles from primary scientific literature, write formal summaries, and synthesize them into a literature review. Emphasis is on analysis, experimental design, and interpretation of data. Oral presentations. Enrollment limited to 8. Prerequisite: prior enrollment in HumBio 155H Humans and Viruses or MI 116, The Human Virosphere. Same as: HUMBIO 155B.

**MI 116. The Human Virosphere. 5 Units.**

Focus on interaction of humans and viruses from a number of perspectives: historical, cultural, political, and demographic. Organismal, molecular biological, biochemical, human and viral interactions; clinical aspects of viral disease, epidemiology and risk factors, public and international health, aspects of virology including emerging viruses and biological weapons. Case studies involving particular viruses: human herpes viruses, retroviruses, oncogenic viruses; vaccination and disease eradication, evolution of viruses as tools for research and therapy. Emphasis on general principles of biology and matters of decision making policy. Prerequisite: Biology core, Human Biology core, or consent of instructor. Same as: MI 216.

**MI 120. Bacteria in Health and Disease. 3 Units.**

(Enrollment limited to junior and senior undergraduates) Throughout history humans have encountered novel microbes, which, in some cases, can cause disease and sometimes death. This course introduces undergraduate students (especially those thinking about a career in the biomedical sciences) to the bacteria that live in and on humans. Topics include the biology of the interaction of the simple microbe with complex human biology and the factors that determine whether or not we coexist relatively peacefully, suffer from overt disease, or succumb to the bacterial onslaught.

Same as: BIO 120.

**MI 155H. Humans and Viruses I. 6 Units.**

Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis is on host pathogen interactions and policy issues. Topics: polio and vaccination, smallpox and eradication, yellow fever and history, influenza and genomic diversity, rubella and childhood infections, adenovirus and viral morphology, ebola and emerging infection, lassa fever and immune response.

Same as: HUMBIO 155H.

**MI 155V. Humans and Viruses II. 6 Units.**

Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis on host pathogen interactions and policy issues. Topics: measles and viral epidemiology, rotavirus and world health, rabies and infections of the brain, HPV and cancer -causing viruses, herpes simplex and viral latency, CMV and viral teratogenesis, retrovirology and endogenous viral sequences, HIV and viral treatment, viral hepatitis and chronic infections, prions and diseases of life style. Prerequisite: MI155H.

**MI 185. Topics in Microbiology. 3 Units.**

For advanced undergraduates and graduate students. 1/3rd of the course consists of lectures by the instructor/colleagues. These cover, at an advanced level, with emphasis on bacteria, topics not covered elsewhere, e.g., phylogeny, molecular regulation, and bioenergetics. The remainder of the course involves interactive discussion of a topic of current interest in microbiology, chosen with student participation, and includes student presentations. (The topic last year was: Gene therapy.) Satisfies Central Menu Area 3 for BIO majors. Prerequisites: CHEM 31X, Biology core. Same as: MI 285.

**MI 198. Directed Reading in Microbiology and Immunology. 1-15 Units.**

Fields of study are decided in consultation with sponsoring professor. Prerequisite: consent of instructor.

**MI 199. Undergraduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Possible fields: microbial molecular biology and physiology, microbial pathogenicity, immunology, virology, and molecular parasitology. Prerequisite: consent of instructor.

**MI 204. Innate Immunology. 3 Units.**

Innate immune mechanisms as the only defenses used by the majority of multicellular organisms. Topics include Toll signaling, NK cells, complement, antimicrobial peptides, phagocytes, neuroimmunity, community responses to infection, and the role of native flora in immunity. How microbes induce and defeat innate immune reactions, including examples from vertebrates, invertebrates, and plants.

Same as: IMMUNOL 204, MI 104.

**MI 209. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites: Part I. 4 Units.**

For graduate students and advanced undergraduates; required of first-year graduate students in Microbiology and Immunology. Emphasis is on mechanisms to establish infection in the host and responses of the host to infection. Current literature. Prerequisite: background in biochemistry and molecular biology.

**MI 210. Advanced Pathogenesis of Bacteria, Viruses, and Eukaryotic Parasites. 4 Units.**

For graduate and medical students, and advanced undergraduates; required of first-year graduate students in Microbiology and Immunology. The molecular mechanisms by which microorganisms invade animal and human hosts, express their genomes, interact with macromolecular pathways in the infected host, and induce disease. Current literature.

**MI 211. Advanced Immunology I. 3 Units.**

For graduate students, medical students and advanced undergraduates. Topics include the innate and adaptive immune systems; genetics, structure, and function of immune molecules; lymphocyte activation and regulation of immune responses. Prerequisites: undergraduate course in Immunology and familiarity with experimental approaches in biochemistry, molecular biology, and cell biology.

Same as: IMMUNOL 201.

**MI 215. Principles of Biological Technologies. 3 Units.**

The principles underlying novel as well as commonly utilized techniques to answer biological questions. Lectures and primary literature critiques on topics such as fluorescence microscopy, including applications such as FRET and single-cell analysis; human and murine genetic analysis; FACS; proteomics and analysis of noncoding RNAs. Class participation is emphasized. Prerequisite: biochemistry. Required of first-year graduate students in Microbiology and Immunology and the Immunology program. Same as: IMMUNOL 215.

**MI 216. The Human Virosphere. 5 Units.**

Focus on interaction of humans and viruses from a number of perspectives: historical, cultural, political, and demographic. Organismal, molecular biological, biochemical, human and viral interactions; clinical aspects of viral disease, epidemiology and risk factors, public and international health, aspects of virology including emerging viruses and biological weapons. Case studies involving particular viruses: human herpes viruses, retroviruses, oncogenic viruses; vaccination and disease eradication, evolution of viruses as tools for research and therapy. Emphasis on general principles of biology and matters of decision making policy. Prerequisite: Biology core, Human Biology core, or consent of instructor.

Same as: MI 116.

**MI 218. Computational Analysis of Biological Information:****Introduction to Python for Biologists. 2 Units.**

Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy. Intended for biological and clinical trainees without substantial programming experience.

Same as: GENE 218, PATH 218.

**MI 233. The Biology of Small Modulatory RNAs. 2 Units.**

Open to graduate and medical students. Explores recent progress and unsolved questions in the field of RNA interference and microRNA biology. Students are required to read assigned primary literature before each class and actively participate in guided discussions on related technical and conceptual issues during class meetings. Assignments include critiques of assigned papers and developing a novel research proposal.

Same as: GENE 233, PATH 233.

**MI 234. Fundamentals of RNA Biology. 2 Units.**

For graduate or medical students and (if space allows) to active participants from other segments of the Stanford Community (e.g., TGR students); undergraduates by instructor consent. Fundamental issues of RNA biology, with the goal of setting a foundation for students to explore the expanding world of RNA-based regulation. Each week a topic is covered by a faculty lecture and journal club presentations by students.  
Same as: GENE 234, PATH 234.

**MI 245. Computational Modeling of Microbial Communities. 4 Units.**

Innovative new sequencing technologies are permitting the generation of massive amounts of sequence data and changing the way we think about and pursue biological questions. Coupled to these opportunities are tremendous challenges for biologists to grapple with the manipulation and analysis of large datasets and to address quantitative questions on a systems scale. The goal of this course is to provide biologists with basic computational tools and knowledge to confront large datasets in a quantitative manner. Students will learn basic programming skills in Matlab and Perl. Covered material will include: image analysis, bioinformatics algorithms, reaction-diffusion modeling, Monte Carlo algorithms, and population dynamics. Students will apply computational skills to a miniature research project studying the human microbiome or biofuel-related photosynthetic microbial communities. Spr 2012. (Huang, K., Sonnenburg, J., and Vora, T.)  
Same as: BIOE 45.

**MI 250. Frontiers in Microbiology and Immunology. 1 Unit.**

Required of first- and second-year students in Microbiology and Immunology. How to evaluate biological research. Held in conjunction with the Microbiology and Immunology Friday noon seminar series. Before the seminar, students and faculty discuss one or more papers from the speaker's primary research literature on a related topic. After the seminar, students meet informally with the speaker to discuss their research.

**MI 285. Topics in Microbiology. 3 Units.**

For advanced undergraduates and graduate students. 1/3rd of the course consists of lectures by the instructor/colleagues. These cover, at an advanced level, with emphasis on bacteria, topics not covered elsewhere, e.g., phylogeny, molecular regulation, and bioenergetics. The remainder of the course involves interactive discussion of a topic of current interest in microbiology, chosen with student participation, and includes student presentations. (The topic last year was: Gene therapy.) Satisfies Central Menu Area 3 for BIO majors. Prerequisites: CHEM 31X, Biology core.  
Same as: MI 185.

**MI 299. Directed Reading in Microbiology and Immunology. 1-18 Units.**

Prerequisite: consent of instructor.

**MI 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**MI 399. Graduate Research. 1-18 Units.**

Students who have completed the necessary foundation courses undertake investigations in general bacteriology, bacterial physiology and ecology, bacterial genetics, microbial pathogenicity, immunology, parasitology, or virology sponsored by individual faculty members. Prerequisite: consent of instructor.

**MI 801. TGR Master's Project. 0 Unit.****MI 802. TGR PhD Dissertation. 0 Unit.**

## Modern Thought Literature Courses

**MTL 210. Critical Theory and The Environment. 3-5 Units.**

Critical theoretical approaches (such as cultural studies, Marxism, postcolonial theory, cultural geography, feminism, and science studies) have generally been underutilized as methodologies for grappling with environmental situations, yet they hold much promise for addressing their complexity. This course asks: How does critical theory about the environment construe the current situation? What kinds of political or technological solutions do these theories call for or imply? The first half of the seminar introduces critical approaches and methodologies in relation to the environment. In the second section, we will use a variety of theoretical approaches to address environmental justice, water, agriculture, toxics, and animals.

Same as: AMSTUD 210, ANTHRO 210B.

**MTL 299. Edgework: New Directions in the Study of Culture. 1-3 Units.**

Workshop. Required of first-year students in the doctoral program. Methodologies of different disciplines, the possibility and difficulty of interdisciplinary work within these disciplines, and their connection with the individual projects of students in Modern Thought and Literature. May be repeated for credit.

**MTL 334A. Concepts of Modernity 1: Philosophical Foundations. 5 Units.**

In the late eighteenth century Immanuel Kant proclaimed his age to be "the genuine age of criticism." He went on to develop the critique of reason, which set the stage for many of the themes and problems that have preoccupied Western thinkers for the last two centuries. This fall quarter course is intended as an introduction to these themes and problems. We begin this course with an examination of Kant's philosophy before approaching a number of texts that extend and further interrogate the critique of reason. In addition to Kant, we will read texts by Hegel, Marx, Nietzsche, Weber, Freud, Lukács, and Heidegger. This course is the first of a two-course sequence. Priority to graduate students in MTL and English. The course will be capped at 12 students.

Same as: ENGLISH 334A.

**MTL 334B. Concepts of Modernity 2: The Study of Culture in the Age of Globalization. 5 Units.**

A survey of 20th-century theory with focus on the concept of culture and methods of studying it from diverse disciplines including, anthropology, historical sociology, literary and cultural studies. Discussions will emphasize modernization, transmodernization and globalization processes in their relations to culture broadly understood, cultures in their regional, national and diasporic manifestations, and cultures as internally differentiated (high and low culture, subcultures, media cultures).

Same as: COMPLIT 334B, ENGLISH 334B.

**MTL 390. Qualifying Paper. 1-5 Units.**

Preparation and writing of the qualifying paper for the Ph.D. in Modern Thought and Literature. (Staff).

**MTL 398. Graduate Independent Study. 1-15 Units.**

Students pursue a special subject of investigation under supervision of a member of the committee or another faculty member. May be repeated for credit.

**MTL 399. Reading for Orals. 1-15 Units.**

Reading in preparation for the University Oral Examination. May be repeated for credit.

**MTL 802. TGR Dissertation. 0 Unit.**

## Molecular Cellular Physiology Courses

### MCP 126. Neurons and Disease. 4 Units.

Diseases of the nervous system. First lecture of each week focuses on the clinical, epidemiological and behavioral aspects of a selected disease or syndrome. Second lecture exposes the cell biological, electrophysiological, biochemical and/or molecular biological processes that underlie each disease presented. Instructors maintain some flexibility in the diseases chosen for elucidation, but students can expect those covered to range from the relatively straightforward, for example Multiple Sclerosis (MS) or Amyotrophic Lateral Sclerosis (ALS), to the more complex, for example, Schizophrenia or Obsessive Compulsive Disorder (OCD). Prerequisite: Biology or Human Biology core.

### MCP 156. How Cells Work: Energetics, Compartments, and Coupling in Cell Biology. 4 Units.

Open to graduate and medical students, and advanced undergraduates. Dynamic aspects of cell behavior and function, including cellular energetics, homeostasis, heterogeneity of membranes, structure and function of organelles, solute and water transport, signaling and motility. Emphasis is on the principles of how coupling of molecular processes gives rise to essential functions at the cellular level. Mathematical models of cell function. Student presentations.

Same as: MCP 256.

### MCP 199. Undergraduate Research. 1-18 Units.

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

### MCP 200. Cardiovascular Physiology. 5 Units.

Offered jointly with the Department of Medicine. Lectures, small group instruction, clinical presentations, and lab demonstrations of normal and disordered human cardiovascular physiology. Prerequisite: understanding of general biochemistry.

### MCP 202. Advanced Immunology II. 3 Units.

Readings of immunological literature. Classic problems and emerging areas based on primary literature. Student and faculty presentations. Prerequisite: IMMUNOL 201/MI 211.

Same as: IMMUNOL 202.

### MCP 216. Genetic Analysis of Behavior. 4 Units.

Advanced seminar. Findings and implications of behavioral genetics as applied to invertebrate and vertebrate model systems. Topics include biological clocks, and sensation and central pattern generators. Relevant genetic techniques and historical perspective. Student presentation.

Same as: NBIO 216.

### MCP 221. Advanced Cell Biology. 4 Units.

For Ph.D. students. Current research on cell structure, function, and dynamics. Topics include complex cell phenomena such as cell division, apoptosis, compartmentalization, transport and trafficking, motility and adhesion, differentiation, and multicellularity. Current papers from the primary literature. Prerequisite for advanced undergraduates: BIO 129A,B, and consent of instructor.

Same as: BIO 214, BIOC 224.

### MCP 222. Imaging: Biological Light Microscopy. 3 Units.

Survey of instruments which use light and other radiation for analysis of cells in biological and medical research. Topics: basic light microscopy through confocal fluorescence and video/digital image processing. Lectures on physical principles; involves partial assembly and extensive use of lab instruments. Lab. Prerequisites: some college physics, Biology core.

Same as: BIO 152.

### MCP 232. Advanced Imaging Lab in Biophysics. 4 Units.

Laboratory and lectures. Advanced microscopy and imaging, emphasizing hands-on experience with state-of-the-art techniques. Students construct and operate working apparatus. Topics include microscope optics, Koehler illumination, contrast-generating mechanisms (bright/dark field, fluorescence, phase contrast, differential interference contrast), and resolution limits. Laboratory topics vary by year, but include single-molecule fluorescence, fluorescence resonance energy transfer, confocal microscopy, two-photon microscopy, and optical trapping. Limited enrollment. Recommended: basic physics, Biology core or equivalent, and consent of instructor.

Same as: APPPHYS 232, BIO 132, BIO 232, BIOPHYS 232.

### MCP 256. How Cells Work: Energetics, Compartments, and Coupling in Cell Biology. 4 Units.

Open to graduate and medical students, and advanced undergraduates. Dynamic aspects of cell behavior and function, including cellular energetics, homeostasis, heterogeneity of membranes, structure and function of organelles, solute and water transport, signaling and motility. Emphasis is on the principles of how coupling of molecular processes gives rise to essential functions at the cellular level. Mathematical models of cell function. Student presentations.

Same as: MCP 156.

### MCP 299. Directed Reading in Molecular and Cellular Physiology. 1-18 Units.

Prerequisite: consent of instructor.

### MCP 370. Medical Scholars Research. 4-18 Units.

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

### MCP 399. Graduate Research. 1-18 Units.

Students undertake investigations sponsored by individual faculty members. Research fields include endocrinology, neuroendocrinology, and topics in molecular and cellular physiology. Prerequisite: consent of instructor. (Staff).

### MCP 801. TGR Project. 0 Unit.

### MCP 802. TGR Dissertation. 0 Unit.

## Music Courses

### MUSIC 1A. Music, Mind, and Human Behavior. 3 Units.

An introductory exploration of the question of why music is a pervasive and fundamental aspect of human existence. The class will introduce aspects of music perception and cognition as well as anthropological and cultural considerations.

### MUSIC 2C. An Introduction to Opera. 3 Units.

The lasting appeal of opera as a lavishly hybrid genre from the 1600s to the present. How and why does opera set its stories to music? What is operatic singing? Who is the audience? How do words, music, voices, movement, and staging collaborate in different operatic eras and cultures? Principal works by Monteverdi, Handel, Mozart, Verdi, Wagner, Strauss, Britten, and Adams. Class studies and attends two works performed by the San Francisco Opera.

### MUSIC 4SI. Interactive Introduction to North American Taiko. 1 Units.

Taught by Stanford Taiko members. Techniques and history. No experience necessary. May be repeated for credit.

**MUSIC 5G. Introduction to Gu-Zheng. 1 Unitss.**

Introduction to Chinese music through learning how to play Gu-Zheng, a 21-stringed traditional Chinese instrument. The cultural, social, and historical significance of Gu-Zheng. 15 Gu-Zheng techniques, how to read Chinese music and Gu-Zheng notation, and two simple classic Gu-Zheng pieces. May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fee and signup information.(AU).

**MUSIC 6SI. Professional Development for Music Students. 1 Unitss.**

Many people struggle to connect their authentic, heart-felt dreams with a tangible action plan, regardless of how much clarity they have on their career goals. This is especially true for college-level musicians as they decide on graduate programs and career choices, evaluating whether music will be the focus of their professional lives, a valued hobby on the side, or something in between. This course is designed to empower students to ask themselves the questions ¿how do I define success and fulfillment?, ¿what role will music play in my professional and personal life?, and ¿how can I shape the educational experience and career that will serve my long-term goals?.

**MUSIC 8A. Rock, Sex, and Rebellion. 3 Units.**

Development of critical listening skills and musical parameters through genres in the history of rock music. Focus is on competing aesthetic tendencies and subcultural forces that shaped the music. Rock's significance in American culture, and the minority communities that have enriched rock's legacy as an expressively diverse form. Lectures, readings, listening, and video screenings.

**MUSIC 10AX. Sound Art. 2 Units.**

The course will explore the use of sound as a medium for artistic expression, from recording and manipulating environmental sounds to studio-created and processed sounds and musical instrument recordings. We will study the physics of sound, how sound is perceived, how to record and manipulate sound, and how to combine all of this knowledge into the creation of sound art. Instruction will include using portable sound recorders, using the recording studio, and how to think about sound as a medium of expression. A final project will combine these elements in the creation of a presentation of the works we produce in the class.

**MUSIC 11AX. An Operatic Play: Mozart's 7 Deadly Sins. 2 Units.**

This course is centered on the operatic repertoire of W.A. Mozart (1756-1791). Students of singing and acting will learn scenes from some of the world's most loved operas. Simultaneously they will develop their own play to be performed at the end of the course. This play will be linked to the Mozart operatic scenes studied, and the finished product will be a continuous narrative. Similarly, the instrumentalists will prepare an "overture" by Mozart appropriate to the enrolled ensemble (i.e. duo/trio/quartet etc.). They will then put their arrangement skills to the test as they adapt the music of the opera scenes to their particular ensemble.

**MUSIC 11N. A View from the Podium: The Art of Conducting. 3 Units.**

How a conductor interprets music, realizes a personal vision through the rehearsal process, and communicates with orchestra and audience. Conducting as based on human communication skills. How to apply these lessons to other fields of endeavor.

**MUSIC 11Q. Art in the Metropolis. 2 Units.**

This seminar is offered in conjunction with the annual "Arts Immersion" trip to New York that takes place over the spring break and is organized by the Stanford Institute for Creativity and the Arts (SiCa). Participation in the trip is a requirement for taking part in the seminar (and vice versa). The trip is designed to provide a group of students with the opportunity to immerse themselves in the cultural life of New York City guided by faculty and the SiCa programming director. Students will experience a broad range and variety of art forms (visual arts, theater, opera, dance, etc.) and will meet with prominent arts administrators and practitioners, some of whom are Stanford alumni. For further details and updates about the trip, see <http://arts.stanford.edu/students/artsimmersion>.

**MUSIC 12A. Introductory Piano Class. 1 Unitss.**

"(A=level 1; B=level 2; C=level 3)There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fee and signup information.Class is closed by design. Please register on the waitlist and show up on the first day of class to receive a permission number for enrollment. Preference to department majors".

**MUSIC 12B. Introductory Piano Class. 1 Unitss.**

This class is closed by design. To enroll, please sign up on the Axes waitlist and show up on the first day to receive a permission number for re-enrollment. Your place on the waitlist will be considered a reservation. If the waitlist is closed, there are no more spaces in the class. (A=level 1; B=level 2; C=level 3) Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fee and signup information.

**MUSIC 12C. Introductory Piano Class. 1 Unitss.**

This class is closed by design. To enroll, please sign up on the Axes waitlist and show up on the first day to receive a permission number for re-enrollment. Your place on the waitlist will be considered a reservation. If the waitlist is closed, there are no more spaces in the class. (A=level 1; B=level 2; C=level 3.) May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fee and signup information.

**MUSIC 12SC. Musical Collisions and Radical Creativity. 2 Units.**

The margins of musical culture; nonconformist, maverick, and eccentric creative impulses that expand the definition of art. Laboratory atmosphere and daily rehearsals in which students create collaborative works with a final public concert involving collaborations with local musicians and presentations of student-composed works created during the course.

**MUSIC 13Q. Classical Music and Politics: Western Music in Modern China. 3 Units.**

Preference to sophomores. Social history, cultural studies, China studies, international relations, and music. From the Italian Jesuit, Matteo Ricci who presented a clavichord to the Chinese emperor to the emergence of a modern generation of Chinese musicians.

**MUSIC 17N. The Operas of Mozart. 3 Units.**

Preference to freshmen. Four of Mozart's mature operas, the earliest works in the operatic repertoire never to go out of fashion. What accounts for this extraordinary staying power? Focus on the history of their composition, performance, and reception, and their changing significance from Mozart's time to the present.

**MUSIC 17Q. Perspectives in North American Taiko. 4 Units.**

Preference to sophomores. Taiko, or Japanese drum, is a newcomer to the American music scene. Emergence of the first N. American taiko groups coincided with increased Japanese American activism, and to some it is symbolic of Japanese American identity. N. American taiko is associated with Japanese American Buddhism. Musical, cultural, historical, and political perspectives of taiko. Hands-on drumming. Japanese music and Japanese American history, and relations among performance, cultural expression, community, and identity.

**MUSIC 18A. Jazz History: Ragtime to Bebop, 1900-1940. 3 Units.**

From the beginning of jazz to the war years.

**MUSIC 18B. Jazz History: Bebop to Present, 1940-Present. 3 Units.**

Modern jazz styles from Bebop to the current scene. Emphasis is on the significant artists of each style.

**MUSIC 19A. Introduction to Music Theory. 3 Units.**

For non-music majors and Music majors or minors unable to pass the proficiency test for entry to MUSIC 21. The fundamentals of music theory and notation, basic sight reading, sight singing, ear training, keyboard harmony; melodic, rhythmic, and harmonic dictation. Skill oriented, using piano and voice as basic tools to develop listening and reading skills.

**MUSIC 19B. Intermediate Music Theory. 3 Units.**

This course is an introduction to music theory geared toward students who have basic literacy skills (i.e. fundamental notation, identifying major and minor scales, keys, etc). Using musical materials from repertoire selected from campus and area concerts, and incorporating the opportunity to attend these concerts, the course will introduce elements of harmony, melody, form, orchestration and arrangement. The course is an appropriate successor to Music 19A. Students who successfully complete Music 19B can go on directly to Music 21.

**MUSIC 20A. Jazz Theory. 3 Units.**

Introduces the language and sounds of jazz through listening, analysis, and compositional exercises. Students apply the fundamentals of music theory to the study of jazz. Prerequisite: 19 or consent of instructor.

**MUSIC 20B. Advanced Jazz Theory. 3 Units.**

Approaches to improvisation through listening and transcribing, and developing familiarity with important contributors to this music. Topics: scale theory, altered dominants, and substitute harmony. Prerequisite: 20A or consent of instructor.

**MUSIC 21. Elements of Music I. 4 Units.**

Preference to majors. Introduction to tonal theory. Practice and analysis. Diatonic harmony focusing on melodic and harmonic organization, functional relationships, voice-leading, and tonal structures. Ear-training and keyboard-harmony skills; analytical methods and listening strategies. Enrollment limited to 40. Prerequisites: (1) Piano Proficiency Exam (must be passed within the first two weeks of the term) or MUSIC 12A (may be taken concurrently); (2) Passing grade on a basic musical skills proficiency examination on the first day of class or MUSIC 19.

**MUSIC 22. Elements of Music II. 4 Units.**

Preference to majors. Introduction to chromatic harmony focusing on secondary functions, modulations, harmonic sequences, mode mixture, and the Neapolitan, and augmented sixth chords. Analysis of musical forms and harmonizations complemented by harmonic and melodic dictation, sight singing, and other practical skills. Prerequisites: (1) MUSIC 21; (2) Piano Proficiency Exam or MUSIC 12B (may be taken concurrently).

**MUSIC 23. Elements of Music III. 4 Units.**

Preference to majors. Continuation of chromatic harmony, complex forms, and introduction to early 20th-century techniques. Satisfactory passage of ear-training proficiency exam, part of the course's final, is a requirement for course completion and for continuation in the major sequence. Prerequisites: (1) MUSIC 22; (2) Piano Proficiency Exam or MUSIC 12C (may be taken concurrently).

**MUSIC 30N. A Stranger in a Strange Land: Jewish Musics in Translation. 3 Units.**

What does it mean to be a stranger in a strange land? For centuries Jewish people have struggled to shape their identities in unfamiliar surroundings, using music to remember the past and generate new, hybrid identities. In this class we adopt the metaphor of translation to think about how minority Jewish communities bridge distinct languages, musical idioms, and cultural practices. Our theme will take us on a journey across time and space; from Italy to India, New York, Syria, Russia, and Israel. We consider the case of Salamone Rossi, a 17th-century Italian Jewish composer who moved uneasily between dual careers in the synagogue and a secular/Christian court. We also explore a group of Indian Jews (Bene Israel) who combine idioms learned from Jewish and Christian missionaries with local Hindu musical traditions. In all our examples musicians translate languages, musical styles, and cultures to unite memories of a Jewish past with the realities of minority status in the present. The class format includes listening, discussion, some singing, student presentations, and guest lectures.

**MUSIC 33N. The Beethoven Project. 3 Units.**

This seminar is designed to coincide with the opening of the Bing Concert Hall in January 2013. During this first season a variety of events will be taking place on campus under the rubric "The Beethoven Project," including performances of all nine symphonies and all five piano concertos. In addition to offering an introduction to the music of Beethoven, especially that being performed in Bing, the course will consider broader questions of biography and reception history. How have images of the composer and the fortunes of his music changed over time? How did his compositions come to define the paradigm of Western classical music? What impact has he had on popular culture? The class will include concert visits and film screenings, and is open to all levels of musical expertise (the ability to read music is not a requirement).

**MUSIC 34N. Performing America: The Broadway Musical from "Little Johnny Jones" to "The Book of Mormon". 3 Units.**

Musical theater as a site for the construction of American identity in the twentieth century. Negotiations of class, race, gender, and sexuality; intersections with jazz, rock, and pop. Individual shows (*Showboat*, *Oklahoma*, *The Music Man*, *West Side Story*, *Chicago*, *Wicked*, *Bloody Bloody Andrew Jackson*), the role of American popular song (show tunes) in jazz performance, the musical in contemporary film and television. Arrangement, performance, reviews of local productions.

**MUSIC 36N. Humor in Music. 3 Units.**

Through theoretical readings the course will touch on psychological and neurological bases of humor, explore contingent, tactical, modal, and ontological difficulties in the apprehension of humor, and address ethical issues surrounding humor in music. In addition to in-class listening and screening sessions, analytic discussions will be led by students who will find and present examples of humor in music. Students will also be invited to compose original humorous song lyrics and to create collaborative works of musical humor.

**MUSIC 38N. Singing Early Music. 3 Units.**

Preference to freshmen. 15th- and 16th-century musical repertoires and their contexts; performance practice.

**MUSIC 40. Music History to 1600. 4 Units.**

Pre- or corequisite: 21.

**MUSIC 41. Music History 1600-1830. 4 Units.**

Pre- or corequisite: 22.

**MUSIC 42. Music History Since 1830. 4 Units.**

Pre- or corequisite: 23.

**MUSIC 65A. Voice Class I. 1 Unitss.**

Group (7 students to a section) beginning voice (A = level 1; B = level 2). May be repeated for credit. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information. This class is closed by design. Please register on the waitlist and show up on the first day of class to receive a permission number for enrollment.

**MUSIC 65B. Voice Class II. 1 Unitss.**

Group (7 students to a section) beginning voice for the non-major (A = level 1; B = level 2). May be repeated for credit. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information. This class is closed by design. Please register on the waitlist and show up on the first day of class to receive a permission number for enrollment.

**MUSIC 72A. Intermediate Piano Class. 1 Unitss.**

For intermediate students. May be repeated for credit a total of 14 times. Prerequisites: 12C or equivalent, audition. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fee and signup information. This class is closed by design. Please register on the waitlist and show up on the first day of class to receive a permission number for enrollment.

**MUSIC 72C. Harpsichord Class. 1 Unitss.**

For beginning harpsichord students who have keyboard skills. May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information. Admission based on instructor consent. Contact instructor prior to enrolling to discuss availability. Class meets in Braun 201.

**MUSIC 72D. Jazz Piano Class. 1 Unitss.**

By invitation only; priority to majors and jazz-ensemble participants. May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information.

**MUSIC 73. Intermediate Voice Class. 1 Unitss.**

For intermediate students. Admission by audition. May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information. This class is closed by design. Please register on the Axxess waitlist and show up on the first day of class to receive a permission number for enrollment.

**MUSIC 74C. Classical Guitar Class. 1 Unitss.**

May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information.

**MUSIC 74D. Harp Class. 1 Unitss.**

May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and signup information.

**MUSIC 75B. Renaissance Wind Instruments Class. 1 Unitss.**

May be repeated for credit. There is a fee for this class. Please visit <http://music.stanford.edu> for class fees and signup information.

**MUSIC 76. Brass Instruments Class. 1 Unitss.**

May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu> for class fees and signup information.

**MUSIC 77. Percussion Class. 1 Unitss.**

May be repeated for credit a total of 14 times. There is a fee for this class. Please visit <http://music.stanford.edu> for class fees and signup information.

**MUSIC 121. Analysis of Tonal Music. 4 Units.**

Complete movements, or entire shorter works of the 18th and 19th centuries, are analyzed in a variety of theoretical approaches. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations.

**MUSIC 122A. Renaissance and Baroque Counterpoint. 4 Units.**

Analysis and composition of contrapuntal styles from the Renaissance and Baroque periods. Use of keyboard, ear training, and sight singing underlies all written work. Prerequisites: 23 and successful completion of the ear-training and piano-proficiency examinations.

**MUSIC 122B. Harmonic Materials of 19th Century. 4 Units.**

Analysis of 19th-century music, with compositional exercises based on 19th-century models. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations.

**MUSIC 122C. Introduction to 20th-Century Composition. 4 Units.**

Contemporary works, with emphasis on music since 1945. Projects in free composition based on 20th-century models. Prerequisites: 23 or consent of instructor; and pass the ear-training and piano-proficiency examinations.

**MUSIC 123. Undergraduate Seminar in Composition. 3 Units.**

Current trends in composition. May be repeated for credit a total of 7 times. Prerequisites: Music major; 23 or consent of instructor.

**MUSIC 124. Computer Assisted Musical Composition using the LISP-based Visual Programming Language PWGL. 1-3 Units.**

PWGL is a free visual music programming language that is designed for computer-assisted composition, music analysis, software synthesis, and music notation. The course will concentrate on modeling algorithms for the creation of compositional systems and musical analysis. No prior programming experience needed.

**MUSIC 125. Individual Undergraduate Projects in Composition. 1-3 Units.**

May be repeated for credit a total of 14 times. Prerequisites: music major, and one quarter of 123.

**MUSIC 126. Introduction to Thoroughbass. 1-3 Units.**

The development of continuo techniques and skills for figured-bass realization. Performance and analysis of selected repertoire, using thoroughbass principles and exercises based on historical theoretical treatises. Prerequisite: 21.

**MUSIC 127. Instrumentation and Orchestration. 3 Units.**

Individual instruments, instrumental groups within the orchestra, and combinations of groups. Arrangements from piano to orchestral music. Score analysis with respect to orchestration. Practical exercises using chamber ensembles and school orchestra. Prerequisite: 23.

**MUSIC 128. Stanford Laptop Orchestra: Composition, Coding, and Performance. 1-5 Units.**

Classroom instantiation of the Stanford Laptop Orchestra (SLOrk) which includes public performances. An ensemble of more than 20 humans, laptops, controllers, and special speaker arrays designed to provide each computer-mediated instrument with its sonic identity and presence. Topics and activities include issues of composing for laptop orchestras, instrument design, sound synthesis, programming, and live performance. May be repeated four times for credit. Same as: CS 170.

**MUSIC 130A. Introduction to Conducting. 3 Units.**

Baton techniques and rehearsal procedures. The development of coordination of the members of the body involved in conducting; fluency in beat patterns and meters; dynamics, tempi, cueing, and use of the left hand in conducting. Prerequisites: 121 and diagnostic musicianship exam given first day of class; preference to students who have completed 122B.

**MUSIC 130B. Elementary Orchestral Conducting. 3 Units.**

Prerequisites: 127 or previous orchestral performance experience, 130A.

**MUSIC 130C. Elementary Choral Conducting. 3 Units.**

Techniques specific to the conducting of choral ensembles: warm-ups, breathing, balance, blend, choral tone, isolation principles, recitative conducting, preparation, and conducting of choral/orchestral works. Prerequisite: 130A.

**MUSIC 140. Studies in Medieval Music. 3-4 Units.**

Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.) Same as: MUSIC 240.

**MUSIC 141. Studies in Renaissance Music. 2-4 Units.**

Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.) Same as: MUSIC 241.

**MUSIC 142. Studies in Baroque Music. 3-4 Units.**

Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.) Same as: MUSIC 242.

**MUSIC 143. Studies in Classic Music. 3-4 Units.**

Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.) Same as: MUSIC 243.

**MUSIC 144. Studies in Romantic Music. 3-4 Units.**

Prerequisites: MUSIC 23, MUSIC 42 (WIM at 4-unit level only.) Same as: MUSIC 244.

**MUSIC 145. Studies in Modern Music. 4 Units.**

Prerequisites: MUSIC 23, MUSIC 42. (WIM at 4-unit level only.) Same as: MUSIC 245.

**MUSIC 146. Music and Urban Film. 3-4 Units.**

How music and sound work in urban cinema. What happens when music's capacity to transform everyday reality combines with the realism of urban films? Provides an introduction to traditional theories of film music and film sound; considers how new technologies and practices have changed the roles of music in film. Readings discuss film music, realistic cinema, urban musical practices and urban culture. Viewing includes action/adventure, Hindi film, documentary, film noir, hip hop film, the musical, and borderline cases by Jean-Luc Godard, Spike Lee, Wong Kar-Wai and Tsai Ming-Liang. Pre- or corequisite (for music majors): MUSIC 22. (WIM at 4 unit level only.) Same as: MUSIC 246.

**MUSIC 147. The Soul Tradition in African American Music. 3-4 Units.**

The African American tradition of soul music from its origins in blues, gospel, and jazz to its influence on today's r&b, hip hop, and dance music. Style such as rhythm and blues, Motown, Southern soul, funk, Philadelphia soul, disco, Chicago house, Detroit techno, trip hop, and neo-soul. Soul's cultural influence and global reach; its interaction with politics, gender, place, technology, and the economy. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4 units only.) Same as: AMSTUD 147, MUSIC 247.

**MUSIC 147A. Music Ethnography of the Bay Area. 3-5 Units.**

An introduction to music ethnography through student research on musical life in the Bay Area. Focus is on the intersections of music, social life, and cultural practice by engaging with people as they perform music and culture in situ. Techniques taught include participant-observation, interviewing and oral history, writing fieldnotes, recording, transcription, analysis, and ethnographic writing. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4- or 5-unit level only.) Same as: MUSIC 247A.

**MUSIC 148. Musical Shakespeare: Theater, Song, Opera, and Film. 3-5 Units.**

The role of music in productions, adaptations, and interpretations of Shakespeare's plays as theater, opera, and film from the Elizabethan era through the present. Emphasis is on the role of songs, stage music, and music in operatic and film adaptations. Incidental music, orchestral tone poems, and art-song settings of lyrics from the plays. Plays include *Romeo and Juliet*, *Othello*, *Macbeth*, *Hamlet*, *The Tempest*, *Midsummer Night's Dream*, and *Twelfth Night*. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4- or 5-unit level only.) Same as: MUSIC 248.

**MUSIC 149. Reactions to the Record: Interpreting Beethoven. 3-4 Units.**

Seminar. Beethoven performance styles in the era of recordings in light of their roots in cultural trends, including shifting hierarchies between composer and performer, work and notation, text and act. Early recordings as documents of musical values and conceptions different from those around us today. Methodologies of performance analysis explored and used to contextualize sources, which include historic recordings from Stanford's Archive of Recorded Sound, performance documents, and field research with performers, composers, critics, and listeners. Repertoire includes works for orchestra, piano, strings, chamber ensemble and voice. Previous research from seminar participants has been featured in *Reactions to the Record* symposia. May be repeated for credit. Pre- or corequisite (for music majors): MUSIC 22. (WIM at 4-unit level only.) Same as: MUSIC 249.

**MUSIC 150. Musical Acoustics. 3 Units.**

The physics of vibrating systems, waves, and wave motion. Time- and frequency-domain analysis of sound. Room acoustics, reverberation, and spatialization. The acoustics of musical instruments: voice, strings, and winds. Emphasis is on the practical aspects of acoustics in making music. Hands-on and computer-based lab. See <http://ccrma.stanford.edu/courses/150/>. Prerequisites: music performance/composition experience, basic algebra, calculus, and physics.

**MUSIC 154. History of Electronic Music. 1-5 Units.**

What is electronic music? Acousmatic, computer music, algorithmic composition, tape music, glitch, electronic, musique concrète, noise, laptop music, DJ'ing, organized sound...what do these labels mean? This course will provide a brief historical survey of electroacoustic music and discuss some of the most salient questions associated with it, from both a compositional and musicological point of view. Topics to be covered include: definitions of musical sounds; Schaefferian theory and musique concrète; serialism and elektronische Musik; tape music and computer music in the USA; analysis of electroacoustic music; sampling and intellectual property; algorithmic and computer-assisted composition; live-electronics and improvisation. The course does not require previous experience in the field. Classes will be based on discussion of selected listening and reading materials, as well as hands-on digital experimentation with sounds.

**MUSIC 154A. Sound Art I. 4 Units.**

Acoustic, digital and analog approaches to sound art. Familiarization with techniques of listening, recording, digital processing and production. Required listening and readings in the history and contemporary practice of sound art. (lower level) Same as: ARTSTUDI 131.



**MUSIC 155. Intermedia Workshop. 3-4 Units.**

Students develop and produce intermedia works. Musical and visual approaches to the conceptualisation and shaping of time-based art. Exploration of sound and image relationship. Study of a wide spectrum of audiovisual practices including experimental animation, video art, dance, performance, non-narrative forms, interactive art and installation art. Focus on works that use music/sound and image as equal partners. Limited enrollment. Prerequisites: consent of instructors, and one of FILMPROD 114, ARTSTUDI 131, 138, 167, 177, 179, or MUSIC 123, or equivalent. May be repeated for credit  
Same as: ARTSTUDI 239, MUSIC 255.

**MUSIC 156. "sic": Improvisation Collective. 1 Unitss.**

Small ensemble devoted to learning trans-idiomatic improvisation techniques and composing indeterminate pieces in a workshop setting. One major concert. Prerequisite: access to an instrument and successful small group audition during the prior quarter. Improvisational experience and conventional instrumental virtuosity not required. May be repeated for credit for a total of 3 times.

**MUSIC 158. Soundwire Ensemble. 2-3 Units.**

Stanford's Internet2-based Soundwire Ensemble rehearses with the East Coast Tintinnabulate Ensemble directed by Pauline Oliveros, Rensselaer Polytechnic Institute. Concerts, composition, and improvisation projects using resources available when connecting with remote musicians. State-of-the-art audio and video technology developed by ensemble participants. May be repeated for credit.

**MUSIC 159. Early Music Singers. 1 Unitss.**

Small choir specializing in Medieval, Renaissance, and early Baroque vocal music. One major concert per quarter. May be repeated for credit for a total of 14 times.

**MUSIC 160. Stanford Symphony Orchestra. 1 Unitss.**

70- to 100-member ensemble performing major orchestral works; minimum one concert per quarter. May be repeated for credit a total of 14 times.

**MUSIC 160A. Stanford Philharmonia Orchestra. 1 Unitss.**

Prerequisite: audition, one year of 160, or consent of instructor. May be repeated for credit.

**MUSIC 160B. Stanford New Ensemble. 1 Unitss.**

Performing compositions of the 20th century, recent works of this century, and new works by Stanford faculty and student composers. Musicians collaborate with composers and artists visiting and performing at Stanford. One concert per quarter. May be repeated for credit.

**MUSIC 160S. Summer Orchestra. 1 Unitss.**

50- to 100-member ensemble performing major orchestral works. May be repeated for credit.

**MUSIC 161A. Stanford Wind Ensemble. 1 Unitss.**

40- to 50-member ensemble performing transcriptions of symphonic music, brass band music, and repertoire composed specifically for symphonic band. One concert per quarter. May be repeated for credit a total of 14 times.

**MUSIC 161B. Jazz Orchestra. 1 Unitss.**

Big band format. Repertoire drawn primarily from the contemporary jazz-ensemble literature. One formal concert per quarter. May be repeated for credit a total of 14 times.

**MUSIC 161C. Red Vest Band. 1 Unitss.**

A small ensemble of the Leland Stanford Junior University Marching Band open to members of the LSJUMB by audition and consent of instructor. Members perform at all men's and women's home basketball games and travel to some away and post-season games. Twice-weekly rehearsals focus on introduction of new student arrangements and the LSJUMB's repertoire of rock, funk, and traditional styles. May be repeated for credit a total of 7 times.

**MUSIC 161D. Stanford Brass Ensemble. 1 Unitss.**

Performance of works for full brass choir and for smaller ensembles of brass instruments. Once weekly rehearsals. May be repeated for credit. Prerequisite: audition and consent of instructor.

**MUSIC 162. Symphonic Chorus. 1 Unitss.**

180- to 200-voice choral ensemble, performing major choral masterworks with orchestra. One concert per quarter. May be repeated for credit a total of 14 times.

**MUSIC 163. Memorial Church Choir. 1 Unitss.**

Official choir of Memorial Church, furnishing music for Sunday services and special occasions in the church calendar. May be repeated for credit a total of 14 times.

**MUSIC 165. Chamber Chorale. 1 Unitss.**

Select 24-voice choral ensemble, specializing in virtuoso choral repertoire from all periods of Western art music. Annual touring commitment required. May be repeated for credit a total of 14 times.

**MUSIC 167. University Singers. 1 Unitss.**

Select, 50-voice choral ensemble, performing choral repertoire from all periods of Western art music. May be repeated for credit a total of 14 times.

**MUSIC 167S. Summer Chorus. 1 Unitss.**

80- to 100-voice non-auditioned ensemble, performing major choral masterworks and choral repertoire from all periods of Western art music.

**MUSIC 169. Stanford Taiko. 1 Unitss.**

Select 15- to 18-member North American taiko ensemble, performing all-original repertoire for Japanese drums. Multiple performances in Winter and Spring quarters, also touring; instrument construction and maintenance. Admission by audition in Autumn Quarter only. May be repeated for credit a total of 14 times.

**MUSIC 170. Collaborative Piano. 1 Unitss.**

Performance class in a workshop setting. Techniques of collaboration with vocalists and instrumentalists in repertoire ranging from songs and arias to sonatas and concertos. Prerequisite: private-lesson proficiency level in piano, or consent of instructor.

**MUSIC 171. Chamber Music. 1 Unitss.**

Audition required. Weekly one-hour coachings from Music department faculty. Classical string quartets and piano/string groups are supervised by the St. Lawrence String Quartet. Two masterclasses and one performance per quarter are required. May be repeated for credit.

**MUSIC 172A. Piano. 1-3 Units.**

Private lessons and group master class weekly. May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 172B. Organ. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 172C. Harpsichord. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 172D. Jazz Piano. 1-3 Units.**

By invitation only; priority to majors and jazz-ensemble participants. May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 172E. Fortepiano. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 172F. Carillon. 1-3 Units.**

May be repeated for credit a total of 14 times.

**MUSIC 173. Voice. 1-3 Units.**

Private lessons and group master classes weekly. May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174A. Violin. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174B. Viola. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174C. Violoncello. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174D. Contrabass. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174E. Viola Da Gamba. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174F. Classical Guitar. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174G. Harp. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174H. Baroque Violin. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174I. Jazz Bass. 1-3 Units.**

Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 174J. Jazz Guitar. 1-3 Units.**

Individual lessons in jazz guitar.

**MUSIC 175A. Flute. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 175B. Oboe. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 175C. Clarinet. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 175D. Bassoon. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 175E. Recorder/Renaissance Wind Instruments. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 175F. Saxophone. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 175G. Baroque Flute. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 176A. French Horn. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 176B. Trumpet. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 176C. Trombone. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 176D. Tuba. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 177. Percussion. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 182. Diction for Singers. 1 Unitss.**

The international phonetic alphabet and its application to German, French, and Italian vocal literature. Open also to pianists interested in vocal coaching and choral conducting.

**MUSIC 183A. German Art Song Interpretation. 1 Unitss.**

By audition only. For advanced singers and pianists as partners. Performance class in a workshop setting. Composers include Beethoven, Schubert, Wolf and Strauss. May be repeated for credit a total of 2 times. Enrollment limit: 20 (ten singers maximum). Prerequisite: consent of instructor. Recommended prerequisite: 170 (pianists) or 182 (singers).

**MUSIC 183B. French Art Song Interpretation. 1 Unitss.**

By audition only. For advanced singers and pianists as partners. Performance class in a workshop setting. Composers include Fauré, Debussy, Ravel and Poulenc. May be repeated for credit a total of 2 times. Enrollment limit: 20 (ten singers maximum). Prerequisite: consent of instructor. Recommended prerequisite: 170 (pianists) or 182 (singers).

**MUSIC 184. Vocal Repertory Workshop. 1-3 Units.**

This course is a practical workshop in vocal repertoire. Each quarter's offering emphasizes a specific genre or period, therefore the course can be repeated with permission of the instructor. In addition to broadening the student's knowledge of vocal repertoire, the following skills are developed: text preparation, foreign language translation and diction; historically informed performance practice; editorial practice through comparison or preparation; rehearsal for performance and/or recording. Prerequisite: vocal or instrumental instruction, as the class is open to singers or collaborative artists.

**MUSIC 185. Music Across Media: Music Video to Postclassical Cinema. 4 Units.**

What makes music videos, YouTube clips and musical numbers in today's films engaging? What makes them tick? This course emphasizes aesthetics and close reading. We will try to figure out how music videos and its related forms work. To do so, we consider uses of the body, how visual iconography operates, what lyrics and dialogue can do, how and what music can say, and how it can work with other media. We will be concerned with questions of representation, how class, ethnicity, gender, race and nationality function. The course also examines viewership and industry practices.

Same as: FILMSTUD 141, FILMSTUD 341, MUSIC 385.

**MUSIC 186. Religion and Music in South Asia. 4-5 Units.**

How music and other arts in South Asia are intertwined with religion. Classical, devotional, folk, and popular examples introduce Gods as musicians, sound as God, music as yoga, singing as devotion, music as ecstasy-inducing, music as site for doctrinal argument, music and religion as vehicles for nationalism. Co-taught by professors of Music and Religious Studies, focusing Hinduism and Islam in India, Pakistan, and the diaspora. Music practice along with academic study; guest artists and films; no background required.

Same as: MUSIC 286, RELIGST 159.

**MUSIC 192A. Foundations of Sound-Recording Technology. 3 Units.**

For upper division undergraduates and graduate students; preference given to Music majors with MST specialization. Topics: elementary electronics; the physics of sound transduction and microphone operation, selection, and placement; mixing consoles; connectors and device interconnection; grounding and shielding; principles of analog magnetic recording; operation maintenance of recording equipment; and principles of recording engineering. Enrollment limited. Prerequisites: MUSIC 150, algebra, physics basics, and consent of instructor.

**MUSIC 192B. Advanced Sound Recording Technology. 3 Units.**

Topics: noise reduction techniques; dynamics and time-delay audio effects; the principles of digital audio; disk- and tape-based digital recorders; digital audio workstations and editing; advanced multitrack techniques; SMPTE and MIDI time code and device synchronization; MIDI sequencing and synchronization. See <http://ccrma.stanford.edu/courses/>. Prerequisite: 192A.

**MUSIC 192C. Session Recording. 1-2 Units.**

Independent engineering of recording sessions. May be repeated for credit a total of 14 times. Prerequisites: 192A,B.

**MUSIC 197. Undergraduate Teaching Apprenticeship. 1-2 Units.**

Work in an apprentice-like relationship with faculty teaching a student-initiated course. Prerequisite: consent of instructor. (Staff).

**MUSIC 198. Concentrations Project. 4 Units.**

For concentration program participants only. Must be taken in senior year. Multiple concentrators may enroll in one section of 198 per concentration.

**MUSIC 199. Independent Study. 1-5 Units.**

For advanced undergraduates and graduate students who wish to do work outside the regular curriculum. Before registering, student must present specific project and enlist a faculty sponsor. May be repeated for credit a total of 14 times.

**MUSIC 200. Graduate Proseminar. 3-4 Units.**

Required of first-year graduate students in music. Introduction to research in music, bibliographical materials, major issues in the field, philosophy, and methods in music history. Guest lecturers and individual research topics.

**MUSIC 201. CCRMA Colloquium. 1 Unitss.**

Weekly review of work being done in the field, research taking place at CCRMA, and tools to make the most of the CCRMA technical facilities.

**MUSIC 220A. Fundamentals of Computer-Generated Sound. 2-4 Units.**

Techniques for digital sound synthesis, effects, and reverberation. Topics: summary of digital synthesis techniques (additive, subtractive, nonlinear, wavetable, spectral-modeling, and physical-modeling); digital effects algorithms (phasing, flanging, chorus, pitch-shifting, and vocoding); and techniques for digital reverberation. Majors (undergraduate or graduate) must take for 4 units. See <http://ccrma.stanford.edu/>.

**MUSIC 220B. Compositional Algorithms, Psychoacoustics, and Computational Music. 2-4 Units.**

The use of high-level programming language as a compositional aid in creating musical structures. Advanced study of sound synthesis techniques. Simulation of a reverberant space and control of the position of sound within the space. See <http://ccrma.stanford.edu/>. Prerequisite: 220A.

**MUSIC 220C. Research Seminar in Computer-Generated Music. 2-4 Units.**

Individual projects in composition, psychoacoustics, or signal processing. See [http://ccrma.stanford.edu](http://ccrma.stanford.edu/). May be repeated for credit. Prerequisite: 220B.

**MUSIC 220D. Research in Computer-Generated Music. 1-10 Units.**

Independent research projects in composition, psychoacoustics, or signal processing. See <http://ccrma.stanford.edu/>. May be repeated for credit. Prerequisite: 220C.

**MUSIC 221. Topics in the History of Theory. 3-5 Units.**

The intersection of music theory and compositional practice in different eras of Western music history. Primary sources in music theory and issues such as notation, rhythm, mode, dissonance treatment, counterpoint, tonality, form, rhetoric, affect and imitation, expression, linear analysis, 12-tone and set theory, in light of relevant repertoire and modern scholarship. May be repeated for credit a total of 5 times.

**MUSIC 222. Sound in Space. 1-4 Units.**

Historical background, techniques and theory on the use of space in music composition and diffusion. Listening and analysis of relevant pieces. Experimental work in spatialization techniques leading to short studies to be diffused in concert at the end of the quarter.

**MUSIC 223. Composition for Electronic Musicians. 1-4 Units.**

Composition for any combination of acoustic and electroacoustic instrumentation, computer-generated sound, invented instruments, sound-sculptures, and multi-disciplinary elements including theater and visual media. Project-based laboratory to advance original student works, supported by lectures on the fundamentals of composition. Concert performance of final works. Taught at CCRMA with a focus on engendering deliberate conversation on the enrichment of a cultural context for new media. Open to undergraduates and graduates.

**MUSIC 223T. Computer Music Improvisation and Algorithmic Performance. 2-4 Units.**

This seminar will investigate how to approach configuring a set of composition tools for real time composition. Composition programming, ensemble rehearsal, and performance. Determining algorithmic composition beginning by imagining a process or a structure, applying a mapping process to transform that structure (which resides in the conceptual domain), into sound (which may reveal the original conception). Investigation of gestural mapping that occurs when a sonic result is achieved by an act of interpretation, whether it be reading a score and/or improvising.

**MUSIC 230. Advanced Orchestral Conducting. 2-4 Units.**

May be repeated for credit a total of 8 times. Prerequisite: 130B.

**MUSIC 231. Advanced Choral Conducting. 2-4 Units.**

Individual instruction continuing trajectory of Music 130C. Focus on gestural technique and analysis of works by genre and historical period. May be repeated for credit a total of 8 times. Prerequisite: 130C.

**MUSIC 236. Future Media, Media Archaeologies. 3-4 Units.**

Hand-on. Media technologies from origins to the recent past. Students create artworks based on Victorian era discoveries and inventions, early developments in electronic media, and orphaned technologies. Research, rediscover, invent, and create devices of wonder and impossible objects. Readings in history and theory. How and what media technologies mediate. Same as: ARTSTUDI 236.

**MUSIC 240. Studies in Medieval Music. 3-4 Units.**

Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.) Same as: MUSIC 140.

**MUSIC 241. Studies in Renaissance Music. 2-4 Units.**

Prerequisites: MUSIC 21, MUSIC 40. (WIM at 4-unit level only.) Same as: MUSIC 141.

**MUSIC 242. Studies in Baroque Music. 3-4 Units.**

Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.) Same as: MUSIC 142.

**MUSIC 243. Studies in Classic Music. 3-4 Units.**

Prerequisites: MUSIC 22, MUSIC 41. (WIM at 4-unit level only.) Same as: MUSIC 143.

**MUSIC 244. Studies in Romantic Music. 3-4 Units.**

Prerequisites: MUSIC 23, MUSIC 42 (WIM at 4-unit level only.) Same as: MUSIC 144.

**MUSIC 245. Studies in Modern Music. 4 Units.**

Prerequisites: MUSIC 23, MUSIC 42. (WIM at 4-unit level only.) Same as: MUSIC 145.

**MUSIC 246. Music and Urban Film. 3-4 Units.**

How music and sound work in urban cinema. What happens when music's capacity to transform everyday reality combines with the realism of urban films? Provides an introduction to traditional theories of film music and film sound; considers how new technologies and practices have changed the roles of music in film. Readings discuss film music, realistic cinema, urban musical practices and urban culture. Viewing includes action/adventure, Hindi film, documentary, film noir, hip hop film, the musical, and borderline cases by Jean-Luc Godard, Spike Lee, Wong Kar-Wai and Tsai Ming-Liang. Pre- or corequisite (for music majors): MUSIC 22. (WIM at 4 unit level only.)

Same as: MUSIC 146.

**MUSIC 247. The Soul Tradition in African American Music. 3-4 Units.**

The African American tradition of soul music from its origins in blues, gospel, and jazz to its influence on today's r&b, hip hop, and dance music. Style such as rhythm and blues, Motown, Southern soul, funk, Philadelphia soul, disco, Chicago house, Detroit techno, trip hop, and neo-soul. Soul's cultural influence and global reach; its interaction with politics, gender, place, technology, and the economy. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4 units only.)

Same as: AMSTUD 147, MUSIC 147.

**MUSIC 247A. Music Ethnography of the Bay Area. 3-5 Units.**

An introduction to music ethnography through student research on musical life in the Bay Area. Focus is on the intersections of music, social life, and cultural practice by engaging with people as they perform music and culture in situ. Techniques taught include participant-observation, interviewing and oral history, writing fieldnotes, recording, transcription, analysis, and ethnographic writing. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4- or 5-unit level only.)

Same as: MUSIC 147A.

**MUSIC 248. Musical Shakespeare: Theater, Song, Opera, and Film. 3-5 Units.**

The role of music in productions, adaptations, and interpretations of Shakespeare's plays as theater, opera, and film from the Elizabethan era through the present. Emphasis is on the role of songs, stage music, and music in operatic and film adaptations. Incidental music, orchestral tone poems, and art-song settings of lyrics from the plays. Plays include *Romeo and Juliet*, *Othello*, *Macbeth*, *Hamlet*, *The Tempest*, *Midsummer Night's Dream*, and *Twelfth Night*. Pre-/corequisite (for music majors): MUSIC 22. (WIM at 4- or 5-unit level only.)

Same as: MUSIC 148.

**MUSIC 249. Reactions to the Record: Interpreting Beethoven. 3-4 Units.**

Seminar. Beethoven performance styles in the era of recordings in light of their roots in cultural trends, including shifting hierarchies between composer and performer, work and notation, text and act. Early recordings as documents of musical values and conceptions different from those around us today. Methodologies of performance analysis explored and used to contextualize sources, which include historic recordings from Stanford's Archive of Recorded Sound, performance documents, and field research with performers, composers, critics, and listeners. Repertoire includes works for orchestra, piano, strings, chamber ensemble and voice. Previous research from seminar participants has been featured in *Reactions to the Record* symposia. May be repeated for credit. Pre- or corequisite (for music majors): MUSIC 22. (WIM at 4-unit level only.)

Same as: MUSIC 149.

**MUSIC 250A. Physical Interaction Design for Music. 3-4 Units.**

This lab and project-based course explores how we can physically interact with real-time electronic sound. Students learn to use and design sensors, circuits, embedded computers, communication protocols and sound synthesis. Advanced topics include real-time media, haptics, sound synthesis using physical model analogs, and human-computer interaction theory and practice. Course culminates in musical performance with or exhibition of completed design projects. See <http://ccrma.stanford.edu/>.

**MUSIC 250B. Interactive Sound Art. 1-4 Units.**

Continuation of 250A, concentrating on interactive computer-music performance systems. See <http://ccrma.stanford.edu/courses/250b/>. Prerequisite: 250A.

**MUSIC 251. Psychophysics and Music Cognition. 1-5 Units.**

Lecture, lab and experiment-based course in perception, psychoacoustics, cognition, and neuroscience of music. (WIM at 4 or 5 units only.)

**MUSIC 252. Introduction to Music Notation Software. 1-2 Units.**

Learn to use music notation programs Finale®, Sibelius® and open-source alternatives.

**MUSIC 253. Symbolic Musical Information. 2-4 Units.**

Focus on symbolic data for music applications including advanced notation systems, optical music recognition, musical data conversion, and internal structure of MIDI files.

Same as: CS 275A.

**MUSIC 254. Music Query, Analysis, and Style Simulation. 2-4 Units.**

Leveraging off three synchronized sets of symbolic data resources for notation and analysis, the lab portion introduces students to the open-source Humdrum Toolkit for music representation and analysis. Issues of data content and quality as well as methods of information retrieval, visualization, and summarization are considered in class. Grading based primarily on student projects. Prerequisite: 253 or consent of instructor. Same as: CS 275B.

**MUSIC 255. Intermedia Workshop. 3-4 Units.**

Students develop and produce intermedia works. Musical and visual approaches to the conceptualisation and shaping of time-based art. Exploration of sound and image relationship. Study of a wide spectrum of audiovisual practices including experimental animation, video art, dance, performance, non-narrative forms, interactive art and installation art. Focus on works that use music/sound and image as equal partners. Limited enrollment. Prerequisites: consent of instructors, and one of FILMPROD 114, ARTSTUDI 131, 138, 167, 177, 179, or MUSIC 123, or equivalent. May be repeated for credit

Same as: ARTSTUDI 239, MUSIC 155.

**MUSIC 256A. Music, Computing, and Design I: Software Paradigms for Computer Music. 1-4 Units.**

Software design and implementation for computer audio. Strategies, best practices, and tradeoffs in building audio software systems of various sizes (S, M, L, XL), with a focus on interactive (real-time) systems. Lectures examine high-level designs as well as dissect code in a hands-on manner. Course work includes small programming assignments and a final software project. This course is the prerequisite for MUSIC 256B. Prerequisite: experience in C/C++ and/or Java.

Same as: CS 476A.

**MUSIC 256B. Music, Computing, Design II: Mobile Music. 1-4 Units.**

Aesthetic, design, and implementation of mobile music, centered around the modern super smartphones such as the iPhone). Similarities and intrinsic differences between mobile and traditional computing and design for music. Topics include mobile software design, social and cloud computing, mobile interface design, and programming phones, in the service of music. Prerequisite: MUSIC 256A.

Same as: CS 476B.

**MUSIC 257. Neuroplasticity and Musical Gaming. 3-5 Units.**

What changes in a musician's brain after hours and years of daily practice? How do skills that make a great violinist transfer to other abilities? Can directed neuroplasticity be used to target skill learning? This course will include fundamentals of psychoacoustics and auditory neuroscience. Focus will be development of video games that use perceptually motivated tasks to drive neural change. Emphasis will be on music, linguistic, and acoustic based skills. Programming experience is highly recommended, but not required.

**MUSIC 260. Music of South Asia. 3-4 Units.**

Focuses on the history, theory, and practice of South Asian music with particular emphasis on the classical traditions of North and South India. Also addresses regional folk, popular, and devotional musical styles of India, Pakistan, and Afghanistan. Topics include: raga, tala, vocal and instrumental genres, improvisation, aesthetics, music transmission, musical nationalism, social organization of musicians, music and ritual, music and gender, and technology. Lecture with discussion, some singing (no experience necessary), guest performances, reading, listening, and analysis.

**MUSIC 269. Research in Performance Practices. 1-5 Units.**

Directed reading and research. May be repeated for credit a total of 5 times.

**MUSIC 272A. Advanced Piano. 1-3 Units.**

Private lessons and group masterclass weekly. May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 272B. Advanced Organ. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 272C. Advanced Harpsichord. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 272D. Advanced Jazz Piano. 1-3 Units.**

By invitation only; priority to majors and jazz-ensemble participants. May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 272E. Advanced Fortepiano. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 272F. Advanced Carillon. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 273. Advanced Voice. 1-3 Units.**

Private lessons and group master class weekly. May be repeated for credit. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274A. Advanced Violin. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274B. Advanced Viola. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274C. Advanced Violoncello. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274D. Advanced Contrabass. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274E. Advanced Viola da Gamba. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274F. Advanced Classical Guitar. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274G. Advanced Harp. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274H. Advanced Baroque Violin. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274I. Advanced Jazz Bass. 1-3 Units.**

Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 274J. Advanced Jazz Guitar. 1-3 Units.**

Individual lessons in jazz guitar. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275A. Advanced Flute. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275B. Advanced Oboe. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275C. Advanced Clarinet. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275D. Advanced Bassoon. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275E. Advanced Recorder/Renaissance Wind Instruments. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275F. Advanced Saxophone. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 275G. Advanced Baroque Flute. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 276A. Advanced French Horn. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 276B. Advanced Trumpet. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 276C. Advanced Trombone. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 276D. Advanced Tuba. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 277. Advanced Percussion. 1-3 Units.**

May be repeated for credit a total of 14 times. Admission is by audition only. There is a fee for this class. Please visit <http://music.stanford.edu/Academics/LessonSignups.html> for class fees and audition information.

**MUSIC 280. TA Training Course. 1 Unit.**

Required for doctoral students serving as teaching assistants. Orientation to resources at Stanford, guest presentations on the principles of common teaching activities, supervised teaching experience. Students who entered in the Autumn should take 280 in the Spring prior to the Autumn they begin teaching.

**MUSIC 286. Religion and Music in South Asia. 4-5 Units.**

How music and other arts in South Asia are intertwined with religion. Classical, devotional, folk, and popular examples introduce Gods as musicians, sound as God, music as yoga, singing as devotion, music as  $\zeta$ ecstasy $\zeta$ -inducing, music as site for doctrinal argument, music and religion as vehicles for nationalism. Co-taught by professors of Music and Religious Studies, focusing Hinduism and Islam in India, Pakistan, and the diaspora. Music practice along with academic study; guest artists and films; no background required. Same as: MUSIC 186, RELIGST 159.

**MUSIC 300A. Medieval Notation. 4 Units.**

Western notation of the Middle Ages and Renaissance: principles, purposes, and transcription.

**MUSIC 300B. Renaissance Notation. 4 Units.**

Western notation of the Middle Ages and Renaissance: principles, purposes, and transcription.

**MUSIC 301A. Analysis of Music: Modal. 4 Units.****MUSIC 301B. Analysis of Music: Tonal. 4 Units.****MUSIC 301C. Analysis of Music: Post-Tonal. 4 Units.**

Current analytical trends, issues, and methods.

**MUSIC 302. Research in Musicology. 1-5 Units.**

Directed reading and research. May be repeated for credit a total of 14 times.

**MUSIC 310. Research Seminar in Musicology. 3-5 Units.**

For graduate students. Topics vary each quarter. May be repeated for credit a total of 8 times.

**MUSIC 312A. Aesthetics and Criticism of Music, Ancients and Moderns: Plato to Nietzsche. 4 Units.**

For graduate students. Primary texts focusing on the nature, purposes, and uses of music and other arts.

**MUSIC 312B. Aesthetics and Criticism of Music, Contemporaries: Heidegger to Today. 4 Units.**

For graduate students. Primary texts focusing on the nature, purposes, and uses of music and other arts.

**MUSIC 318. Advanced Acoustics. 1-5 Units.**

Current topics. May be repeated for credit.

**MUSIC 319. Research Seminar on Computational Models of Sound Perception. 1-3 Units.**

All aspects of auditory perception, often with emphasis on computational models. Topics: music perception, signal processing, auditory models, pitch perception, speech, binaural hearing, auditory scene analysis, basic psychoacoustics, and neurophysiology. See <http://ccrma.stanford.edu/courses/>. May be repeated for credit a total of 14 times.

**MUSIC 320. Introduction to Digital Audio Signal Processing. 3-4 Units.**

Digital signal processing for music and audio research. Topics: complex numbers, sinusoids, spectrum representation, sampling and aliasing, digital filters, frequency response, z transforms, transfer-function analysis, and associated Matlab software. See <http://ccrma.stanford.edu/courses/320/>.

**MUSIC 321. Readings in Music Theory. 1-5 Units.**

Directed reading and research. May be repeated for credit a total of 5 times.

**MUSIC 323. Doctoral Seminar in Composition. 3-4 Units.**

Illustrated discussions of compositional issues and techniques. Presentation of relevant topics, including students' own compositional practice. May be repeated for credit a total of 14 times.

**MUSIC 324. Graduate Composition Forum. 1 Unitss.**

Community forum for all graduate student composers. Discussion of completed and in-progress work by students, faculty, and visiting composers. Repertoire listening sessions. Planning of upcoming Department events. Special area exam topic presentations, final doctoral project presentations, and review of portfolios. Many sessions are open to the public. May be repeated for credit.

**MUSIC 325. Individual Graduate Projects in Composition. 1-5 Units.**

May be repeated for credit.

**MUSIC 330. Musicology Dissertation Colloquium. 1-4 Units.**

Weekly meetings for all musicology students 4th year and beyond to discuss research and writing strategies, share and critique work in progress, and discuss issues in professional development (preparing abstracts, conference papers, C.V. and job interviews, book reviews, submitting articles for publication). Open to 3rd-year students.

**MUSIC 341. Ph.D Dissertation. 1-10 Units.**

May be repeated for credit a total of 5 times.

**MUSIC 351. Seminar in Music Perception and Cognition. 1-3 Units.**

A seminar on topics in music perception and cognition. Students will study and discuss recent research as well as design and implement experiments.

**MUSIC 385. Music Across Media: Music Video to Postclassical Cinema. 4 Units.**

What makes music videos, YouTube clips and musical numbers in today's films engaging? What makes them tick? This course emphasizes aesthetics and close reading. We will try to figure out how music videos and its related forms work. To do so, we consider uses of the body, how visual iconography operates, what lyrics and dialogue can do, how and what music can say, and how it can work with other media. We will be concerned with questions of representation & how class, ethnicity, gender, race and nationality function. The course also examines viewership and industry practices.

Same as: FILMSTUD 141, FILMSTUD 341, MUSIC 185.

**MUSIC 390. Practicum Internship. 1 Unitss.**

On-the-job training under the guidance of experienced, on-site supervisors. Meets the requirements for curricular practical training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. May be repeated for credit. Prerequisite: qualified offer of employment and consent of adviser.

**MUSIC 399. D.M.A. Final Project. 1-10 Units.**

May be repeated for credit a total of 5 times.

**MUSIC 420A. Signal Processing Models in Musical Acoustics. 3-4 Units.**

Computational methods in musical sound synthesis and digital audio effects based on acoustic physical models. Topics: acoustic simulation with delay lines, digital filters, and nonlinear elements; comb filters; allpass filters; artificial reverberation; delay-line interpolation and sampling-rate conversion; phasing, flanging, and chorus effects; efficient computational models of strings, woodwinds, brasses, and other musical instruments. See <http://ccrma.stanford.edu/courses/420/>. Prerequisites: 320 or equivalent; PHYSICS 21 or equivalent course applying Newton's laws of motion; and CS 106B or equivalent programming in C and C++.

**MUSIC 420B. Software for Sound Synthesis and Audio Effects. 1-10 Units.**

Preferred software embodiments for digital sound synthesis and audio effects. Topics: The Faust language for audio signal processing, effects programming, plugin generation for various platforms, software components for stringed and wind musical instruments, delay effects, variable filters, and nonlinear effects such as compression and distortion. The principal activity is a software project due at the end of the quarter. Prerequisite: Music 420A or equivalent experience with audio signal processing in C++. Recommended Corequisite: Music 424.

**MUSIC 421A. Audio Applications of the Fast Fourier Transform. 3-4 Units.**

Spectrum analysis and signal processing using Fast Fourier Transforms (FFTs) with emphasis on audio applications. Topics: Fourier theorems; FFT windows; spectrum analysis; spectrograms; sinusoidal modeling; spectral modeling synthesis; FFT convolution; FIR filter design and system identification; overlap-add and filter-bank-summation methods for short-time Fourier analysis, modification, and resynthesis. See <http://ccrma.stanford.edu/courses/421/>. Prerequisite: Music 320 or equivalent background in spectrum analysis and linear systems. Same as: FFT.

**MUSIC 421B. Projects in Spectral Audio Signal Processing. 1-10 Units.**

Frequency-domain methods for analysis and/or synthesis of sound. The principal activity is a software project. Continuing 421A, additional frequency-domain techniques for analysis, modification, and/or synthesis of audio signals will be discussed.

**MUSIC 422. Perceptual Audio Coding. 3 Units.**

History and basic principles: development of psychoacoustics-based data-compression techniques; perceptual-audio-coder applications (radio, television, film, multimedia/internet audio, DVD, EMD). In-class demonstrations: state-of-the-art audio coder implementations (such as AC-3, MPEG) at varying data rates; programming simple coders. Topics: audio signals representation; quantization; time to frequency mapping; introduction to psychoacoustics; bit allocation and basic building blocks of an audio codec; perceptual audio codecs evaluation; overview of MPEG-1, 2, 4 audio coding and other coding standards (such as AC-3). Prerequisites: knowledge of digital audio principles, familiarity with C programming. Recommended: 320, EE 261. See <http://ccrma.stanford.edu/>.

**MUSIC 423. Graduate Research in Music Technology. 1-4 Units.**

Research discussion, development, and presentation by graduate students, visiting scholars, and CCRMA faculty in the areas of music and/or audio technology. See <http://ccrma.stanford.edu/courses/423/> for latest information. May be repeated for credit a total of 11 times.

**MUSIC 424. Signal Processing Techniques for Digital Audio Effects. 3-4 Units.**

Techniques for dynamic range compression, reverberation, equalization and filtering, panning and spatialization, digital emulation of analog processors, and implementation of time-varying effects. Single-band and multiband compressors, limiters, noise gates, de-essers, convolutional reverberators, parametric and linear-phase equalizers, wah-wah and envelope-following filters, and the Leslie. Students develop effects algorithms of their own design in labs. Prerequisites: digital signal processing, sampling theorem, digital filtering, and the Fourier transform at the level of 320 or EE 261; Matlab and modest C programming experience. Recommended: 420 or EE 264; audio effects in mixing and mastering at the level of 192.

## Native American Studies Courses

**NATIVEAM 109A. Federal Indian Law. 5 Units.**

Cases, legislation, comparative justice models, and historical and cultural material. The interlocking relationships of tribal, federal, and state governments. Emphasis is on economic development, religious freedom, and environmental justice issues in Indian country. Same as: CSRE 109A.

**NATIVEAM 109B. Indian Country Economic Development. 5 Units.**

The history of competing tribal and Western economic models, and the legal, political, social, and cultural implications for tribal economic development. Case studies include mineral resource extraction, gaming, and cultural tourism. 21st-century strategies for sustainable economic development and protection of political and cultural sovereignty. Same as: CSRE 109B.

**NATIVEAM 114. Making History/Making Indians: Myths, Stereotypes & Realities. 5 Units.**

This course examines the ways historians and others have portrayed American Indians, both in canonical works and in various manifestations of popular culture. The time period begins with the Boston Tea Party. We explore a series of events prior to the Revolutionary War period, through the 19th into the 21st century to examine the myths and the reality. The focus is about perceptions of "The Indian"; we will also examine the connection between "The Indian" and American identity.

**NATIVEAM 138. American Indians in Comparative Historical Perspective. 5 Units.**

(Graduate students register for 238.) Demographic, political, and economic processes and events that shaped relations between Euro-Americans and American Indians, 1600-1890. How the intersection of these processes affected the outcome of conflicts between these two groups, and how this conflict was decisive in determining the social position of American Indians in the late 19th century and the evolution of the doctrine of tribal sovereignty. Same as: SOC 138, SOC 238.

**NATIVEAM 139. American Indians in Contemporary Society. 5 Units.**

(Graduate students register for 239.) The social position of American Indians in contemporary American society, 1890 to the present. The demographic resurgence of American Indians, changes in social and economic status, ethnic identification and political mobilization, and institutions such as tribal governments and the Bureau of Indian Affairs. Recommended: 138 or a course in American history. Same as: SOC 139, SOC 239.

**NATIVEAM 143A. American Indian Mythology, Legend, and Lore. 3-5 Units.**

(English majors and others taking 5 units, register for 143A.) Readings from American Indian literatures, old and new. Stories, songs, and rituals from the 19th century, including the Navajo Night Chant. Tricksters and trickster stories; war, healing, and hunting songs; Aztec songs from the 16th century. Readings from modern poets and novelists including N. Scott Momaday, Louise Erdrich, and Leslie Marmon Silko, and the classic autobiography, *Black Elk Speaks*. Same as: ENGLISH 43A, ENGLISH 143A.

**NATIVEAM 167. Performing Indigeneity on Global Stage. 4 Units.**

Explores how indigeneity is expressed and embodied through performance on the global stage. Same as: DANCE 167.

**NATIVEAM 200R. Directed Research. 1-5 Units.****NATIVEAM 200W. Directed Reading. 1-5 Units.****NATIVEAM 240. Psychology and American Indian Mental Health. 3-5 Units.**

Western medicine's definition of health as the absence of sickness, disease, or pathology; Native American cultures' definition of health as the beauty of physical, spiritual, emotional, and social things, and sickness as something out of balance. Topics include: historical trauma; spirituality and healing; cultural identity; values and acculturation; and individual, school, and community-based interventions. Prerequisite: experience working with American Indian communities. Same as: EDUC 340.

## Neurobiology Courses

**NBIO 101. Social and Ethical Issues in the Neurosciences. 2-4 Units.**

Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology core; or consent of instructor. Same as: NBIO 201.



**NBIO 198. Directed Reading in Neurobiology. 1-18 Units.**

Prerequisite: consent of instructor. (Staff).

**NBIO 199. Undergraduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**NBIO 201. Social and Ethical Issues in the Neurosciences. 2-4 Units.**

Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology core; or consent of instructor.

Same as: NBIO 101.

**NBIO 206. The Nervous System. 7-8 Units.**

Structure and function of the nervous system, including neuroanatomy, neurophysiology, and systems neurobiology. Topics include the properties of neurons and the mechanisms and organization underlying higher functions. Framework for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.

**NBIO 216. Genetic Analysis of Behavior. 4 Units.**

Advanced seminar. Findings and implications of behavioral genetics as applied to invertebrate and vertebrate model systems. Topics include biological clocks, and sensation and central pattern generators. Relevant genetic techniques and historical perspective. Student presentation. Same as: MCP 216.

**NBIO 218. Neural Basis of Behavior. 5 Units.**

Advanced seminar. The principles of information processing in the nervous system and the relationship of functional properties of neural systems with perception, behavior, and learning. Original papers; student presentations. Prerequisite: NBIO 206 or consent of instructor.

**NBIO 220. Central Mechanisms in Vision-based Cognition. 2-4 Units.**

Contemporary visual neuroscience, emphasizing the neural mechanisms underlying primate vision and visually guided behavior. Seven foundational topics in visual neuroscience; current papers concerning each topic. Student presentations. Computer-based demonstration exercises.

**NBIO 221. Frontiers in Translational Medicine. 1 Unitss.**

Small group course for first year MSTP and Master's in Medicine students only. Focus is on pathways for combining science and medicine during graduate and postdoctoral training and in one's career, and practical aspects of translational medicine. Guest lecturers are physician-scientists who have advanced the frontiers of translational medicine. Previous lecturers have included Drs. Gilbert Chu, Jamie Topper, Irv Weissman, Beverly Mitchell, Geoff Duyk, William Mobley, Judy Shizuru, Carla Shatz, Linda Boxer and David Cox. Prerequisite: consent of instructor.

**NBIO 227. Understanding Techniques in Neuroscience. 2 Units.**

Topics include molecular, genetic, behavioral, electrophysiological, imaging, and computational approaches used in the field of neuroscience. Presentations by senior graduate students with examples from the literature, and optional laboratory demonstrations. Intended for graduate students in the biosciences; advanced undergraduates with backgrounds in biology or engineering and all graduate students also encouraged to enroll.

**NBIO 228. Mathematical Tools for Neuroscience. 1-3 Units.**

Student-instructed. For students with no math background beyond basic calculus, or as a review for more advanced students. Techniques useful for analysis of neural data including linear algebra, Fourier transforms, probability and statistics, signal detection, Bayesian inference, and information theory.

**NBIO 254. Molecular and Cellular Neurobiology. 5 Units.**

For graduate students. Includes lectures for BIO 154. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases.

Same as: BIO 254.

**NBIO 258. Information and Signaling Mechanisms in Neurons and Circuits. 4 Units.**

How synapses, cells, and neural circuits process information relevant to a behaving organism. How phenomena of information processing emerge at several levels of complexity in the nervous system, including sensory transduction in molecular cascades, information transmission through axons and synapses, plasticity and feedback in recurrent circuits, and encoding of sensory stimuli in neural circuits.

**NBIO 299. Directed Reading in Neurobiology. 1-18 Units.**

Prerequisite: consent of instructor.

**NBIO 300. Professional Development and Integrity in Neuroscience. 1-2 Units.**

Required of Neurosciences Ph.D. students every quarter. Develops professional skills in critical assessment and oral presentation of findings from current neuroscience literature in the visual presentation of quantitative data and writing research grants. The role of animals in lab research, fraud in science, the responsibility of authors and reviewers, science in a multicultural environment, and the relationship between student and mentor. Student and faculty presentations and discussions.

**NBIO 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**NBIO 399. Graduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Neurology Neurological Sciences Courses

**NENS 67N. Intracellular Trafficking and Neurodegeneration. 3 Units.**

Preference to freshmen. Cell structures and functions, the intracellular trafficking system that maintains exchanges of materials and information inside cells, and clinical features and pathologies of neurodegenerative diseases. Techniques for examining cellular and subcellular structures, especially cytoskeletons; functional insights generated from structural explorations. Prerequisite: high school biology.

**NENS 199. Undergraduate Research. 1-18 Units.**

Students undertake research sponsored by an individual faculty member. Prerequisite: consent of instructor.

**NENS 202. Longevity. 4 Units.**

Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists.

Same as: HUMBIO 149L, PSYCH 102.

**NENS 204. Stroke Seminar. 1 Unitss.**

Standing at the intersection of many fields of medicine, including neurology, internal medicine, cerebrovascular surgery, diagnostic and interventional radiology, and emergency medicine, as the third leading cause of death and the leading cause of disability, stroke is a critical topic for all practitioners of medicine. This seminar draws upon Stanford's leaders in stroke research to present and discuss the causes, presentation, treatment, and imaging characteristics of the disease.

**NENS 205. Neurobiology of Disease Seminar. 3 Units.**

Case demonstrations of selected disorders, discussion of the pathophysiological basis of the disorder, presentation of the basic principles underlying modern diagnostic and therapeutic management, and a discussion of recent research advances for each disease entity. Prerequisite: Neurobiology 206 or consent of instructor.

**NENS 206. Introduction to Neurology Seminar. 1 Unitss.**

Exploration of aspects of neurology, including subspecialties. Current issues, clinical cases, and opportunities in the field.

**NENS 220. Computational Neuroscience. 4 Units.**

Computational approaches to neuroscience applied at levels ranging from neurons to networks. Addresses two central questions of neural computation: How do neurons compute; and how do networks of neurons encode/decode and store information? Focus is on biophysical (Hodgkin-Huxley) models of neurons and circuits, with emphasis on application of commonly available modeling tools (NEURON, MATLAB) to issues of neuronal and network excitability. Issues relevant to neural encoding and decoding, information theory, plasticity, and learning. Fundamental concepts of neuronal computation; discussion focus is on relevant literature examples of proper application of these techniques. Final project. Recommended for Neuroscience Program graduate students; open to graduate, medical, and advanced undergraduate students with consent of instructor. Prerequisite: NBIO 206. Recommended: facility with linear algebra and calculus.

**NENS 230. Analysis Techniques for the Biosciences Using MATLAB. 2 Units.**

Data analysis and visualization techniques commonly encountered in biosciences research. Fundamentals of the MATLAB computing environment, programming and debugging, data import/export, data structures, plotting, image analysis, introduction to statistical tools. Examples and assignments draw from a range of topics applicable to bioscience research: frequency analysis, genetic data mining, ion channel kinetics, neural spike rasters and spike-triggered averages, cell counting in fluorescence images, regression, PCA, and stochastic simulation. Assignments are practical in nature and demonstrate how to implement specific analyses that a biosciences student is likely to encounter.

**NENS 299. Directed Reading in Neurology and Neurological Science. 1-18 Units.**

Prerequisite: consent of instructor.

**NENS 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**NENS 399. Graduate Research. 1-18 Units.**

Students undertake research sponsored by individual faculty members. Includes laboratory work in neurophysiology and neurochemistry.

## Neurosciences Program Courses

**NEPR 299. Directed Reading in Neurosciences. 1-18 Units.**

Prerequisite: consent of instructor.

**NEPR 399. Graduate Research. 1-18 Units.**

Student Investigations sponsored by individual faculty members.

Prerequisite: consent of instructor.

**NEPR 801. TGR Project. 0 Unit.****NEPR 802. TGR Dissertation. 0 Unit.**

## Neurosurgery Courses

**NSUR 70Q. Experimental Stroke. 2 Units.**

Preference to sophomores. How stroke is studied in the laboratory; advances in stroke research over the last two decades; and future directions. Topics include: cellular and molecular mechanisms of neuronal death and survival in the brain after stroke, including necrosis, apoptosis, inflammation, and cell signaling pathways; experimental tools for stroke treatment, such as gene therapy, cell therapy, hypothermia, preconditioning, postconditioning, and other pharmacological treatments; the gap and barrier between laboratory research and clinical translation.

**NSUR 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members.

Prerequisite: consent of instructor.

**NSUR 261. Principles and Practice of Stem Cell Engineering. 3 Units.**

Quantitative models used to characterize incorporation of new cells into existing tissues emphasizing pluripotent cells such as embryonic and neural stem cells. Molecular methods to control stem cell decisions to self-renew, differentiate, die, or become quiescent. Practical, industrial, and ethical aspects of stem cell technology application. Final projects: team-reviewed grants and business proposals.

Same as: BIOE 261.

**NSUR 280. Early Clinical Experience in Neurosurgery. 1-2 Units.**

Provides an observational experience as formulated by the instructor and student. Prerequisite: consent of instructor.

**NSUR 299. Directed Reading in Neurosurgery. 1-18 Units.**

Prerequisite: consent of instructor.

**NSUR 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**NSUR 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members.

Prerequisite: consent of instructor.

## Obstetrics Gynecology Courses

### **OBYGN 81Q. Perspectives on the Abortion Experience in Western Fiction. 3 Units.**

Explores the role of media in delivering abortion-related messages as well as the broader questions of how abortion and related issues are fundamentally integrated into the social fabric of US and global societies. Abortion remains one of the most controversial and polarizing challenges of our time. Yet, it has been a clinical, social, political, and cultural fact in a broad swath of societies for centuries. As is common for such lightning rod issues, the topic of abortion has featured prominently in a number of novels and films. Each treatment provides a unique perspective on at least one aspect of abortion, whether it be clinical, social, political or cultural. Examination of how abortion is portrayed in novels and films provides the student of history, anthropology, and biology not only with insights into the author's or director's perspectives, but also into societal attitudes and mores.

### **OBYGN 199. Undergraduate Research in Reproductive Biology. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

### **OBYGN 202. Assisted Reproductive Technologies. 1-3 Units.**

Primary and current literature in basic and clinical science aspects of assisted reproductive technologies (ART), and demonstrations of current ART techniques including in vitro fertilization and embryo culture, and micromanipulation procedures such as intracytoplasmic sperm injection and embryo biopsy and cryopreservation. Class only may be taken for 1 unit. 2 units includes papers and attendance at clinical demonstrations. 3 units includes a term paper. Recommended: DBIO 201, or consent of instructors. Same as: DBIO 202, HUMBIO 150A.

### **OBYGN 216. Current Issues in Reproductive Health. 1 Unit.**

Reproductive Health is a broad subject encompassing many concepts and practices. Issues and services within the context of reproductive health include such diverse topics as fertility, pregnancy, contraception, abortion, sexuality, menopause and parenting. This course focuses on topics related to abortion services, fertility and contraception; current research and practices in family planning; legislation and issues of access. Sponsored by Medical Students for Choice.

### **OBYGN 230. Women's Health Medical Forum. 1 Unit.**

Required for the Women's Health Scholarly Concentration. Ten seminars featuring a Women's Health research presentation (by faculty or student), followed by discussion. Emphasis is on topics related to the five Stanford Institutes of Medicine (cardiovascular; cancer; stem cell; neurosciences; and immunity), and the subspecialties of Obstetrics & Gynecology. Assigned readings and related papers.

### **OBYGN 240. Sex and Gender Differences in Human Physiology and Disease. 2-3 Units.**

Chromosomal and hormonal influences on cells, tissues, and organs that underlie the development of reproductive organs and sexual dimorphism of the neuroendocrine system. Effects of endogenous and exogenous sex hormones and environmental factors that differ between men and women on the musculoskeletal, neurological, cardiovascular, and immunological systems over the lifecourse, from conception to puberty, through reproductive phases (including changes during the menstrual cycle up to and beyond menopause in women and with aging in men). Transgender health issues. Guest lecturers. Prerequisite: Human Biology core or equivalent, or consent of instructor. Same as: HUMBIO 140, MED 240.

### **OBYGN 256. Current Controversies in Women's Health. 2-3 Units.**

Interdisciplinary. Focus is on the U.S. Topics include: health research; bioethical, legal, and policy issues; scientific and cultural perspectives; social influences; environmental and lifestyle effects on health; and issues related to special populations. Guest lecturers; student debates. Prerequisite: Human Biology core or equivalent, or consent of instructor. Only students who can attend both Mon and Wed classes can register for 3 units; students who can attend only Wed, register for 2 units. Same as: HUMBIO 125.

### **OBYGN 280. Early Clinical Experience in Obstetrics and Gynecology. 1-2 Units.**

Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

### **OBYGN 282. Pregnancy, Birth, and Infancy. 3 Units.**

Comprehensive clinical experience where pre-clinical medical students follow pregnant women receiving care at Stanford hospitals to attend prenatal visits, delivery, and postnatal visits. Continuity clinic format, combined with didactic lessons and discussion seminars. Students are exposed to clinical activities in a meaningful context, bolstering classroom studies in anatomy, physiology, embryology and human development, and emphasizing social, economic, and personal issues related to medicine. This program spans one quarter, covering topics related to pregnancy, labor and delivery and newborn care. In addition to clinic experiences, students are expected to spend 1-2 hours/week in lectures and to complete a reflection of their experiences in the course. Prerequisite: pre-clinical medical student. Same as: PEDS 282.

### **OBYGN 299. Directed Reading in Obstetrics and Gynecology. 1-18 Units.**

Prerequisite: consent of instructor.

### **OBYGN 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

### **OBYGN 399. Graduate Research in Reproductive Biology. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Operations Information Technology Courses

### **OIT 245. Optimization and Simulation Modeling. 2 Units.**

This course provides basic skills in quantitative modeling. The emphasis is on constructing abstractions of real-world processes, and using the tools of optimization, Monte Carlo simulation and sensitivity analysis to generate and interpret recommendations. A variety of applications drawn from revenue management, healthcare, finance and manufacturing are discussed. The instructional medium used is Excel, together with appropriate packages for simulation and optimization.

### **OIT 247. Optimization and Simulation Modeling - Accelerated. 2 Units.**

The course is similar in content and emphasis to OIT 245, but is aimed at students who already have background or demonstrated aptitude for quantitative analysis, and thus are comfortable with a more rapid coverage of the topics, in more depth and breadth.

### **OIT 256. Electronic Business. 3 Units.**

This course focuses on the intersection of strategy and information technology. It considers how you can take advantage of new technology opportunities and how they change the structure of firms, industries and value chains, with an emphasis on business issues. Classes combine lecture and case study discussions and the workload is above the GSB average. Same as: Accelerated.

**OIT 258. Incentive Mechanisms for Societal Networks. 2 Units.**

In many of the challenges faced by the modern world, from overcrowded road networks to overstretched healthcare systems, large benefits for society come about from small changes by very many individuals. This course survey the problems and the cost they impose on society. It describes a series of pilot projects which aim to develop principles for inducing small changes in behavior in Societal Networks--transportation networks, wellness programs, recycling systems and, if time permits, energy grids. Students will learn how low-cost sensing and networking technology can be used for sensing individual behavior, and how incentives and social norming can be used to influence the behavior. The effectiveness of this approach in pilots conducted in Bangalore (commuting), Singapore (public transit system), Stanford (congestion and parking), and a wellness program at Accenture-USA will be discussed. Students may experience the incentive platform as participants.

**OIT 262. Operations. 3 Units.**

This course focuses on basic managerial issues arising in the operations of both manufacturing and service industries. The objectives of the course are to familiarize students with the problems and issues confronting operations managers and to introduce language, conceptual models, and analytical techniques that are broadly applicable in confronting such problems. The spectrum of different process types used to provide goods and services is developed and then examined through methods of process analysis and design.

**OIT 265. Data and Decisions. 4 Units.**

This is the base version of D&D. This course introduces the fundamental concepts and techniques for analyzing risk and formulating sound decisions in uncertain environments. Approximately half of the course focuses on probability and its application. The remainder of the course examines statistical methods for interpreting and analyzing data including sampling concepts, regression analysis, and hypothesis testing. Applications include inventory management, demand analysis, portfolio analysis, surveys and opinion polls, A/B testing, environmental contamination, online advertising and the role of analytics in business settings more generally. The course emphasizes analytical techniques and concepts that are broadly applicable to business problems.

**OIT 267. Data and Decisions - Accelerated. 4 Units.**

Data and Decisions - Accelerated is a first-year MBA course in probability, statistics, multiple regression analysis, and decision trees for students with strong quantitative backgrounds. Probability provides the foundation for modeling uncertainties. Statistics provides techniques for interpreting data, permitting managers to use small amounts of information to answer larger questions. Regression analysis provides a method for determining the relationship between a dependent variable and predictor variables. Decision tree analysis consists of quantitative approaches to decision making under uncertainty. Students taking this course need to be comfortable with mathematical notation, algebra, and some calculus. If you are not confident with your quantitative abilities, then you should enroll in OIT 265. Accelerated D&D will cover material covered in OIT 265 faster and in more depth. One main difference is that Accelerated D&D will cover the additional topics of advanced multiple regression analysis (e.g., correction for autocorrelation), discrete dependent variable models, and panel data. A multiple regression group project is required.

**OIT 268. Making Data Relevant. 4 Units.**

Data is everywhere. Firms collect it. Data on customers' preferences are collected through websites or loyalty programs or cash registers. Data on employees' traits are collected through in-house databanks or social networking sites. All of us are used to thinking about data. How can you make data relevant to doing your job? How can data analysis serve to increase your competitive advantage over that of others? This class goes beyond graphing data in bar charts or time trends. It makes you think about causal relationships. The examples we use are primarily taken from talent management, because it's easy to think about our own careers or those of our employees. But the tools covered extend to all contexts, and your project is on an idea of your choosing. The class focuses on the use of regressions to think experimentally. To take the class, you should have covered regression analysis in a former class (such as an econometrics course for economics majors) or be comfortable with learning basic math concepts quickly. You also should understand distributions of data (such as the Bell curve, or normal distribution), but this topic is not covered. There are no required proofs or derivations; you've done that as undergraduates. This is about using data: we use cases, examples, Notes written for the class, and a quiz, final exam, and several assignments in which you play with data sets to answer questions. Note that this 4-unit course, if successfully completed, counts for the Data Analysis foundations requirement.

**OIT 269. Sloan: Operations. 4 Units.**

This course focuses on basic managerial issues arising in the operations of both manufacturing and service industries. The objectives of the course are to familiarize students with the problems and issues confronting operations managers and to introduce language, conceptual models, and analytical techniques that are broadly applicable in confronting such problems. The spectrum of different process types used to provide goods and services is developed and then examined through methods of process analysis and design.

**OIT 333. Entrepreneurial Design for Extreme Affordability. 4 Units.**

This course is a Bass Seminar. Project course jointly offered by School of Engineering and Graduate School of Business. Students apply engineering and business skills to design product or service prototypes, distribution systems, and business plans for entrepreneurial ventures that meet that challenges faced by the world's poor. Topics include user empathy, appropriate technology design, rapid prototype engineering and testing, social technology entrepreneurship, business modeling, and project management. Weekly design reviews; final course presentation. Industry and adviser interaction. Limited enrollment via application; see <http://extreme.stanford.edu/index.html> for details.

**OIT 334. Entrepreneurial Design for Extreme Affordability. 4 Units.**

This course is a Bass Seminar. Project course jointly offered by School of Engineering and Graduate School of Business. Students apply engineering and business skills to design product or service prototypes, distribution systems, and business plans for entrepreneurial ventures that meet that challenges faced by the world's poor. Topics include user empathy, appropriate technology design, rapid prototype engineering and testing, social technology entrepreneurship, business modeling, and project management. Weekly design reviews; final course presentation. Industry and adviser interaction. Limited enrollment via application; see <http://extreme.stanford.edu/index.html> for details.

**OIT 343. D-Lab: Design for Service Innovation. 4 Units.**

Students in multidisciplinary teams work with a partner organization to design new services that address the needs of an underserved population of users. Teams identify an unmet customer needs, develop and prototype new service designs (e.g. web services, services with a product component, educational campaigns), test these services with real customers and develop an implementation plan. Fundraising strategies are also explored and tested. We will offer two sections: financial services (MW: 1:15 pm - 3:00 pm); health services (MW: 4:15 pm - 6:00 pm). The specific domains for the two sections will be announced in the fall based on the needs of partner organizations. Possible domains for financial services: financial literacy for young adults, planning for major expenses at retirement, financial services for the underserved. For health services: transition to adulthood of pediatric patients with chronic conditions, transitions to nursing care for elderly patients. See <http://designforservice.stanford.edu/>.

**OIT 344. Design for Service Innovation. 4 Units.**

Design for service innovation is an experiential course in which students work in multidisciplinary teams to design new services (including but not limited to web services) that will address the needs of an underserved population of users. Through a small number of lectures and guided exercises, but mostly in the context of specific team projects, students will learn to identify the key needs of the target population and to design services that address these needs. Our projects this year will focus on services for young adult survivors of severe childhood diseases. For the first time ever, children who have cystic fibrosis, rheumatoid arthritis, major cardiac repairs, organ transplants, genetic metabolic disorders, and several forms of cancer are surviving. The first wave of these survivors is reaching young adulthood (ages 18-25). Many aspects of the young adult world are not yet user-friendly for them: applying to and then entering college, adherence to required medication and diet, prospects for marriage and parenthood, participation in high school or college sports, driving, drinking, drugs, and more. Our aspiration is to develop services to improve these young adults' options for a fulfilling and satisfying life. The course is open to graduate students from all schools and departments: business (MBA1, MBA2, PhD, Sloan), Medicine (medical students, residents, fellows and postdocs), engineering (MS and PhD), humanities, sociology, psychology, education, and law. Students can find out more about this course at: <http://DesignForService.stanford.edu>; GSB Winter Elective BBL Jan 10th, 12 noon - 1 pm; D-School Course Exposition Feb 3rd, time TBA. Admission into the course by application only. Applications will be available at <http://DesignForService.stanford.edu> on Jan 13th. Applications must be submitted by Feb 4th midnight. Students will be notified about acceptance to the course by Feb 7th. Accepted students will need to reserve their slot in the course by completing an online privacy training course. Details about online training will be provide to accepted students. The training is related to the protection of our partners' privacy. Application Deadline: Noon, Feb 4th.

**OIT 356. Electronic Business. 3 Units.**

This course focuses on the intersection of strategy and information technology. It considers how you can take advantage of new technology opportunities and how they change the structure of firms, industries and value chains, with an emphasis on business issues. Case studies include Salesforce.com, Apple, Google, Netflix, Linden Lab (Second Life), Amazon (The Kindle), Zappos and PayPal. Classes combine lecture and case study discussions and the workload is above the GSB average.

**OIT 361. Technology Concepts for Managers. 4 Units.**

Electronics, computing, networks and software applications have become an integral part of business. The course is aimed at the student who wishes to learn those electronic and computer science concepts needed to understand how computers, networks, and the software that runs them operate, but who lacks background in engineering or computer science. The premise of the course is that adequate knowledge of technology is now a prerequisite for a successful manager, but that knowledge does not have to be at the level of rigor required in the practice of engineering or computer science. This course is intended to provide a basic literacy in these areas, with an emphasis on implications for managers and organizations. A meaningful course that focuses on particular technologies is difficult because rapid changes in any technology can quickly render today's lessons obsolete. Therefore, this course will stress fundamentals and trends, rather than a snapshot of the current status of different technologies. As a result, classroom coverage of current "hot" topics in technology is subordinate to giving the technology concepts necessary for one to learn such current (and future) topics on their own. Investigation of technology will be facilitated by lectures readings and homework assignments. Students will have an opportunity to investigate and learn more about a particular technology in more depth as part of a term project. The general flow of the course will focus upon four areas approximately as follows: Part I Electronic Systems: Fundamental Electronics (2 sessions), Digital and Microelectronics (2 sessions), Computer Hardware and Systems (2 sessions), Technology Trends (1 session), Communications including wireless (2 sessions); Part II Networks: Networked Computing (1 session), the Internet (2 sessions); Part III Software: Software and software development (3 sessions), Data Base Technology (1 session); and Part IV The Web: Clients and Servers (1 session), Case study of a web site (1 session), Video/Multimedia (1 session). The course is specifically designed for students with liberal arts or soft science backgrounds who have career ambitions in high-tech or who wish to be more technically aware as managers. Students with hard science, engineering or computer science backgrounds are welcome but must avoid redirecting the class discussion into narrow or advanced material that causes dysfunction to less technical colleagues. Students may elect either to take a final exam or do a term project. Students electing to do a term project will create it as a Web page. Separate training for building a Web page will be offered.

**OIT 364. Global Operations. 3 Units.**

Globalization of businesses has resulted in companies having to manage global networks of suppliers, integrators, contract manufacturers, logistics service providers, distributors, and service support operators in geographically dispersed locations. The customer network is also globally distributed. This course will focus on (1) how global and international companies can overcome the geographical, cultural, and organizational barriers, and leverage the strengths of the network to create values, and (2) how these companies may use different ways to manage operations in different regions to take full advantage of the local strengths and limitations. The course will be based on cases on innovative strategies and tactics used by global and international companies.

**OIT 367. Analytics from Big Data. 4 Units.**

This is an advanced first-year MBA course in data-mining, machine learning, and cloud computing. The course presents real-world examples where a significant competitive advantage has been obtained through large-scale data analysis. Examples include advertising, finance, health care, revenue management, and the Internet. Students taking this course need to be comfortable with mathematical notation, algebra, calculus, probability, and statistics. Willingness to work with analytical software such as Matlab or R is required.

**OIT 384. Biodesign Innovation: Needs Finding and Concept Creation. 4 Units.**

This is the first quarter of a two-quarter course series (OIT 384/OIT 385). In this course, students learn how to develop comprehensive solutions (most commonly medical devices) to some of the most significant medical problems. The first quarter includes an introduction to needs finding methods, brainstorming and concept creation. Students learn strategies for understanding and interpreting clinical needs, researching literature and searching patents. Working in small entrepreneurial multidisciplinary teams, students gain exposure to clinical and scientific literature review, techniques of intellectual property analysis and feasibility, basic prototyping and market assessment. Students create, analyze and screen medical technology ideas, and select projects for future development. Final presentations at the end of the winter quarter to a panel of prominent inventors and investors in medical technology provide the impetus for further work in the spring quarter. Course format includes expert guest lecturers (Thu: 4:15 to 6:05 pm), faculty-led practical demonstrations and coaching sessions and interactive team meetings under the mentorship of Biodesign fellows (Tues: 4:15 to 6:05 pm). Projects from previous years included: prevention of hip fractures in the elderly; methods to accelerate healing after surgery; less invasive techniques for bariatric surgery; point of care diagnostics to improve emergency room efficiency; novel devices to bring specialty-type of care to primary care community doctors. More than 4,000 patients have been treated to date with technologies developed as part of this program and more than ten venture-backed companies were started by alums of the program. Students must apply and be accepted into the course. The application is available online at <http://biodesign.stanford.edu/bdn/courses/bioe374.jsp>.

**OIT 385. Biodesign Innovation: Concept Development and Implementation. 4 Units.**

Two quarter sequence (continuation of OIT385 - see OIT384 for complete description of the sequence). The second quarter focuses on how to take a conceptual solution to an important medical need forward from early concept to technology translation, development and possible commercialization. Students expand on the topics they learned in OIT384 to learn about prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation and commercialization route (licensing vs. start-up); marketing, sales and distribution strategies; ethical issues including conflict of interest; fundraising approaches and cash requirements; financial modeling; essentials of writing a business or research plan; strategies for assembling a development team. Students continue to work in multidisciplinary teams to select a final concept and develop a business plan. Final presentations are made to a panel of prominent venture investors and serve the role of a VC pitch. New students (i.e. students who did not take OIT384 in the winter quarter) will need to submit an application at <http://www.stanford.edu/group/biodesign/courseapplication11.html>. Students who took OIT384 in the winter quarter are automatically accepted into the spring quarter.

**OIT 522. Field Trips to Grassroots Innovators in Health Care: Improving Access & Outcomes for the Underserved. 2 Units.**

Some of the most impressive innovations in health care are developed at hospitals and other non-profit organizations by dedicated health care professionals (drs, nurses, administrators) who are not afraid to roll up their sleeves and work hard to solve an important health care problem they face in their everyday patient encounters. Because of limited financial resources and because they often target underserved market segments, these innovations lack a validated business model and commercialization pathway. In this seminar we will gain hands-on experience of some of these grassroots innovations through field trips to a local public hospital (a candidate hospital is San Francisco General Hospital) and a non-profit product incubator (hopelab.org). We will then work in teams to identify and address the main barriers to commercialization for two specific innovations presented in these field trips: An electronic referral system to promote access to specialist care in underserved communities; A video game to promote healthy lifestyles in at-risk youth. We will learn and apply the brainstorming approach to come up with innovative solutions to overcome these barriers. On the last day we will meet key executives in both organizations to present our recommendations.

**OIT 530. Advanced Modeling Seminar. 2 Units.**

Modern spreadsheet and simulation software now makes it possible for general managers themselves to model complex and uncertain business situations on their personal computers. This seminar will consist of hands-on experience with advanced applications for modeling situations that include both uncertainty and discontinuous change. These situations often are called "ill-behaved" because they defeat the traditional tools of analysis covered in the Foundations Modeling courses. For example, financial spreadsheet models involving discontinuous change, such as winning an auction or unexpectedly altering a production process or marketing campaign (so-called "black swan" events), may arise in business projections, but actual models of such events are rarely, if ever, considered for optimization under uncertainty. As another example, the Operations formulas used to estimate throughput times in models involving congestion and delay often cannot be applied to systems that include unexpected service interruptions or complex routing of items (e.g., modern hospitals). The mission of this seminar is to utilize recent advances in software and the speed of modern multi-core PC's that have produced easy-to-use tools for interactively building and analyzing such models. Each day, students will build models of these more-realistic situations, using the software tools "hands-on" and working with the instructors as coaches in a laboratory setting. We will use a more advanced version of the Excel Solver add-in, called Risk Solver, which combines optimization with Monte Carlo simulation, as well as ExtendSim, a graphical tool for constructing and analyzing discrete event simulation models. Exercises will include optimization under uncertainty such as Value at Risk in financial statement projections, capacity expansion plans involving Real Options, customer service and manufacturing workflow systems, courtroom scheduling, and airport security policies. The first 2.5 sessions of the course will focus on learning and using Risk Solver to analyze risk-based spreadsheet models with an emphasis on interpreting Value at Risk and Conditional Value at Risk constraints in such models. The second 2.5 sessions will focus on learning and using ExtendSim to model operational situations in services and manufacturing, with an emphasis on dealing with congestion and delay in complex settings. Who should take this seminar? Our intended audience consists of students who: a. Want to develop a deeper appreciation for how discontinuous change, risk, and uncertainty affect decision-making in financial and operational settings, and b. Want to learn how advanced optimization and simulation software allows you to examine easily the effects of such events directly, rather than through complex and unwieldy mathematical approximations. How much computer background is necessary? We want the seminar to be illuminating, fun, and easy to master. The seminar is designed specifically for both non-technical ("poet") and technical ("quant") students who have completed the introductory concepts of optimization with Excel Solver, as covered in Foundations Modeling (either basic or advanced), and are comfortable building Excel spreadsheets. We will assume that students have no prior experience with optimization of risk-based models or with discrete event simulation software, and would like to gain that experience now in a hands-on, build-your-own-model setting. Students will use the software both for individual preparation via tutorial documents and for classroom exercises. Each session will be team-taught by Professors Moore and Patell and will be a combination of lectures, demonstration, and coaching to help you experiment with the tools.

**OIT 538. Environmental Science for Managers - Accelerated. 3 Units.**

This course satisfies the MBA distribution requirement in Optimization and Simulation Modeling (OSM). It is challenging but doable for students without an undergraduate degree in science or engineering; it does not assume experience in environmental science or quantitative analysis beyond admission requirements for the MBA program. Students will learn fundamental science of ecosystems, climate and energy systems, by building decision-support models for managing these systems. In so doing, students will develop widely-applicable skills in model representation in a spreadsheet, optimization, and Monte Carlo simulation. Students are strongly encouraged to take the follow-on course on renewable energy, OIT 540 Environmental Science for Managers II. For the joint MBA-MS in Environment and Resources degree, students are required to take OIT 540, and either OIT 538 or OIT 539.

**OIT 539. Environmental Science for Managers - Advanced. 3 Units.**

Fundamental science of ecosystems, climate and energy. Spreadsheet modeling, optimization, and Monte Carlo simulation applied to resource management and environmental policy. Similar to OIT 338, but allocates more class time to environmental/energy science and implications for management and policy, and less class time to fundamentals of modeling/optimization/simulation.

**OIT 540. Environmental Science for Managers II. 1 Units.**

This course provides an introduction to renewable sources of electricity and fuel, and is required for the joint MBA-MS in Environment and Resources degree. Students are strongly encouraged, but not required, to take OIT 538 or OIT 539 prior to taking this course.

**OIT 542. Price and Revenue Optimization. 2 Units.**

This is the Advanced Application option in the menu of courses that satisfy the Management Foundations requirement in Optimization and Simulation Modeling(OSM). Three core modeling topics are covered in rapid-review fashion - model representation in a spreadsheet environment, optimization theory, and stochastic models - but primary emphasis is on the application domain described immediately below. OIT 542 is a two-unit course, with nine class sessions plus a final exam. Systems for price and revenue optimization - also called yield management, dynamic pricing, or revenue management - combine the use of information technology, statistical forecasting, and mathematical optimization to make tactical decisions about pricing and product availability. A familiar example is the passenger airline industry, where a carrier may sell seats on the same flight at many different fares, with fare availability changing as time advances and uncommitted capacity declines. Over the last 30-35 years, revenue optimization practices have transformed the transportation and hospitality industries, where fixed capacity and advance reservations by customers are important structural factors. But model-based, data-driven pricing systems are increasingly common in other industries that have different structures, such as financial services and retail clothing. In this course students learn about the model structures and modelling techniques that underlie systems for price and revenue optimization. Two topics are given roughly equal emphasis: model-based tactical pricing, including customized pricing and retail markdown management; and classical revenue management, where automated logic is used for booking control (that is, to make yes-or-no decisions in response to booking requests from customers), rather than to set prices explicitly. OIT 542 is tailored to students who already have command of basic modelling techniques and wish to learn about their application in an important business context. To be specific, a prior college course on optimization modelling is assumed as background. (Typically, such courses focus on linear programming, or linear optimization, with secondary coverage of non-linear programming and discrete optimization.) Various aspects of optimization theory will be covered in quick-review format, along with the basics of spreadsheet model representation and stochastic modelling, in order to standardize terminology and establish certain conventions that facilitate grading. In exceptional cases, for students who have strong math background and high mathematical aptitude but no prior coursework on optimization, the background knowledge assumed in OIT 542 may be acquired through self-study; appropriate study materials will be suggested by the instructor upon request. The course is entirely appropriate for second-year MBA students who have completed either base or accelerated MODS in their first year. OIT 542 draws on knowledge acquired and skills developed in two other Management Foundations courses that are taken simultaneously: Data and Decisions (OIT 265) and Microeconomics (MGTECON 200 or 203). Students are required to construct and analyze at least one model for every class session.

**OIT 556. Electronic Business and Commerce. 2 Units.**

Beyond the hype surrounding the rise and fall of "dot-com" businesses, Information Technology has fundamentally changed the costs of transactions and communications, affecting the ways firms are internally managed and the ways they deal with customers and business partners. This course focuses on approaches to value creation using Information Technology and their application to a variety of business settings. It explores ways in which firms can use electronic business to create value, and strategies for capturing a portion of that value. The course will examine such issues as: how Information Technology affects information flows within the firm; electronic commerce # applications and pitfalls; how electronic business is likely to change traditional supply chains, logistics and payment systems; and the impact of electronic business on established industries and companies.

**OIT 562. Supply Chain Management & Technology. 2 Units.**

Supply chain management (SCM) deals with the management of materials, information and financial flows in a network consisting of suppliers, manufacturers, distributors, retailers and customers. The coordination and integration of these flows within and across companies are critical in effective supply chain management. In this course, we introduce key concepts and new developments in information technologies (IT) for use in SCM. In particular, the advances of information technologies such as enterprise systems, the Internet, collaborative network, operational analytics and wireless technologies have a profound impact on how supply chains are structured and run. You are all challenged to think, discuss, share, and debate on the issues brought up.

**OIT 571. Homeland Security: Operations, Strategy and Implementation. 2 Units.**

This course is a Bass Seminar. This course covers a variety of topics in homeland security: bioterrorism (attacks with contagious agents such as smallpox or non-contagious agents such as anthrax, and attacks on the food supply), pandemic influenza, nuclear security at ports and around cities, the biometric aspects of the US-VISIT Program, the intersection of homeland security and immigration, and suicide bombings. For each of these topics, students will typically read one academic paper that focuses on the operations aspects of the problem, and one reading about the strategic aspects of the problem. For each topic, the professor will spend part of the class lecturing on the problem (including how the results of the academic paper were implemented), and a student will be assigned as a discussant (in addition to a classwide discussion).

**OIT 581. Biodesign Innovation: Needs Finding and Concept Creation. 2 Units.**

OIT581 is a two-unit version of the Biodesign Innovation course (OIT384). In this course, students learn how to develop comprehensive solutions (most commonly medical devices) to some of the most significant medical problems. In OIT581, students learn the basic principles of biodesign innovation: methods of validating medical needs; techniques for analyzing intellectual property; basics of regulatory (FDA) and reimbursement planning; early market analysis; design principles; brainstorming and early prototyping; university licensing. Course format includes expert guest lecturers and faculty-led practical demonstrations. Students apply the concepts learned by serving as "commercialization and marketing consultants" to multidisciplinary teams of students in the four-unit course (OIT 384). Consultants interact with their teams on a regular basis and provide a consulting report on market analysis and competitive dynamics. Projects from previous years included: prevention of hip fractures in the elderly; methods to accelerate healing after surgery; less invasive procedures to perform bariatric surgery; low cost healing devices for diabetic ulcers; point of care diagnostics to improve emergency room efficiency; novel devices to bring specialty-type of care to primary care community doctors. More than 40,000 patients have been treated to date with technologies developed as part of this program and more than ten venture-backed companies were started by alums of the program. Students must apply and be accepted into the course. The application is available online at <http://www.stanford.edu/group/biodesign/courseapplication.html>, and the application deadline is November 20, 2010. Students must indicate whether they are applying for the four-unit version (OIT384) or two-unit version (OIT581).



**OIT 582. Biodesign Innovation, Project A. 2 Units.**

Students work in multidisciplinary teams at the intersection of medicine, engineering and business to develop a comprehensive solution to an important medical need of their choice. With coaching from faculty and real-world experts, the teams identify an important medical need and through brainstorming they develop several potential conceptual approaches to solving the need and pursue initial prototyping, along with planning for regulatory and reimbursement pathways. The project culminates with a presentation to a panel of venture investors and entrepreneurs. In previous years, student teams examine needs in emergency and acute care, orthopedics, cardiovascular, wound closure etc. Concurrent registration at OIT581 is required. An application needs to be submitted online.

**OIT 583. Biodesign Innovation Core, Spring. 2 Units.**

Two quarter sequence (continuation of OIT581 -- see OIT 581 for a general description of the Biodesign Innovation course and OT384/385 for a description of the four unit option). The second quarter focuses on how to take a conceptual solution to an important medical need forward from early concept to technology translation, development and possible commercialization. Students expand on the topics they learned in OIT581 to learn about prototyping; patent strategies; advanced planning for reimbursement and FDA approval; choosing translation and commercialization route (licensing vs. start-up); marketing, sales and distribution strategies; ethical issues including conflict of interest; fundraising approaches and cash requirements; financial modeling; essentials of writing a business or research plan; strategies for assembling a development team. Students serve as "commercialization consultants" to a multidisciplinary team in OIT385. Students interact regularly with their team and prepare a consulting report that outlines a funding strategy and validates the financial model developed by the team. (OIT581 or OIT384 are a pre-requisite). New students (i.e. students who did not take OIT581/OIT384) in the winter quarter will need to submit an application at <http://www.stanford.edu/group/biodesign/courseapplication.html> by February 19, 2011. In the application they should indicate whether they are applying for the 2-unit or 4-unit version. Students who took OIT581/OIT384 in the winter quarter are automatically accepted into the spring quarter and they can choose the version they want: 2 unit or 4 unit.

**OIT 584. Biodesign Innovation Project, Spring. 2 Units.**

Students work in multidisciplinary teams at the intersection of medicine, engineering and business to further develop and refine the solutions they identified in OIT 582. The focus this quarter is on implementation. The teams select the most promising solution from the concepts of the first term and move forward into prototyping and project planning. Teams develop specific strategies for patenting, FDA submission, commercialization and third-party reimbursement, along with funding strategies (e.g. licensing agreement or launching a start-up). The project culminates with a presentation to a panel of venture investors. OIT 583 should be taken concurrently. Permission of instructor needed if student has not taken OIT 582.

**OIT 587. Global Biodesign. 1 Unitss.**

Seminar examines the development and commercialization of medical technologies in the global setting focusing primarily on Europe, India and China. Faculty and guest speakers from industry and government discuss the status of the industry, as well as opportunities in and challenges to medical technology innovation unique to each geography. Topics related to development of technologies for bottom of the pyramid markets will also be addressed.

**OIT 601. Fundamentals of OIT. 2 Units.**

The goal of this course is to provide first-year Ph.D. students in OIT with sufficient fundamentals to subsequently take advanced research seminars. The course covers the very basics of six topics: queueing theory, inventory theory, multi-echelon inventory theory, game theory, stochastic dynamic programming and econometrics. Lectures will be given by advanced Ph.D. students in OIT.

**OIT 602. Dynamic Pricing and Revenue Management I. 2 Units.**

In tandem with OIT 603, this course explores the application of stochastic modeling and optimization to two closely related problem areas: (a) dynamic price selection, and (b) dynamic allocation of limited capacity to competing demands. As background, students are assumed to know stochastic process theory at the level of Statistics 217-218, microeconomics at the level of Economics 202N, and optimization theory at the level of MS&E 211, and to have some familiarity with the basic ideas of dynamic programming. Additional dynamic programming theory will be developed as needed for the applications covered. Emphasis will be on current research topics, especially in the realm of airline revenue management.

**OIT 603. Dynamic Pricing and Revenue Management II. 2 Units.**

In tandem with OIT 602, this course explores the application of stochastic modeling and optimization to two closely related problem areas: (a) dynamic price selection, and (b) dynamic allocation of limited capacity to competing demands. As background, students are assumed to know stochastic process theory at the level of Statistics 217-218, microeconomics at the level of Economics 202N, and optimization theory at the level of MS&E 211, and to have some familiarity with the basic ideas of dynamic programming. Additional dynamic programming theory will be developed as needed for the applications covered. Emphasis will be on current research topics, especially involving customized pricing of financial services. OIT 602 is not a prerequisite for OIT 603 but is highly recommended.

**OIT 624. Theory of Inventory Management. 3 Units.**

The course provides students a strong theoretical background in several fundamental aspects underlying inventory theory. Topics include deterministic inventory models (EOQ, Power-of-two policies, ELS, serial and assembly networks), the Newsvendor model, multi-period stochastic inventory theory, serial and multi-echelon models, approximation algorithms, batch ordering and lost-sales models, infinitesimal perturbation analysis, distribution-free inventory theory, models for joint pricing and inventory decisions. The course also provides an overview of relevant mathematical concepts used in inventory theory, including convexity, duality, probability theory, finite and infinite state Markov decision processes, and comparative statics.

**OIT 655. Foundations of Supply Chain Management. 3 Units.**

This course provides an overview of research in supply chain management (SCM). It has three parts. The first part reviews basic tools of SCM research through selected readings in economics, IT and operations research. The second part reviews the literature in SCM, covering topics such as inventory models, information sharing, information distortion, contract design, value of integration, performance measurement, risk management, and the use of markets for procurement. The last part is devoted to recent advances in SCM research.

**OIT 660. Applied OIT. 4 Units.**

Description is currently unavailable because of ongoing review of the OIT PhD program by OIT faculty. Description will become available when the review is completed at the end of the Summer.

**OIT 663. Methods of Operations/Information Systems. 4 Units.**

This course covers basic analytical tools and methods that can be used in research in operations and information systems. The emphasis is on foundations of stochastic inventory theory. Basic topics include convexity, duality, induced preference theory, and structured probability distributions. Much of the course is devoted to Markov decision processes, covering finite and infinite horizon models, proving the optimality of simple policies, bounds and computations, and myopic policies.

**OIT 664. Stochastic Networks. 4 Units.**

Processing network models may be used to represent service delivery systems, multi-stage manufacturing processes, or data processing networks. The first half of this two-unit course consists of lectures on performance analysis (e.g., estimating congestion and delay) for classical product-form networks and for Brownian networks. The second half consists of student presentations of recent papers on managing processing networks, typically with game-theoretic aspects. Prerequisites: Statistics 217 and 218, or consent of instructor; some prior exposure to stochastic models in general, and queueing theory in particular, is useful but not essential.

**OIT 665. Seminar on Information-Based Supply Chain Management. 4 Units.**

This seminar will highlight the research evolution and advances on the smart use of information in supply chain management. Such usage has helped companies sharing information to coordinate their supply chain and to realign their incentives. It has also helped reduce the so-called bullwhip effect. Latest information technology like RFID (radio-frequency identification) has also enabled visibility and structural changes that result in significant supply chain performance enhancements. This seminar will focus on the modeling approaches used by researchers that tried to capture the values and potentials of such applications.

**OIT 672. Stochastic Control in Operations and Economics. 4 Units.**

The first half of this course covers (a) the basic theory of Brownian motion, (b) Ito stochastic calculus, and (c) the rudiments of continuous-time stochastic control, all undertaken at a brisk pace, aimed at students who already know the basics or else have a strong enough math background to learn them quickly. The text for this part of the course will be *Brownian Motion and Stochastic Flow Systems*, by J. Michael Harrison, John Wiley and Sons, 1985. (The book is available as a scanned PDF file at <http://faculty-gsb.stanford.edu/harrison/HarrisonBook.pdf>.) The second half of the course will explore in depth several models arising in operations research and economic theory. MS&E 322 (Stochastic Calculus and Control) provides ideal preparation, but this course is also suitable for students who have taken Statistics 310 A, B (measure theoretic probability) and have no previous exposure to stochastic calculus or stochastic control.

**OIT 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, HRMGT 691, MGTECON 691, MKTG 691, OB 691, POLECON 691, STRAMGT 691.

**OIT 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, HRMGT 692, MGTECON 692, MKTG 692, OB 692, POLECON 692, STRAMGT 692.

**OIT 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, HRMGT 802, MGTECON 802, MKTG 802, OB 802, POLECON 802, STRAMGT 802.

**OPHT 201. Clinical Topics in Ophthalmology. 1 Unitss.**

Introduction to the professional opportunities available to the ophthalmologist in the areas of clinical research, community health, biotech and pharmaceutical development, international blindness prevention, graduate and post-graduate education.

**OPHT 202. Clinical Topics in Ophthalmology. 1 Unitss.**

(Continuation of 201) Professional opportunities available to the ophthalmologist in the areas of clinical research, community health, biotech and pharmaceutical development, international blindness prevention, graduate and post-graduate education.

**OPHT 203. Introduction to Ophthalmology. 1 Unitss.**

(Continuation of 202) Introduction to the practical skills used within the field of ophthalmology. Diagnostic tools and instruments; applications of these tools; practice using instruments under the guidance of faculty and residents; practice in microsurgical techniques with one-on-one guidance.

**OPHT 280. Early Clinical Experience in Ophthalmology. 1-2 Units.**

Provides an observational experience as formulated by the instructor and student. Prerequisite: consent of instructor.

**OPHT 299. Directed Reading in Ophthalmology. 1-18 Units.**

Prerequisite: consent of instructor.

**OPHT 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**OPHT 399. Graduate Research. 1-18 Units.**

Students to undertake investigations sponsored by individual faculty members. Opportunities are available at both predoctoral and postdoctoral levels. Prerequisite: consent of instructor.

## Organizational Behavior Courses

**OB 205. Managing Groups and Teams. 1 Unitss.**

This course introduces you to the structures and processes that affect group performance and highlights some of the common pitfalls associated with working in teams. Topics include team culture, fostering creativity and coordination, making group decisions, and dealing with a variety of personalities. You will participate in a number of group exercises to illustrate principles of teamwork and to give you practice not only diagnosing team problems but also taking action to improve total team performance.

**OB 206. Organizational Behavior. 2 Units.**

This course is designed to introduce incoming students to the structures and processes that affect group performance as well as some of the common pitfalls associated with working in teams. Topics include understanding team culture, fostering creativity and coordination, making group decisions, and dealing with a variety of personalities. Students will participate in a number of group exercises designed to illustrate principles of team work and to give students practice diagnosing team problems and taking action to improve team performance.

## Ophthalmology Courses

**OPHT 199. Undergraduate Research. 1-18 Units.**

Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**OB 209. Leadership Laboratory. 2 Units.**

In the Leadership Labs class we ask you to consider the question, "Why would someone follow YOU?" This is a course in which you consider what kind of leader you want to be, what kind of leader you are, and how to align your leadership behavior with your leadership goals. In this class you will have an opportunity to lead your squad and in doing so to discover your strengths and challenges as a leader. You will receive feedback about your approach to leadership and you will have opportunity to try out new skills and tools. Students will be placed into 6-7 person "squads" and the majority of class time will be spent in these squads. Your squad will meet to work on basic leadership challenges (e.g. managing conflict, assessing a team's progress). There will be the opportunity for a lot of feedback so you can achieve a deeper understanding of the impact of your behavior on others. The squads will do role-play cases and group exercises designed to help you think more deeply about the dynamics in your workgroup and to allow you to practice and experiment with new ways of leading. Each session will be divided into two segments, and one squad member will be the leader for each segment. MBA1 squad members will rotate through the segment leader position. Your squad will have an MBA2 Leadership Fellow assigned to it and he or she will also be present for these meetings in order to provide coaching to the leader and to the squad as whole. Over the course of the quarter your squad will also produce an outside of class project oriented toward changing lives, changing organizations, and changing the world. The project is intended to further challenge your leadership skills and lead to greater reflection about the nature of effective leadership. Your squad's project will be evaluated by your peers as well as faculty, and the teams who are evaluated most positively will have the opportunity to present to a group of alumni experts. Finally, the quarter culminates with the Executive Challenge. The Executive Challenge will be an opportunity for you to further refine your leadership skills by engaging with alumni judges in role plays that test your ability to lead effectively. The alumni will provide you feedback and evaluate your performance.

**OB 219. Sloan: Organizational Design. 2 Units.**

This course examines fundamental issues of general management and leadership within an organization. You will learn about setting an organization's strategic direction, aligning structure to implement strategy, and leading individuals within the firm. You will study the interplay among formal structure, routines, informal networks, and culture in shaping organizational performance.

**OB 259. Sloan: High Performance Leadership. 4 Units.**

This course asks the question: What does it take to build a high-performance unit? The focus is on middle and upper-middle management in contemporary complex organizations. These are organizations that have complex tasks, exist in a rapidly changing environment, and have highly skilled subordinates. The premise of the course is that traditional methods of management may produce adequate levels of performance but prevent excellence from developing. New approaches to leadership will be presented that are more likely to lead to a truly high-performing system. Time will be spent discussing the components of effective leadership, what a manager can do to build a high-performing department, and what members can do to support the leader who wants to initiate such changes. The first two classes are required. In addition to class, students will meet for 2 1/2 hours each week in a Skill Development Group to apply the course material to their own personal development. (While there is minimal overlap in content between OB 259 and OB 374 and these two classes are highly complimentary, both require Journals and an evening group. We therefore recommend against taking both classes in the same quarter for workload reasons.).

**OB 278. Sloan: Organizational Behavior. 2 Units.**

This course is designed to introduce incoming students to the structures and processes that affect group performance as well as some of the common pitfalls associated with working in teams. Topics include understanding team culture, fostering creativity and coordination, making group decisions, and dealing with a variety of personalities. Students will participate in a number of group exercises designed to illustrate principles of team work and to give students practice diagnosing team problems and taking action to improve team performance.

**OB 289. Sloan: Negotiations. 2 Units.**

This course is designed to improve students' skills in all phases of a negotiation: understanding prescriptive and descriptive negotiation theory as it applies to dyadic and multi-party settings, buyer-seller transactions and the resolution of disputes, to the development of negotiation strategy and the management of integrative and distributive aspects of the negotiation process. This course is based on a series of simulated negotiations in a variety of contexts, including one-on-one, multiparty, and team negotiations. When playing a role in a simulated conflict, you will be free to try out tactics that might feel uncomfortable in a real negotiation. You will get feedback from your classmates about how you come across. In sum, you can use this course to expand your repertoire of conflict management and negotiation skills, to hone those skills, and to become more adept in choosing strategies and tactics that are appropriate for a particular negotiation situation. This course is an intense, more compact version to the elective OB381 and is almost identical to the OB581 immersion course. Thus, students should not take either of these courses as there is considerable overlap among the three. Attendance and participation in the negotiation exercises are mandatory.

**OB 322. Networks. 4 Units.**

This course is designed to improve your effectiveness as a manager by introducing you to both the concepts and tools that are part of the "new science of social networks" as they apply to organizations. In this course, you will develop the skills to understand social networks and recognize social capital, both offline and online, as well as be able to identify key elements of your own and others' social networks that enhance competitive capabilities. Topics to be covered include how social networks affect power and influence, leadership, innovation and the generation of novel ideas, careers, organizational change and competitive advantage. Additional topics to be covered include the increasing importance of online social networks in organizational life and the importance of social cognition and how it can be used to enhance social capital. At the conclusion of this course you will have the skills to map out social networks, diagnose features of the networks that either help or hinder the performance of individuals, groups and companies, and be able to manage important features of social networks in organizations.

**OB 330. Leadership Fellows I. 4 Units.**

The Arbuckle Leadership Fellows Program plays an integral role in the GSB leadership curriculum by bringing together a group of talented second years to support the leadership development of the first-year class. OB330, an 8 unit two-quarter MBA2 elective course, is the academic component of this program and runs the entirety of both Autumn and Winter Quarters. Both quarters must be completed to receive any units of credit. The course is open only to those students who have applied and been accepted into the Fellows Program. Interested students apply during at the start of Winter Quarter of their first year and undergo a competitive application process, after which successful applicants are invited to take part in the program. Informational meetings are held late in Autumn Quarter and in early Winter Quarter and Fellows are selected from the first year class in mid-Winter Quarter. Knowing how to develop others is a crucial leadership competency. In this class, Fellows develop the advanced leadership skills of leading leaders and developing others through coaching and mentoring. Among the competencies developed in this class are: 1) Team Coaching Skills (e.g. facilitating a group, diagnosing group dynamics, debriefing, coaching without undermining the leader), 2) Individual Coaching Skills (e.g. effective inquiry, asking powerful questions, balancing support and challenge, providing effective feedback, holding others accountable, utilizing, valuing and connecting across differences and power differentials, using oneself in service of another's development) and 3) Personal Development Skills (e.g. self-reflection and self-awareness, leveraging strengths, stretching outside one's comfort zone.) In the Autumn Quarter Fellows are assigned to a squad of six MBA1s in Leadership Labs. Fellows guide their MBA1 squad through the learning process in the Labs and provide both individual and team coaching to their MBA1 squad members. In addition to the work with their MBA 1 squad, Fellows provide in-depth 1:1 coaching to three additional MBA1 students who are not members of their squad. This 1:1 coaching begins after Autumn midterms and continues through the end of Winter Quarter. Fellows classes meet twice a week for 105 minutes. There will be a reading list of conceptual material which will be supplemented during class with lectures and discussions. Students will have the opportunity to apply those concepts through role-playing and experiential exercises during class time as well as in their coaching and mentoring of their MBA1 coachees. Additionally, Fellows will attend weekly Leadership Labs with the first year squad to which they have been assigned and meet 1:1 with MBA1 coachees. Fellows meet regularly with five of their peers in "clinics," standing groups led by a GSB Leadership Coaches, professional executive coaches who are a staff members of the school's Center for Leadership Development and Research (CLDR). Fellows meet with their Leadership Coach and clinic approximately every other week during regular class time to discuss specific strategies for working with their first year students. Fellows also periodically meet with their Leadership Coach one-on-one to hone their skills and explore their areas for specific improvement. Note: OB374, Interpersonal Dynamics, is a PRE/CO-REQUISITE for this course; students who want to be Fellows are advised to assess whether that is a class they want to take in the spring quarter of their first year. Additionally, signing up for 1:1 coaching by a Fellow as an admit strengthens a MBA1 student's application to the Arbuckle Leadership Fellows program.

**OB 331. Leadership Fellows II. 4 Units.**

This course is the continuation of Leadership Fellows I, an 8-unit course that begins in Autumn Quarter. During this quarter Fellows will continue to deepen their coaching and mentoring skills, and will focus exclusively on in-depth 1:1 coaching with three MBA1 coachees (who were not members of their MBA1 squad.) Classes and clinics continue as in Autumn Quarter.

**OB 333. Acting with Power. 4 Units.**

The ability to function effectively within a hierarchy is a crucial determinant of managerial success, yet many people struggle with "authority issues" that make certain hierarchical roles and positions difficult for them. This course draws on the craft of acting and the science of psychology to help students learn to use themselves to develop the characters that can play these roles effectively. This class is designed specifically for students who have trouble "playing" authoritative roles: those who find it difficult to act with power, status, and authority. It will also be useful for students who find it difficult to share power and authority, which involves accepting and deferring to the power and authority of others. Participants will be asked to read, think deeply about, and share some of their own feelings about power and authority, and the origins of those feelings. They will also be asked to prepare for and present a series of in-class performances that involve playing characters with and without power, in scenes that highlight the interactions and relationships between high and low power characters. These performances will take up much of our time during class. Out-of-class assignments will include reading important works on psychology, and on the theory and practice of acting, as well as writing short essays analyzing their own and others' performances.

**OB 343. Scaling Change. 4 Units.**

A problem for every manager is to make 'good' behaviors spread quickly and to shrink 'undesirable' behaviors quickly. This course provides you practical frameworks to accomplish these managerial goals. We will examine issues such as scaling Idea generation, scaling knowledge sharing, scaling the adoption of ideas across firms, scaling change in global firms. We will be using a newly written series of cases for this course and also draw on guest speakers. We will be require a project that may involve design thinking - so we encourage those who have not had exposure to design thinking to apply.

**OB 362. Leadership Coaching and Mentoring. 3 Units.**

This two-quarter course is offered for 6 units and runs for the Winter and Spring Quarters. Both quarters must be completed to receive any units of credit. THERE IS BOTH A PREQUALIFICATION AND A PRE/CO-REQUISITE for this course. It is open to a maximum of 24 MBA2s who have passed an assessment of their potential to coach effectively, though they need not have been coached as first years. (The number of students may be increased to 36 if sufficient first-year coachees are identified.) The pre/co-requisite is OB 374-Interpersonal Dynamics. (If taken as a co-requisite, OB 374 must be taken in the winter quarter.) There will be a reading list of conceptual material which will be supplemented during class with lectures and discussions. Students will have the opportunity to apply those concepts through role-playing and exercises during class time. Each MBA2 will be assigned three MBA1s to coach. The MBA2 coaches will meet with their MBA1s five times each quarter (i.e. a total of 10 coaching sessions) in a series of semi-structured coaching activities. In addition, the MBA2 students will meet, in groups of 6, with a Master Coach for a two-hour clinic approximately every other Friday during the Winter Quarter during class time. During Spring Quarter, students will meet every Monday (only) from 3:15 to 5:00 pm (alternating between class and clinics) with two additional Friday classes to be held on Friday, April 1, and Friday, April, 15 from 3:15 to 5:00 pm. Note: Students MUST attend the first class (including waitlisted) or they will be dropped. The drop deadline for this course is Friday, January 7, at 11:59 p.m. (i.e. earlier than standard GSB add/drop deadline).

**OB 363. Leadership Perspectives. 4 Units.**

What does it mean to be a principled leader? What role do values play in an organization, and how do successful leaders apply their values in their daily business lives? This course examines the concept of principled leadership and the various ways that leaders try to institutionalize particular values within the organizations they lead. Equally important, it explores the difficult challenges that leaders sometimes face when trying to apply their principles in a tough, fast-paced business environment, where others may not share the same expectations. Through assigned readings, interactive lectures with visiting executives, and weekly small group discussions, students will learn how practicing leaders implement their principles, while reflecting the realities of different cultural expectations and meeting business demands. The course will provide a forum for students to learn directly from practicing leaders and to think introspectively about their own personal values, leadership styles, and long-term aspirations.

**OB 368. How to Make Ideas Stick. 4 Units.**

Having a good idea is not enough, we must also be able to convey our ideas in a way that people can understand and act on them. But often our messages don't persuade or persist. This course assumes that we can craft more effective messages by understanding the principles that make certain ideas stick in the natural social environment: Urban legends survive in the social marketplace without advertising dollars to support them or PR professionals to spin them. How could we make true or useful information survive as well as bogus rumors? We will use research in sociology, folklore, and psychology to analyze what kinds of ideas survive the selection process in the marketplace of ideas and to develop a set of strategic tools to craft ideas that are more likely to survive. Topics covered include crafting messages for complex information that don't exceed the capacity of human attention and memory, using emotional appeals that inspire people and motivate action, acquiring attention in a crowded environment, and gaining legitimacy for new ideas, approaches, and technologies.

**OB 372. High-Performance Leadership. 4 Units.**

This course asks the question: "What does it take to build high-performance?" The focus is on middle and upper-middle management in contemporary organizations that have complex tasks, exist in a rapidly changing environment, and have highly skilled subordinates. The premise of the course is that traditional methods of management may produce adequate levels of performance but prevent excellence from developing. New approaches to leadership will be presented that are more likely to lead to a truly high-performing system. Time will be spent discussing the components of effective leadership, what a manager can do to build a compelling vision, strong teams, and mutual influence sideways and upwards as well as with direct reports. Also, what members can do to support the leader who wants to initiate such changes. In addition to class, students will meet for 2 1/2 hours each week in a Skill Development Group to apply the course material to their own personal development. (While there is minimal overlap in content between OB 372 and OB 374 and these two classes are highly complementary, both require Journals and an evening group. We recommend against taking both classes in the same quarter for workload reasons.).

**OB 374. Interpersonal Dynamics. 5 Units.**

PRE-QUALIFICATION IS REQUIRED BY THE DEADLINE (APPROXIMATELY TWO WEEKS BEFORE THE QUARTER BEGINS). The focus of this course is to increase one's competencies in building more effective relationships. Learning is primarily through feedback from other group members. This course is very involving and, at times, can be quite emotional. However, this course is not a substitute for therapy; we deal more with inter-personal issues than with intra-personal ones. If you are in therapy, please talk this over with your therapist and get their advice before enrolling in this course. The students are divided into three 12-person T-groups that meet the same evening of the class. It is very important to note that when you decide to take this course, you make an explicit contract to be actively involved. Attendance to the first class is required for the 1-day/week section of this class. Attendance to the first three classes is required for the 2-day/week sections of this class. Failure to attend the first class will result in an automatic drop. Students who are waitlisted must attend either a 1-day/week class or the first two classes of a 2-day/week section to secure a place in the course should space open up. It is the student's responsibility to notify respective OB 374 faculty if your attendance is aimed at fulfilling your waitlist requirement. You also need to inform the faculty member for which specific section you are waitlisted. T-group meetings for all sections will meet for 3 hours the same evening as 1-day/week class and the same evening of the first day of the 2-day/week section. The class has a weekend retreat the seventh or eighth week (check your specific section) of the course. Because of the highly interactive nature of this course, it is very important that all students attend all sessions. Missing class, class-t-group, evening T-group, or portions of the weekend will negatively influence your grade and may result in a student's grade being dropped one grade level (for each absence). Arriving late on Friday or the weekend will negatively influence your grade level- missing any more of the weekend beyond that will result in a U. Students must pre-qualify before taking this course. Qualification essays are due 10 days before the first day of the class. More information about the qualification process can be found at [http://faculty-gsb2.stanford.edu/OB\\_374\\_Qualification/default.asp](http://faculty-gsb2.stanford.edu/OB_374_Qualification/default.asp).

**OB 377. The Paths to Power. 4 Units.**

Power and influence processes are ubiquitous and important in organizations, so leaders need to be able both to understand power and to act on that knowledge. This course has three objectives: 1) increasing students' ability to diagnose and analyze power and politics in organizational situations; 2) increase students' skills in exercising power effectively; and 3) helping students come to terms with the inherent dilemmas and choices, and their own ambivalence, involved in developing and exercising influence. Topics covered include: the sources of power, including individual attributes and structural position; dealing with resistance and conflict; obtaining allies and supporters; maintaining power; how and why power is lost; living in the limelight--the price of having power; preparing oneself to obtain power; and the use of language and symbolism in exercising power. The class involves a reasonably large number of written, self-reflective assignments as well as a group project (doing a power diagnosis on an external subject) and an individual project (using the class material during the quarter to gain power in some group or organization or develop a plan for doing so). The emphasis is on both learning the material and incorporating it into one's own actions and plans.

**OB 381. Conflict Management and Negotiation. 3 Units.**

Conflict is unavoidable in every organization. The key question is how it will be handled: will it escalate to dysfunctional levels or will it be effectively managed? Hence, a first aim of the course is to develop your ability to analyze conflicts, to look beneath the surface rhetoric of a conflict, to isolate the important underlying interests, and to determine what sort of agreement (if any) is feasible. We'll analyze which negotiation strategies are effective in different conflicts. We'll also examine psychological and structural factors that create conflict and often pose a barrier to its resolution. But understanding how to analyze a conflict is not enough. To manage conflict effectively, you need a broad repertoire of behavioral skills. Developing these is the second aim of the course. To achieve this, negotiation exercises are used in every session. When playing a role in a simulated conflict, you will be free to try out tactics that might feel uncomfortable in a real one. You will get feedback from your classmates about how you come across. In sum, you can use this course to expand your repertoire of skills, to hone your skills, and to become more adept in choosing when to apply each skill.

**OB 383. Lives of Consequence: How Individuals Discover Paths to Meaningful Engagement. 4 Units.**

This Bass Seminar will examine the lives of extra-ordinary individuals who have made exceptional contributions to society, either through their impact on business, politics, science, social activism, or the arts. We will take a close look, for example, at creative individuals such as Steve Jobs, George Lucas, and Pixar's Brad Bird; political achievers such as Robert F. Kennedy, Martin Luther King and Margaret Thatcher; business leaders such as Bill and Melinda Gates, Whole Foods CEO John Mackey, and Starbuck's Howard Schultz (to name just a few). We will use these examples to develop useful ideas about the narrative unfolding of creative and extra-ordinary lives. In addition, using theories and evidence from the social and behavioral sciences, we will develop a conceptual framework for thinking about individuals' "paths to extra-ordinary achievement." Drawing on psychological and philosophical theory and research, we will also examine how human achievement relates to happiness and the perception of meaning in one's life. You will have a chance to work in small groups to study individuals or domains of special interest. Students will also have an opportunity to apply the framework to their own lives using a series of enjoyable reflective exercises, including writing and public speaking exercises. The seminar will be very discussion oriented and quite lively. The goal of the seminar is to change how you think about your self and your life!

**OB 385. Leading Social Change: Educational and Social Entrepreneurship. 4 Units.**

(Same as OB 385) The course provides an overview of different approaches to leading change in the social sector, drawing primarily, but not exclusively, on case examples in education. While there is a substantial need for innovation and visionary leadership in sectors such as education, social entrepreneurs who want to drive change must appreciate the significant barriers and unique opportunities presented by non-market forces in these sectors. The course will equip students with an appreciation for different mechanisms of change and theories of action as well as some of the challenges of initiating and sustaining meaningful change in social sectors such as education. The course will draw on readings and case studies, and we will benefit from the wisdom of an inspirational group of guest lecturers. While the course will benefit any student concerned with making a positive impact in the world, it is particularly (although not exclusively) appropriate for students in the joint MA/MBA program as well as those who will lead social change through nonprofit consulting or entrepreneurship. Same as: EDUC 321X.

**OB 387. Women and Men in Management. 4 Units.**

The objective of this course is to examine the ways in which gender impacts the work experiences of both men and women. The course focuses on the working experience of men and women in managerial and professional positions in businesses and some non-profit organizations. We will examine a wide variety of career-related gender issues including the effects of proportions of men and women in a job on the experiences of men and women, whether and how men and women's networks differ, the various causes of the gender gap in pay and promotions, and the multiple issues related to juggling the demands of work and family and how this impacts both men and women. The goal of this course is to raise awareness of the reasons for gender differences in the workplace and to suggest some ways to change these differences. This course will use a variety of teaching mechanisms including, but not limited to, business cases, scholarly articles, videos, lectures, and class discussions.

**OB 388. Leadership in the Entertainment Industry. 3 Units.**

The entertainment industry is one of the largest and most important industries in the world. It is an industry characterized by tremendous opportunities and great uncertainties. The industry is currently undergoing tremendous change as new technologies transform the way entertainment is produced and disseminated throughout the world. For all of these reasons, the dynamic industry creates tremendous challenges for entrepreneurial students interested in leaving an artistic or creative imprint on the world. This course is designed to help prepare students for careers in the media industries, and to explore leadership within them. The industry is truly an intersection of art and commerce, and a major portion of the course will involve bringing to the class leaders who represent key areas of the entertainment industry, both on the business and creative sides. As with any business, the entertainment industry is driven by the vision of its leaders. These leaders daily make financial and artistic decisions, and manage staff and productions with the goal of producing entertainment product meant to be seen as widely as possible, and meant to make a profit. It is hoped that through interaction with these speakers, students taking this course will gain a greater understanding of the industry and what it takes to succeed in it. Further, the students will see the potential of strong leadership and how it works to advance entertainment companies and the films and TV programming they produce. Topics to be examined include the process of project development, production, and marketing; emerging technologies and their impact on the industry; the roles studio and network executives, directors, film and television producers, writers, actors, agents, and others play in the making and distribution of film and television productions.

**OB 392. Leadership Coaching and Mentoring II. 3 Units.**

This course is the continuation of a 6 unit course that runs for the Winter and Spring Quarters. Classes/clinics meet 10 times in the spring. It is open to up to 24 MBA2 students who have been selected on the basis of their having passed a screening to assess their potential to coach effectively. They also need to have taken OB 374 - Interpersonal Dynamics or will take OB 374 in the Autumn or Winter. There will be a reading list. That conceptual material will be supplemented during class time with lectures and discussions. Students will have the opportunity to apply those concepts through role-plays and exercises during class time. Each second-year student will be assigned three first-year students. The second-year coaches will meet with their coaches 5 times each quarter in a series of semi-structured coaching activities. In the spring there will be two mandatory Friday sessions, on April 1 and April 15 in addition to Monday afternoon classes.

**OB 393. Leadership in Diverse Organizations. 4 Units.**

How improve capacity to exercise leadership and work effectively with others within the context of culturally diverse groups and organizations. Premise is that diversity presents challenges and opportunities that push students to develop leadership skills relevant across a variety of situations. What social and psychological obstacles limit people's ability to work effectively across identity-based differences? What can people do to build the relational and organizational capacity to enable these differences to be a resource for learning and effectiveness within teams and organizations? Focus is on dynamics of race and gender; attention to other dimensions of identity and difference in organizations, including sexual orientation, nationality, class, and religion.

**OB 541. How to Change Things When Change is Hard. 2 Units.**

This course will explore case studies and research about how to create behavior change from a position without much formal authority or power: e.g., a middle manager trying to change a failing unit of a big firm or a social entrepreneur trying to influence the behavior of a community. We'll use principles from social psychology, clinical psychology, and behavioral economics to analyze cases like the following: How a new head of the equities research department at Lehman Brothers changed his group's ranking in the Institutional Investor polls from #15 to #1 over a four year period. How Teach for America teachers take unmotivated kids in neglected schools and manage on standardized tests to gain more than two year's progress in one year of schooling. How a clever application of behavioral economics managed to triple employee savings rates.

**OB 543. Scaling Change. 2 Units.**

A problem for every manager is to make 'good' behaviors spread quickly and to shrink 'undesirable' behaviors quickly. This course provides you practical frameworks to accomplish these managerial goals. We will examine issues such as scaling Idea generation, scaling knowledge sharing, scaling the adoption of ideas across firms, scaling change in global firms. We will be using a newly written series of cases for this course and also draw on guest speakers.

**OB 552. The Quest for Happiness: Exploring the Psychology of Human Fulfillment. 2 Units.**

In this seminar, we will explore the nature of human happiness. We will examine recent theories and new evidence from psychological research indicating who among us is likely to achieve deep and enduring happiness and why. We also will review what we know about the determinants of happiness throughout the lifespan. We will discuss how happiness is created and sustained, even in the face of adversity and tragedy. We will describe the "geography" of happiness, examining different cultural conceptions of happiness and variations in the distribution of happiness around the globe. We will also discuss some prevalent misconceptions regarding the antecedents of human happiness—why so many people, in short, stumble in their quest for happiness. We will explore how leaders can use happiness research to create more satisfying work places. To illustrate these ideas, we will examine in detail a number of fascinating individuals, including Bill Gates, Warren Buffet, Oprah Winfrey, venture capitalist Tom Perkins, Steven Spielberg, Martha Stewart, and the Nobel physicist Richard Feynman. Students will also work, either individually or in small self-selected teams, on a case study of an individual or organization they find interesting. There will also be several reflective exercises designed to probe students' self-conceptions regarding their own happiness. This seminar will be very discussion-oriented and our time will be spent engaging in lively, provocative debate of controversial ideas and evidence about happiness.

**OB 568. How to Make Ideas Stick. 2 Units.**

This class will explore the properties shared by ideas that stick with people and change the way they think and act. The course is based on the framework in the book *Made to Stick* and focuses on hands-on exercises that will teach you how to transform your messages to make them stick: How do you get attention for your idea in a crowded marketplace of ideas? How can you convey complex information quickly? How do you make a broad, abstract idea concrete and tangible enough for people to understand? How do you provide credibility for your idea without resorting to dry statistics? Although the exercises in this course are fun and generally short, students in the past have said that they do require a lot of thinking time outside of class in order to apply the course principles to a specific message. This is particularly true of the final project which involves improving the message of a specific live client (e.g., a friend with a start-up business, the recruiting materials of a former employer). This course will be especially useful for entrepreneurs who must pitch their ideas to customers, investors, and potential employees and for students in the nonprofit sector where resources for spreading ideas are often thin.

**OB 571. Diversity, Dynamics, and Influence. 2 Units.**

The course is based on the premise that diversity can present unique challenges and opportunities thereby compelling students to expand their sensitivity and develop a wider repertoire of skills, many of which are relevant across a variety of situations. The course is intended for students who plan to work in culturally diverse groups or organizations and will be equally relevant to those who work in the not-for-profit, public, and for-profit sectors. Through the presentation of new concepts, participation in experiential group activities, and faculty facilitated debriefing, students are expected to improve their ability to better assess group level diversity dynamics and in turn both intentionally influence and to be influenced inclusive of three fundamental differences presented by peers - values, gender, and group identity. Students will be taught how to practice 'authentic discourse' during regular faculty facilitated small task group debriefings. 'Authentic discourse' is a skill stressed in Interpersonal Dynamics (OB374).

**OB 572. High Performance Leadership for Family Business Leaders. 2 Units.**

This course examines the unique leadership problems faced in family businesses. What is unique is that there are two over-lapping systems; the family system and the business system. These can be congruent or at cross-purposes. For example, the latter might stress promotion on merit while the other values family ties. There also can be difference in purpose. Is the organization to maximize shareholder value or to provide employment for family members? These and other related issues impact the communication process, how decisions are made and how power is distributed. The course will be case based. The content will overlap that of OB372 so it is not advised to take both courses. Because of the shortened nature of 572, there would be minimal overlap with OB374 Interpersonal Dynamics. In addition to class, students will meet for 1 1/2 hours each week in a Skill Development Group to apply the course material to their own personal development.

**OB 574. Interpersonal Dynamics at Work. 2 Units.**

This course is open to students who have taken OB 374 Interpersonal Dynamics or GSBGEN 374 Interpersonal Influence and Leadership. The objectives of OB 574 is to take what was learned in the introductory Interpersonal Dynamics course further with a specific emphasis on how those approaches are applicable in a work setting. Specifically how issues of fuller self-expression/disclosure, feedback, resolution of interpersonal difficulties and building effective relationships can apply to working with peers and one's manager as well as in a team setting. The course will meet Thursdays 3:15-5:00 for five sessions starting April 2nd and running until April 30th. The T-groups will meet that evening, 7:00-9:30. In addition, there will be one all-day meeting (instead of a weekend), Saturday, April 4th running from 9:00 a.m. to 9:30 p.m. Attendance in all class sessions, evening meetings, and the Saturday retreat is required. Any absence will result in lowering of the grade. In addition to a modest amount of reading, students will keep an on-going self-diagnostic log. One-third of the grade will be on the log and the remaining 2/3 on the extent of participation in class, risk-taking in the group, and helping building learning conditions for self and others.

**OB 581. Negotiations. 2 Units.**

This course is designed to improve students' skills in all phases of a negotiation: understanding prescriptive and descriptive negotiation theory as it applies to dyadic and multiparty negotiations, to buyer-seller transactions and the resolution of disputes, to the development of negotiation strategy and to the management of integrative and distributive aspects of the negotiation process. The course is based on a series of simulated negotiations in a variety of contexts including one-on-one, multi-party, and team negotiations. When playing a role in a simulated conflict, you will be free to try out tactics that might feel uncomfortable in a real one. You will get feedback from your classmates about how you come across. You will have an opportunity to reflect on your experience in your negotiation paper. In sum, you can use this course to expand your repertoire of conflict management and negotiation skills, to hone your skills, and to become more adept in choosing when to apply each skill. This course represents a shorter, more intense version of OB 381-Conflict Management and Negotiations. Students should not take both courses, as there is considerable overlap in course content. Attendance and participation in the negotiation exercises is mandatory.

**OB 582. Leading Social Change: Educational and Social Entrepreneurship. 2 Units.**

The course provides an overview of different approaches to change, drawing primarily on entrepreneurial initiatives in education. The course will equip students with an appreciation for different mechanisms of change as well as some of the challenges of initiating and sustaining change in social sectors such as education. The course will draw on readings and case studies, and we will benefit from the wisdom of an inspirational group of guest lecturers. While the course will benefit any student concerned with making a positive impact, it is particularly appropriate for students in the joint MA/MBA program as well as those who will lead social change through nonprofit consulting or entrepreneurship.

**OB 586. Organizational Learning. 2 Units.**

This is a course about how firms learn from their experiences and the opportunities created by flawed learning. It will explore common mistakes in learning and barriers to the adoption of effective practices. Understanding learning problems will help future managers avoid common mistakes and build organizations that learn more effectively; learning is particularly important for entrepreneurs who are trying out new ideas and so must adapt correctly to feedback from the environment. But understanding common mistakes is also useful for identifying possible opportunities in markets; opportunities exist when firms make mistakes and when they fail to learn effective practices. The course will introduce concepts and findings from organization theory, psychology, decision theory, and statistics. A variety of exercises, cases, and readings will be used to illustrate barriers to learning and the opportunities they create, including the book "Moneyball" by Michael Lewis which discusses market-level mistakes in professional baseball.

**OB 591. Advanced Negotiation. 1 Unitss.**

This course is designed for individuals who have taken one of the basic negotiation courses (OB 381 or OB 581) and are interested in honing their negotiation and conflict management skills and expanding their knowledge about bargaining and dispute resolution. To dig deeper into the minds of negotiators, we will use analyses of in-class exercises and in-depth discussions of new and exciting research findings. Thus, we will play strategic games and negotiate in all our meetings, but we will also read and discuss theory and research on bargaining. So, if you enjoy negotiating, you will enjoy the classes. At the same time, if you enjoy analyzing human behavior and social interactions, you will like the reading and our discussions. We will start off the class by launching a week-long entrepreneurial negotiation assignment that will allow you to test your bargaining skills outside of class. Our in-class exercises and in-depth discussions will subsequently tackle critical issues in negotiation, including the role of power and norms in negotiation; cross-cultural negotiations; accountability, emotions, and information processing in negotiation; and creativity in negotiation. After taking this course, you will: (a) be better able to identify and avoid common traps in negotiation; (b) have a larger repertoire of behavioral skills to apply in various negotiations; and (c) have a deeper understanding of other people's behavior in negotiation.

**OB 593. Leadership in Diverse Organizations. 2 Units.**

This course is designed to help students improve their capacity to exercise leadership and work effectively with others within the context of culturally diverse groups and organizations. The course is based on the premise that diversity can present unique challenges and opportunities and thereby pushes students to develop crucial leadership skills, many of which are relevant across a variety of situations. The class will address two primary questions: 1) What social and psychological obstacles limit people's ability to work effectively across identity-based differences? 2) What can you do to create contexts that enable differences to be used as a resource for learning and effectiveness within teams and organizations? Students should be prepared to experiment with various conceptual and analytic skills inside and outside of the classroom. While the course focuses on dynamics of race and gender, there will be opportunities for students to explore a variety of other dimensions of identity and difference in organizations, including (but not limited to) sexual orientation, nationality, class, and religion. The course is intended for students who expect to work in culturally diverse groups or organizations and will be equally relevant to those who plan to work in the not-for-profit, public, and for-profit sectors. The course is cross listed in the School of Education.

**OB 601. Organizational Ecology. 4 Units.**

This seminar examines theoretical and methodological issues in the study of the ecology of organizations. Particular attention is given to the dynamics that characterize the interface between organizational populations and their audiences.

Same as: SOC 366A.



**OB 622. Topics in Social Network Analysis: Structure and Dynamics. 3 Units.**

This course provides coverage of both introductory and intermediate topics in social network analysis with a primary focus on recent developments in theory, methods and substantive applications. We will begin the course with a brief overview of introductory themes and concepts from various disciplines that have contributed to social network theory, including sociology, anthropology, social psychology, and organizations. Introductory topics to be included: centrality, cliques, structural and regular equivalence and cognitive social structures. The primary topics to be covered in this course include the application of network theory to the study of careers, competition, innovation, inequality/stratification, and recent research on IT mediated networks, as well as an examination of network formation and dynamics. The course will also provide hands-on experience applying social network methods in empirical research. Students will have an opportunity to learn some modern network analysis methods and apply them to network data using the R programming language. No prior experience with social network analysis or software is required.

**OB 625. Economic Development and Economic Sociology. 4 Units.**

As a field, economic sociology has had little to say about economic development. Much of this quietude stems from the latter's identification with "backward," "poor" or "developing" economies, and the former's interest in many of the advanced features of the richer economies. This state of affairs not only sets up a false dichotomy but also makes it difficult by construction to theorize or research the issue of economic decline, seemingly a necessary piece of any coherent theory of development. The (admittedly ambitious) goal of this seminar is to move toward a better theory of economic development. We will review several of the more common strands of thought on development in related literatures and then consider some alternative perspectives that might bridge this research and contemporary sociology. No guarantees are made that we will have a full-fledged theory by the end of the quarter, but with luck we will have breathed some new life into an often marginalized but critically important strain of social thought and research. The class will be a seminar based around the readings. Grading will be a combination of class participation, a take-home midterm and a final paper.

**OB 630. Social Norms. 4 Units.**

This course covers research and theory on the origins and function of social norms. Topics include the estimation of public opinion, the function of norms as ideals and standards of judgment, and the impact of norms on collective and individual behavior. In addition to acquainting students with the various forms and functions of social norms the course will provide students with experience in identifying and formulating tractable research questions.

Same as: PSYCH 223.

**OB 635. Social Movements and Organizations. 4 Units.**

This research seminar is intended for students seeking to learn more about how collective action underpins institutional change in organizations and industries, and how the success of collective action, in turn, hinges on organizational structures and processes to recruit and mobilize individuals. The purpose of this course is to provide you a roadmap for you to roam the terrain of movements and organizations, and be prepared to generate original research ideas that extend inquiry in your chosen area of research.

**OB 652. Statistical Methods for Behavioral and Social Sciences. 3 Units.**

For students who seek experience and advanced training in empirical research methods. Analysis of experimental data through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables. Integrated with the use of the statistical computing package R. Prerequisite: An intro stats class (Same as Psych 252 -- Co-taught with Ewart Thomas).

**OB 670. Designing Social Research. 3 Units.**

This is a course in the design of social research, with a particular emphasis on research field (i.e., non-laboratory) settings. As such, the course is a forum for discussing and developing an understanding of the different strategies social theorists employ to explain social processes, develop theories, and make these theories as believable as possible. In general, these issues will be discussed in the context of sociological research on organizations, but this will not be the exclusive focus of the course. A range of topics will be covered, for example: formulating and motivating research questions; varieties of explanation; experimental and quasi-experimental methods, including natural experiments; counterfactual models; conceptualization and measurement; sampling and case selection; qualitative and quantitative approaches. This course is particularly oriented toward developing an appreciation of the tradeoffs of different approaches. It is well suited to Ph.D. students working on qualifying papers and dissertation proposals.

**OB 671. Social Psychology of Organizations. 3 Units.**

This seminar focuses on social psychological theories and research relevant to organizational behavior. It reviews the current research topics in micro-organizational behavior, linking these to foundations in cognitive and social psychology and sociology. Topics include models of attribution, decision making, emotion, coordination, influence and persuasion, and the psychology of power and culture. Prerequisites: Enrollment in a PhD program, and a graduate-level social psychology course. Also listed as Sociology 361.

**OB 672. Organization and Environment. 3 Units.**

This seminar considers the leading sociological approaches to analyzing relations of organizations and environments, with a special emphasis on dynamics. Attention is given to theoretical formulations, research designs, and results of empirical studies. Prerequisite: Enrollment in a PhD program. Also listed as Sociology 362.

**OB 673. Perspectives on the Social Psychology of Organizations. 3 Units.**

This seminar focuses on topics relevant to organizational behavior, drawing primarily on social psychological and some sociological research. Topics vary from year to year. In Spring 2013 the seminar will focus on conflict and cooperation within and between groups and teams. Topics will include interdependence theory, behavioral game theory, negotiation, task and relationship conflict, social identity processes, and hierarchy in groups, among others. Prerequisites: Enrollment in a PhD Program. Cannot be audited or taken pass/fail.

**OB 674. Perspectives on Organization and Environment: Social Movement Organizations and Environments. 3 Units.**

This course examines the interaction between organizations and their environments. It is given every year by a different faculty member. What follows is the description of the course for the academic year 2012-13: This research seminar explores recent theory and research on social movement organizations and their environments. We'll consider the way in which organizational theories help us to explain social movement phenomena, and the way in which social movement theories help us to explain organizational phenomena.

**OB 675. Micro Research Methods. 3 Units.**

The purpose of this course is to develop students' skill at designing, executing, interpreting, and describing micro-organizational and social psychological research. The course will have a practical focus and will focus on questions such as how to identify and formulate a tractable research question, how to decide on an appropriate research design and strategy; how to operationalize independent and dependent variables, and how to build a research paper.

**OB 676. Social and Political Process in Organizations. 4 Units.**

Social psychological and sociological research at the meso, or intermediate between micro and macro, level of analysis. Topics vary from year to year, but usually include organizational routines and learning; mobility and attainment processes; gender and race inequality and discrimination; social networks; cultural perspectives on organizations, and related topics. Prerequisite: Ph.D. student.

**OB 678. The Design and Process of Experimental Research. 2 Units.**

This year-long course takes a hands-on approach to learning about experimental research. It will cover the entire process of experimental research from idea and hypothesis generation to study design, analysis, and publication. The topical content will be customized to the specific interests of the enrolled students, but generally will be concerned with questions about behavioral phenomena in organizational contexts.

**OB 683. Models of Social Dynamics. 4 Units.**

This seminar provides an introduction to several important theoretical and formal models in sociology, psychology, and organization theory. The purpose is, in part, to provide an overview of commonly used models. More important, participants will learn to read, criticize, and formulate models for their own research questions. The focus is on model development, deriving implications from models, comparing models, but also on how models can be and have been tested. Topics include models of size distributions, network evolution, contagion, group formation, conceptual structures, decision making, and learning.

**OB 690. Organizations in Competition. 3 Units.**

When organizations compete, why do some fail while others succeed? This is one of the defining questions of the interdisciplinary research field known as "strategic management." In this seminar, we will address this question from a sociological perspective. Seen from this vantage point, the field of strategic management can be understood as the study of organizations in competition. Over the past 30 years, a considerable amount of research in organizational sociology has addressed this topic, only some of which has been explicitly framed as being aimed at the field of strategic management. This course studies the central themes that have emerged from this sociological research on organizations in competition.

**OB 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, HRMGT 691, MGTECON 691, MKTG 691, OIT 691, POLECON 691, STRAMGT 691.

**OB 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, HRMGT 692, MGTECON 692, MKTG 692, OIT 692, POLECON 692, STRAMGT 692.

**OB 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, HRMGT 802, MGTECON 802, MKTG 802, OIT 802, POLECON 802, STRAMGT 802.

## Orthopedic Surgery Courses

**ORTHO 97Q. Sport, Exercise, and Health: Exploring Sports Medicine. 3 Units.**

Preference to sophomores. Sports medicine is the practice of clinical medicine at the interface between health and performance, competition and well-being. While sports medicine had its origins in providing care to athletes, medical advances developed in care of athletes exerted a great effect on the nature and quality of care to the broader community. Topics include sports injuries, medical conditions associated with sport and exercise, ethics, coaching, women's issues, fitness and health, and sports science. Case studies.

Same as: HUMBIO 97Q.

**ORTHO 102. Orthopaedic Surgical Anatomy. 2 Units.**

Open to medical, graduate and undergraduate students. Opportunity to enhance knowledge of anatomy as it pertains to the practice of Orthopaedic Surgery and to improve dissection skills. Follows the surgical anatomy syllabus used by the Stanford Orthopaedic Surgery Residency Program. Sessions led by Stanford Orthopaedic Surgery attendings and residents. Didactic sessions, prosection review, dissection.

Same as: ORTHO 202.

**ORTHO 110. Practical Sports Medicine and Orthopaedic Exam. 1-2 Units.**

Designed for students considering a career in sports medicine, orthopaedics, physical medicine and rehabilitation, emergency medicine, internal medicine, family practice, or physical therapy. Focus is on diagnosis and treatment of the most common injuries encountered in sports medicine, from head to toe and from acute trauma to chronic overuse. Students gain competence performing an efficient sports medicine exam, developing a differential diagnosis, and a treatment plan on how to safely return athletes back to their sport. Focused physical exam skills are taught for the neck, shoulder, elbow, wrist and hand, low back, hip, knee, leg, ankle and foot. Most sessions consist of anatomy review, case discussion, and hands-on exam practice in small groups. A few sessions cover specific hot topics in sports medicine such as concussion, athletic heart syndrome, and advanced performance techniques. Registration for 2 units (preferred) requires an additional in-class presentation or short review paper.

Same as: ORTHO 210.

**ORTHO 120. Introduction to Lifestyle Medicine. 1 Unitss.**

Lifestyle medicine is an exciting new movement to empower practicing clinicians and aspiring physicians to facilitate behavioral change and promote a culture of health and wellness in patients. Focus is on both concrete, evidence-based findings and tangible, practical tools to readily translate into everyday clinical practice. A series of leading experts and guest lectures guide students through interactive, patient-focused activities in topics including, but not limited to: nutrition, exercise, sleep, motivational interviewing, meditation, and acupuncture.

Same as: ORTHO 220.

**ORTHO 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**ORTHO 201. Musculoskeletal Exam Practicum. 1 Unitss.**

Student initiated course. Opportunity to enhance knowledge and skills for conducting musculoskeletal exams. Sessions led by Stanford Orthopaedic Surgery attendings and residents. Didactic introductions followed by hands-on practice of specific aspects of the musculoskeletal exam.

**ORTHO 202. Orthopaedic Surgical Anatomy. 2 Units.**

Open to medical, graduate and undergraduate students. Opportunity to enhance knowledge of anatomy as it pertains to the practice of Orthopaedic Surgery and to improve dissection skills. Follows the surgical anatomy syllabus used by the Stanford Orthopaedic Surgery Residency Program. Sessions led by Stanford Orthopaedic Surgery attendings and residents. Didactic sessions, prosection review, dissection. Same as: ORTHO 102.

**ORTHO 210. Practical Sports Medicine and Orthopaedic Exam. 1-2 Units.**

Designed for students considering a career in sports medicine, orthopaedics, physical medicine and rehabilitation, emergency medicine, internal medicine, family practice, or physical therapy. Focus is on diagnosis and treatment of the most common injuries encountered in sports medicine, from head to toe and from acute trauma to chronic overuse. Students gain competence performing an efficient sports medicine exam, developing a differential diagnosis, and a treatment plan on how to safely return athletes back to their sport. Focused physical exam skills are taught for the neck, shoulder, elbow, wrist and hand, low back, hip, knee, leg, ankle and foot. Most sessions consist of anatomy review, case discussion, and hands-on exam practice in small groups. A few sessions cover specific hot topics in sports medicine such as concussion, athletic heart syndrome, and advanced performance techniques. Registration for 2 units (preferred) requires an additional in-class presentation or short review paper. Same as: ORTHO 110.

**ORTHO 220. Introduction to Lifestyle Medicine. 1 Unitss.**

Lifestyle medicine is an exciting new movement to empower practicing clinicians and aspiring physicians to facilitate behavioral change and promote a culture of health and wellness in patients. Focus is on both concrete, evidence-based findings and tangible, practical tools to readily translate into everyday clinical practice. A series of leading experts and guest lectures guide students through interactive, patient-focused activities in topics including, but not limited to: nutrition, exercise, sleep, motivational interviewing, meditation, and acupuncture. Same as: ORTHO 120.

**ORTHO 260. Tissue Engineering. 3 Units.**

Principles of tissue engineering and design strategies for practical applications for tissue repair. Topics include tissue components and dynamics, morphogenesis, stem cells, cellular fate processes, cell and tissue characterization, controlled drug and gene delivery, bioreactors, cell-materials interactions, and host integration. Present research proposal to solve a real life tissue engineering problem. Same as: BIOE 260.

**ORTHO 270. Orthopaedic Tissue Engineering. 3 Units.**

Biological principles underlying the use of engineering strategies and biocompatible materials for tissue repair and regeneration. Structure, physiology, and mechanics of articular cartilage, bone, and dense soft connective tissues. Current ideas, approaches, and applications being implemented as therapeutic regimens for arthritis, spinal deformities, and limb salvage. Multidisciplinary constraints on the design and creation of tissue constructs. Prerequisite: familiarity with basic cell and molecular mechanisms underlying tissue differentiation.

**ORTHO 280. Early Clinical Experience in Orthopedic Surgery. 1-2 Units.**

Provides an observational experience in a surgical specialty. Prerequisite: consent of instructor.

**ORTHO 299. Directed Reading in Orthopedic Surgery. 1-18 Units.**

Consists of studies in progress including circulatory problems; hemostatic disorders; homotransplantation; orthopedic pathology; bone growth; radiation injury; immunology; bacteriology; nasal function; muscular and nerve disorders and their effect on function, hand kinetics and hand function. Prerequisite: consent of instructor.

**ORTHO 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**ORTHO 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Otolaryngology Courses

**OTOHNS 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**OTOHNS 200. Introduction to Otolaryngology-Head and Neck Surgery. 1 Unitss.**

Seminar series designed to expose students to the field, including its subspecialties and commonly performed procedures. Goals: supplement anatomical knowledge with clinical correlates; understand basic diagnosis, pathophysiology, and management of ENT problems commonly seen in primary care practice; how to perform a thorough head and neck examination. Seminars, given by faculty experts, cover major topics relating to each of the subdivisions within ENT. May be repeated for credit.

**OTOHNS 299. Directed Reading in Otolaryngology. 1-18 Units.**

Prerequisite: consent of instructor.

**OTOHNS 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**OTOHNS 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Overseas Studies General Courses

### Overseas Studies in Australia Courses

**OSPAUSTL 10. Coral Reef Ecosystems. 3 Units.**

Key organisms and processes, and the complexity of coral reef ecosystems. Students explore the Great Barrier Reef from the southern end which demonstrates the physical factors that limit coral reefs, to the northern reef systems which demonstrate key aspects of these high biodiversity ecosystems. Human-related changes. Emphasis is on research experiences and development of analytical skills. Two units only counted for the Biology major.

**OSPAUSTL 25. Freshwater Systems. 3 Units.**

Integrated water resource management and how this applies across the globe, comparing strategies and results in the developing and more developing world. Ethics, values and politics of water and the management of extremes such as drought and flood. Ecology and hydrology in an urban context, along with important current issues such as stormwater and water sensitive urban design. Construction of a well, a water tank, and a pit latrine. Community service working with a local catchment management group on riparian and wetland restoration work. Field work complements lectures.

**OSPAUSTL 30. Coastal Forest Ecosystems. 3 Units.**

Prehistory of Australian rainforest and how rainforest structure and biodiversity change with altitude, latitude, and geology. Tropical coastal marine wetlands, mangrove forests, and the relationship between land- and sea-based biota. Biology and ecology of marine plants, mangroves, and tropical salt marsh. Introduction to specialized fields of marine plant biology and ecology including biogeography and evolution, aquatic plant ecophysiology, water quality and bioindicator techniques, pollution and eutrophication, and environmental control of marine plant distribution and productivity. Two units only counted for the Biology major.

**OSPAUSTL 40. Australian Studies. 3 Units.**

Introduction to Australian society, history, culture, politics, and identity. Social and cultural framework and working understanding of Australia in relationship to the focus on coastal environment in other program courses. Field trips.

**OSPAUSTL 50. Targeted Research Project. 4 Units.**

Prior to arriving in Australia, students establish a link with University of Queensland faculty to develop project ideas that combine personal interests and career goals with opportunities presented by the Australian Coastal Studies program, such as how mangrove roots find sediment rich zones of the shore, or the dynamics of ecotourism in southern and northern coastal Queensland. Project report and presentation in Australia.

## Overseas Studies in Barcelona Courses

**OSPBARCL 101. Language and Culture in Catalonia. 4 Units.**

Preparation for students to function in the academic and social environment of Barcelona. Basic listening, reading, and comprehension in Catalan; review of Spanish with focus on writing academic papers and listening to lectures. Introduction to Barcelona with emphasis on contemporary history, culture, and politics. Bilingualism; multiculturalism; varieties of nationalism and globalization in context of Barcelona.

**OSPBARCL 113. Learning From Barcelona: Architecture through History. 5 Units.****OSPBARCL 122. Writing on Barcelona: History and Culture of the City. 5 Units.****OSPBARCL 140A. Universitat de Barcelona: Humanities 1. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 140B. Universitat de Barcelona: Humanities 2. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 140C. Universitat de Barcelona: Humanities 3. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 142A. Universitat de Barcelona: Social Science 1. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 142B. Universitat de Barcelona: Social Science 2. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 142C. Universitat de Barcelona: Social Science 3. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 144A. Universitat de Barcelona: Natural Science 1. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 144B. Universitat de Barcelona: Natural Science 2. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 144C. Universitat de Barcelona: Natural Science 3. 5 Units.**

Student selection from course catalog of Universitat de Barcelona.

**OSPBARCL 146A. Universitat de Barcelona: Engineering 1. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 146B. Universitat de Barcelona: Engineering 2. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 146C. Universitat de Barcelona: Engineering 3. 5 Units.**  
Student selection from course catalog of Universitat de Barcelona.**OSPBARCL 150A. Universitat Autònoma de Barcelona: Humanities 1. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 150B. Universitat Autònoma de Barcelona: Humanities 2. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 150C. Universitat Autònoma de Barcelona: Humanities 3. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 150D. Universitat Autònoma de Barcelona: Humanities 4. 10 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 152A. Universitat Autònoma de Barcelona: Social Science 1. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 152B. Universitat Autònoma de Barcelona: Social Science 2. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 152C. Universitat Autònoma de Barcelona: Social Science 3. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 154A. Universitat Autònoma de Barcelona: Natural Science 1. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 154B. Universitat Autònoma de Barcelona: Natural Science 2. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 154C. Universitat Autònoma de Barcelona: Natural Science 3. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.**OSPBARCL 156A. Universitat Autònoma de Barcelona: Engineering 1. 5 Units.**  
Student selection from course catalog of Universitat Autònoma de Barcelona.

**OSPBARCL 156B. Universitat Autònoma de Barcelona: Engineering 2. 5 Units.**

Student selection from course catalog of Universitat Autònoma de Barcelona.

**OSPBARCL 156C. Universitat Autònoma de Barcelona: Engineering 3. 5 Units.**

Student selection from course catalog of Universitat Autònoma de Barcelona.

**OSPBARCL 160A. Universitat Pompeu Fabra: Humanities 1. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 160B. Universitat Pompeu Fabra: Humanities 2. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 160C. Universitat Pompeu Fabra: Humanities 3. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 162A. Universitat Pompeu Fabra: Social Science 1. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 162B. Universitat Pompeu Fabra: Social Science 2. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 162C. Universitat Pompeu Fabra: Social Science 3. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 164A. Universitat Pompeu Fabra: Natural Science 1. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 164B. Universitat Pompeu Fabra: Natural Science 2. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 164C. Universitat Pompeu Fabra: Natural Science 3. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 166A. Universitat Pompeu Fabra: Engineering 1. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 166B. Universitat Pompeu Fabra: Engineering 2. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 166C. Universitat Pompeu Fabra: Engineering 3. 5 Units.**

Student selection from catalog of Universitat Pompeu Fabra.

**OSPBARCL 170A. Universitat Politècnica de Catalunya: Engineering 1. 5 Units.**

Student selection from course catalog of Universitat Politècnica de Catalunya.

**OSPBARCL 170B. Universitat Politècnica de Catalunya: Engineering 2. 5 Units.**

Student selection from course catalog of Universitat Politècnica de Catalunya.

**OSPBARCL 170C. Universitat Politècnica de Catalunya: Engineering 3. 5 Units.**

Student selection from course catalog of Universitat Politècnica de Catalunya.

## Overseas Studies in Beijing Courses

**OSPBEIJ 1C. First-Year Modern Chinese, First Quarter. 5 Units.**

Conversation, grammar, reading, elementary composition.

**OSPBEIJ 3C. First-Year Modern Chinese, Third Quarter. 5 Units.****OSPBEIJ 6C. Beginning Conversational Chinese, First Quarter. 2 Units.**

Three quarter sequence. Basic language skills in Mandarin to function abroad.

**OSPBEIJ 9. Chinese Language Tutorial. 2 Units.****OSPBEIJ 16. Art Scene of Beijing. 4 Units.**

Contemporary art in China. Analysis of artwork in the context of Chinese history, culture, society and politics, developing visual literacy and critical thinking in the study of key artists and artistic trends. Key questions: How is contemporary Chinese art related to history and culture of China? How are traditional elements turned into contemporary forms? How is contemporary Chinese art influenced by international trends such as conceptualism and postmodernism? How do artists address social and political issues and struggle with censorship? Field trips to galleries and artists' studios.

**OSPBEIJ 17. Chinese Film Studies. 4 Units.**

Stages of Chinese cinema from the establishment of P.R. China in 1949 to the present. State policies, filmmaking trends, representative filmmakers and films, and the state of the industry in the different periods, with close readings of some important films. Historical perspective and broad knowledge of Chinese cinema; academic approaches to film studies.

**OSPBEIJ 20. Communication, Culture, and Society: The Chinese Way. 4 Units.**

How people communicate, what they achieve through their communications, and the social and cultural consequences of these communicative behaviors. Focus on the interactive relationship between communication, culture and society in China. How communication habits are influenced by the individual's culture and how communication acts help to change and transform the society in which we live.

**OSPBEIJ 21C. Second-Year Modern Chinese. 5 Units.****OSPBEIJ 23C. Second-Year Modern Chinese. 5 Units.****OSPBEIJ 41. Chinese Society and Business Culture. 4 Units.**

Key features of Chinese society and their applications to Chinese business culture from a sociological perspective. Structural differences between Chinese and U.S. societies and their social, economic, and cultural implications. Emerging patterns in areas such as retailing and consumer behaviors, work relations and management, and business negotiation and collaboration.

**OSPBEIJ 42. Chinese Media Studies. 4 Units.**

Fundamental changes in Chinese media. Issues such as: how Chinese media emerge and evolve against the background of modern Chinese history; how they interact with government, sponsors, receivers, and other social institutions; and implications for Chinese social development.

**OSPBEIJ 48. Chinese Literature: Tradition in Transformation. 4 Units.**

Classical Chinese literature from the beginning (ca. 1000 BC) to the 14th century. Primary texts in translation with attention to the poetic works that feature Chinese literary tradition. Understanding of past experience of Chinese people living in another cultural space through observation, analysis, and reconstruction.

**OSPBEIJ 49. Independent Study Projects in Art. 4 Units.**

Projects in either studio art or art history. Studio art topics: painting, drawing, photography or mixed media work inspired by living in China and involving ideas and proposal for body of works, instruction and critiques, review and assessment of completed works. Art history topics: contemporary Chinese art or important individual artists working in Beijing. Field trips and site visits for either focus.

**OSPBEIJ 55. Chinese Economy in Transition. 5 Units.**

From planned regime to market economy: political economy and institutional aspects of China's economic transition and open-door policy. How can China achieve economic success given disadvantages in natural resources, human capital stock, and institutional arrangements? Theoretical economic analysis, empirical data, and case studies. Emergence of China as an economic superpower; major challenges ahead.

**OSPBEIJ 67. China-Africa and Middle East Relations. 4 Units.**

China's relations with the outside world, with a focus on Africa and the Middle East. Historically contextualized relations; evolution of relations within the international climate during different periods, especially in the present; impact of geopolitical and geoeconomic relations on the existing international order.

**OSPBEIJ 75. China in the Global Economy. 5 Units.**

China's economic relations with the rest of the world. Its increasing trade, investment and commercial links across the globe and their resulting impacts on China's rise to the second largest global economy last year; the ensuing implications for the opportunities and challenges for the world's major economies.

**OSPBEIJ 101C. Third-Year Modern Chinese. 5 Units.****OSPBEIJ 103C. Third-Year Modern Chinese. 5 Units.****OSPBEIJ 199A. Directed Reading A. 1-4 Units.**

Course may be repeated for credit.

**OSPBEIJ 199B. Directed Reading B. 1-4 Units.**

Course may be repeated for credit.

**OSPBEIJ 211C. Fourth-Year Modern Chinese. 5 Units.**

## Overseas Studies in Berlin Courses

**OSPBER 1Z. Accelerated German: First and Second Quarters. 8 Units.**

A jump start to the German language, enabling students with no prior German to study at the Berlin Center. Covers GERLANG 1 and 2 in one quarter.

**OSPBER 2Z. Accelerated German, Second and Third Quarters. 8 Units.**

Qualifies students for participation in an internship following the study quarter. Emphasis is on communicative patterns in everyday life and in the German work environment, including preparation for interviews.

**OSPBER 3B. German Language and Culture. 5 Units.**

Grammar, composition, and conversation. Increases fluency in German as rapidly as possible to help students take advantage of the many opportunities in Berlin. Corequisite: GERLANG 100B.

**OSPBER 15. Shifting Alliances? The European Union and the U.S.. 4-5 Units.**

The development of European integration, a model for global security and peace, and a possible replacement for the U.S. position as unilateral superpower. Competing arguments about the state of transatlantic relations.

**OSPBER 17. Split Images: A Century of Cinema. 4 Units.**

20th-century German culture through film. The silent era, Weimar, and the instrumentalization of film in the Third Reich. The postwar era: ideological and aesthetic codes of DEFA, new German cinema, and post-Wende filmmaking including *Run Lola Run* and *Goodbye Lenin*. Aesthetic aspects of the films including image composition, camera and editing techniques, and relation between sound and image.

**OSPBER 21B. Intermediate German. 5 Units.**

Grammar review, vocabulary building, writing, and discussion of German culture, literature, and film. Corequisite: OSPBER 100B.

**OSPBER 30. Berlin vor Ort: A Field Trip Module. 1 Unit.**

The cultures of Berlin as preserved in museums, monuments, and architecture. Berlin's cityscape as a narrative of its history from baroque palaces to vestiges of E. German communism, from 19th-century industrialism to grim edifices of the Sachsenhausen concentration camp.

**OSPBER 40B. Introductory Electronics. 5 Units.**

Electrical quantities and their measurement, including operation of the oscilloscope. Function of electronic components including resistor, capacitor, and inductor. Analog circuits including the operational amplifier and tuned circuits. Digital logic circuits and their functions. Lab assignments. Prerequisite: PHYSICS 43.

**OSPBER 47. Ethics in Medicine and Everyday Life. 4 Units.**

Ethical conflicts in relation to life situations. Moral questions in the conduct of science. Collaboration of physicians and academics with Nazi medical experiments; Milgram's experiments on obedience; Stanford's prison experiments; misleading marketing strategies used by the tobacco industry; ethics of placebo controlled clinical trials; decisions related to stem cell research and reproductive technologies. Visits to Nürnberg and Sachsenhausen.

**OSPBER 48. Topics in Medicine and Ethics. 2-4 Units.**

Independent study with weekly meetings. Topics: comparative analysis of legislation of human fertilization and embryology in the U.S. and UK; history and structure of the health care systems in Germany, Canada, and the U.S.; lives of admirable precepts but dubious practice such as Seneca, the Stoics, and Rousseau; promise and pitfalls of genetically modified plant and animal food. Do ethnic, national, and professional stereotypes serve a function? Primarily in English, but some topics might require German.

**OSPBER 50M. Introductory Science of Materials. 4 Units.**

Topics include: the relationship between atomic structure and macroscopic properties of man-made and natural materials; mechanical and thermodynamic behavior of surgical implants including alloys, ceramics, and polymers; and materials selection for biotechnology applications such as contact lenses, artificial joints, and cardiovascular stents. No prerequisite.

**OSPBER 52. European Modernism in Art. 4 Units.**

French and German modernist artists such as Cezanne, Van Gogh, Kirchner, and Kandinsky in the period of early modernist art. Cubism, Dadaism, Surrealism, and the German period *Neue Sachlichkeit*. Why modernism took certain directions in these countries, how the social and political circumstances in these areas impacted the arts, and how artists acted and reacted in these sociopolitical environments.

**OSPBER 53. The Brothers Grimm and their Fairy Tales. 4 Units.**

Cultural context for collection of these fairy tales. Questions related to sources of the tales; reception of tales in different cultures and at different times; values represented by the tales; service to interests of German states in the present and past. Theoretical perspectives such as feminist and psychoanalytic. In German.

**OSPBER 57. Independent Study in Art: Electronic Media. 2-4 Units.**

Studies in a variety of areas including video, digital arts, or theoretical and historical research in media.

**OSPBER 60. Cityscape as History: Architecture and Urban Design in Berlin. 5 Units.**

Diversity of Berlin's architecture and urban design resulting from its historical background. Architect Ludwig Mies van der Rohe and his artistic ancestors. Role of the cultural exchange between Germany and the U.S. Changing nature of the city from the 19th century to the present.

**OSPBER 61. The Grimms' Fairy Tales for English Speakers. 2 Units.**

Open only to students with less than one year of German. Read selection of tales in English and consider theoretical treatment from historical-cultural, psychological, feminist, and linguistic perspectives.

**OSPBER 65. Berlin -- City of Sound. 4 Units.**

Elements of historical presentations. Studio visits with internationally acclaimed Berlin-based artists and composers: sound spatialization at the Technische Universität and sound studies at the Universität Künste. Create works of sound art that respond to site, to objects, and to sound/image combinations.

**OSPBER 66. Theory from the Bleachers: Reading German Sports and Culture. 3 Units.**

German culture past and present through the lens of sports. Intellectual, societal, and historical-political contexts. Comparisons to Britain, France, and the U.S. The concepts of *Körperkultur*, *Leistung*, *Show*, *Verein*, and *Haltung*. Fair play, the relation of team and individual, production and deconstruction of sports heroes and heroines, and sports nationalism. Sources include sports narrations and images, attendance at sports events, and English and German texts. Taught in German.

**OSPBER 68. Protestant Reformation. 4 Units.**

New forms of Christian religious thought and practice that emerged in Western Europe in the early to mid-sixteenth century and decisively shaped the course of Western history. Religious status quo and other forms of religious dissent that challenged late medieval Christendom; proposals for reform exemplified by Martin Luther, Andreas Karlstadt, Thomas Müntzer; impact of the changes in religion and the conflicts over religion for society more broadly.

**OSPBER 70. The Long Way to the West: German History from the 18th Century to the Present. 4-5 Units.**

Battles still current within Germany's collective memory. Sources include the narrative resources of museums, and experts on the German history in Berlin and Potsdam. Field trips.

**OSPBER 78. Identity on the Move: Migrating From, In, and To Germany. 4-5 Units.**

Germany's multiple migrations; migration between different German speaking Laender; emigration mainly to the US in the second half of the 19th century and after 1933; immigration mainly from Eastern and Southern Europe into the German economic powerhouse after unification in 1871 and again during the Wirtschaftswunder, the economic miracle in the 1950s. Topics include: Germany as a Kulturnation, defined mainly by its common culture; Germany as Einwanderungsland, a country of immigration; and Germany as a member of the EU with its concepts of migration and integration.

**OSPBER 100B. Berlin Heute. 2 Units.**

Required for students enrolled in OSPBER 21B; open to students in other German language classes. Active use of German, including vocabulary from a variety of fields and disciplines, and discussion of current issues.

**OSPBER 101A. Contemporary Theater. 5 Units.**

Texts of plays supplemented by theoretical texts or reviews. Weekly theater visits, a tour of backstage facilities, and discussions with actors, directors, or other theater professionals. In German. Prerequisite: completion of GERLANG 3 or equivalent.

**OSPBER 101B. Advanced German. 5 Units.**

For intermediate and advanced students. Focus is on Berlin through film, literature, music, live performance, news media, and field trips. Essay writing, vocabulary building, and in-class presentations. Reading literature and news stories, essay writing, vocabulary building, and in-class presentations.

**OSPBER 115X. The German Economy: Past and Present. 4-5 Units.**

The history of the German economy in the Wilhelmine Empire, the Weimar Republic, the Third Reich, the postwar real socialism of the GDR, and the free market economy of the FRG. The processes of economic transition since unification and current challenges faced by united Germany.

**OSPBER 126X. A People's Union? Money, Markets, and Identity in the EU. 4-5 Units.**

The institutional architecture of the EU and its current agenda. Weaknesses, strengths, and relations with partners and neighbors. Discussions with European students. Field trips; guest speakers.

**OSPBER 161X. The German Economy in the Age of Globalization. 4-5 Units.**

Germany's role in the world economy: trade, international financial markets, position within the European Union; economic relations with Eastern Europe, Russia, the Third World, and the U.S. International aspects of German economic and environmental policies. The globalization of the world's economy and Germany's competitiveness as a location for production, services, and R&D, focusing on the German car industry.

**OSPBER 174. Sports, Culture, and Gender in Comparative Perspective. 5 Units.**

Theory and history of mass spectator sports and their role in modern societies. Comparisons with U.S., Britain, and France; the peculiarities of sports in German culture. Body and competition cultures, with emphasis on the entry of women into sports, the modification of body ideals, and the formation and negotiation of gender identities in and through sports. The relationship between sports and politics, including the 1936 Berlin Olympic Games.

**OSPBER 177A. Culture and Politics in Modern Germany. 4-5 Units.**

Key paradigms of modern Germany: German romanticism, the belated state and national identity, National Socialism and the Holocaust, Germany divided and unified. Literary, analytical, and theoretical texts; newspaper articles; film and TV; oral history.

**OSPBER 198D. Humboldt Universität: Humanities 2. 1-3 Units.**

Course may be repeated for credit.

**OSPBER 198F. Humboldt Universität: Social Sciences 2. 1-3 Units.****OSPBER 198H. Freie Universität: Humanities 3. 1-5 Units.**

Course may be repeated for credit.

**OSPBER 198K. Weissensee Art University 1. 1-4 Units.**

Course may be repeated for credit.

**OSPBER 198L. Weissensee Art University 2. 1-4 Units.**

Course may be repeated for credit.

**OSPBER 198M. Weissensee Art University 3. 1-4 Units.**

Course may be repeated for credit.

**OSPBER 199A. Directed Reading A. 2-4 Units.**

Course may be repeated for credit.

**OSPBER 199B. Directed Reading B. 2-3 Units.**

Course may be repeated for credit.

**OSPBER 199D. Humboldt Universität: Humanities. 1-3 Units.**

Course may be repeated for credit.

**OSPBER 199F. Humboldt Universitat: Social Sciences. 1-3 Units.**  
Course may be repeated for credit.

**OSPBER 199G. Freie Universitat: Social Sciences 1. 1-3 Units.**  
Course may be repeated for credit.

**OSPBER 199H. Freie Universitat: Humanities 1. 1-3 Units.**  
Course may be repeated for credit.

**OSPBER 199J. Freie Universitat: Natural Sciences 1. 1-3 Units.**  
Course may be repeated for credit.

**OSPBER 199K. Freie Universitat: Social Sciences 2. 1-3 Units.**  
Course may be repeated for credit.

**OSPBER 199L. Freie Universitat: Humanities 2. 1-3 Units.**  
Course may be repeated for credit.

**OSPBER 199M. Freie Universitat: Natural Sciences 2. 1-3 Units.**  
Course may be repeated for credit.

## Overseas Studies in Cape Town Courses

**OSPCPTWN 12. Independent Study in Infectious Diseases. 2-4 Units.**  
Independent work in one of the following areas: Impact of AIDS in South Africa; South Africa's Antarctic Policy; Photographing Cape Town: Using the camera to enhance observation and communication; AIDS denialism; Malaria in Africa; African Hemorrhagic fevers; Teaching evolution in South Africa. Individual meetings to follow progress.

**OSPCPTWN 13. Biology and Ecology of the Lion King. 3 Units.**  
Scientific and ecological issues addressed in the movie *The Lion King*. Insights, comparisons, and contradictions, with emphasis on animals: lions, hyenas, warthogs, meerkats, mandrills, and horn bills, but also including insects, flamingos, giraffes, and zebras. Issues: food webs, predation, animal locomotion, animal behavior, animal communication, and symbiosis. Also addressed: issues of land and water conservation, climate change and global warming, and recycling of organic materials and the circle of life. Elements of the literary hero; portrayal of African language; and parallels with other Disney movies.

**OSPCPTWN 16. South Africa Sites of Memory. 2 Units.**  
Required Course. Relation between conventional histories and different kinds of individual and collective memory that are focused on places and spaces, testing the relation between grand narratives and more particularized pasts. Questions of cultural heritage, in particular its contestations among individual, familial, local, national, and international interests.

**OSPCPTWN 17. Western Cape Sites of Memory. 1 Unitss.**  
Required Course. Relation between conventional histories and different kinds of individual and collective memory that are focused on places and spaces, testing the relation between grand narratives and more particularized pasts. Questions of cultural heritage, in particular its contestations among individual, familial, local, national, and international interests.

**OSPCPTWN 18. Xhosa Language and Culture. 2 Units.**  
History of the Xhosa language; understanding Xhosa culture and way of life. Listening, speaking, reading and writing, combined with the social uses of the language in everyday conversations and interactions. Intercultural communication. Content drawn from the students' experiences in local communities through their service learning/volunteer activities to support the building of the relationships in these communities. How language shapes communication and interaction strategies. Course may be repeated for credit.

**OSPCPTWN 22. Preparation for Community-Based Research in Community Health and Development. 3 Units.**

For students intending to engage in community-based research in South Africa in the summer following spring study quarter in Cape Town. Approaches and methods of collaborative, community-based research; qualitative data gathering and analysis methods in community-based research; effective collaboration with community partners and data sources; race and privilege in community-based research. Identifying research partners and sponsors; articulating potential research questions; and planning research projects.

**OSPCPTWN 24A. Targeted Research Project in Community Health and Development. 3 Units.**

Two-quarter sequence for students engaging in Cape Town-sponsored community based research. Introduction to approaches, methods and critical issues of partnership-based, community-engaged research and to the community-based research partners. Qualitative data gathering and analysis methods in community-based research; effective collaboration with community partners and data sources; race and privilege in community-based research. Preparation of research proposals and plans for research carried out during spring quarter through OSPCPTWN 24B.

**OSPCPTWN 24B. Targeted Research Project in Community Health and Development. 5 Units.**

Two-quarter sequence for students engaging in Cape Town-sponsored community-based research. Substantive community health or development investigations in collaboration with the Stanford Centre's community partners: Western Cape NGOs or government agencies, or community-based organizations or groups. Students' research supported through methods workshops, sharing of progress and problems, and data and findings presentations. Prerequisite: OSPCPTWN 24A.

**OSPCPTWN 31. Theory and Politics of Foreign Aid. 3 Units.**

Political economy approach to foreign aid. Context of debate on development: differences between developed and less developed countries, concept of poverty, how to measure development. History of foreign aid; main actors and characteristics of official development assistance. Theoretical and empirical impact of aid with regard to economic growth and governance. Benefits and problems associated with aid.

**OSPCPTWN 32. Learning, Development, and Social Change: Service Learning in the Contemporary South African Context. 5 Units.**

Adult learning and its role in community social action; development; service learning. Micro contexts of people's daily lives and experiences in the context of an emergent democracy; understanding possibilities of community action and mobilisation for social change. Service in a historically marginalised community near Cape Town to understand realities of everyday life in informal settlements, to engage with education in a developmental context, and to gain insight into sociopolitical factors that shape social action and learning.

**OSPCPTWN 33. From Apartheid to Democracy: Namibia and South Africa. 4 Units.**

Comparison of the transition from apartheid to democracy in Namibia and South Africa. Focus on peaceful process involving negotiated settlement in South Africa. Significance of democracy in Namibia post 1990 and in South Africa post 1994; South Africa's truth and reconciliation commission and post-1994 economic policy.

**OSPCPTWN 36. The Archaeology of Southern African Hunter Gatherers. 4 Units.**

Archaeology, history and ethnography of the aboriginal hunter gatherers of southern Africa, the San people. Formative development of early modern humans and prehistory of hunters in southern Africa before the advent of herding societies; rock paintings and engravings of the subcontinent as situated in this history. Spread of pastoralism throughout Africa. Problems facing the descendants of recent hunter gatherers and herders in southern Africa, the Khoisan people.



**OSPCPTWN 38. Genocide: The African Experience. 3-5 Units.**

Genocide as a major social and historical phenomenon, contextualized within African history. Time frame ranging from the extermination of indigenous Canary Islanders in the fourteenth and fifteenth centuries to more recent mass killings in Rwanda and Darfur. Emphasis on southern African case studies such as Cape San communities and the Herero people in Namibia. Themes include: roles of racism, colonialism and nationalism in the making of African genocides. Relevance of other social phenomena such as modernity, Social Darwinism, ethnicity, warfare and revolution. Comparative perspective to elucidate global dimensions.

**OSPCPTWN 43. Public and Community Health in Sub-Saharan Africa. 4 Units.**

Introduction to concept of public health as compared with clinical medicine. Within a public health context, the broad distribution of health problems in sub-Saharan Africa as compared with U.S. and Europe. In light of South Africa's status as a new democracy, changes that have occurred in health legislation, policy, and service arenas in past 16 years. Topics include: sector health care delivery, current distribution of infectious and chronic diseases, and issues related to sexual and reproductive health in South Africa. Site visits to public sector health services and health related NGOs.

**OSPCPTWN 45. Energy and Africa. 5 Units.**

How development in Africa will impact global energy choices in the second half of this century. Role that energy plays in fostering (or inhibiting) development. Key questions: How does development affect possible choices about energy? How do energy resources and their mobilization affect local people? How does the global economics of energy exert pressure on governments in the developing world? How does education affect population and indigenous efforts to develop local solutions to problems? How do these affect projections for global energy in the future?.

**OSPCPTWN 68. Cities in the 21st Century: Urbanization, Globalization and Security. 4 Units.**

Cities in a globalizing world. Themes: challenges posed by globalization; general and specific responses of cities to these challenges; security issues created by globalization and urbanization. Concerns related to food security, resource availability, and threat of political instability. Policies recommended by World Bank. Case study method.

**OSPCPTWN 199A. Directed Reading A. 2-4 Units.**

Course may be repeated for credit.

**OSPCPTWN 199B. Directed Reading B. 1-5 Units.**

Course may be repeated for credit.

## Overseas Studies in Florence Courses

**OSPFLOR 21F. Accelerated Second-Year Italian, Part A. 5 Units.**

Review of grammatical structures; grammar in its communicative context. Listening, speaking, reading, and writing skills practiced and developed through authentic material such as songs, newspaper articles, video clips, and literature. Insight into the Italian culture and crosscultural understanding. Prerequisite: one year of college Italian if completed within two quarters of arriving in Florence, or ITALLANG 21.

**OSPFLOR 22F. Accelerated Second-Year Italian Part B., 5 Units.**

Grammatical structures, listening, reading, writing, speaking skills, and insight into the Italian culture through authentic materials. Intermediate to advanced grammar. Content-based course, using songs, video, and literature, to provide cultural background for academic courses. Prerequisite: ITALLANG 21 within two quarters of arriving in Florence or ITALLANG 21A or OSPFLOR 21F.

**OSPFLOR 31F. Advanced Oral Communication: Italian. 3 Units.**

Refine language skills and develop insight into Italian culture using authentic materials. Group work and individual meetings with instructor. Minimum enrollment required. Prerequisite: ITALLANG 22A, 23 or placement.

**OSPFLOR 34. The Woman in Florentine Art. 4 Units.**

Influence and position of women in the history of Florence as revealed in its art. Sculptural, pictorial, and architectural sources from a social, historical, and art historical point of view. Themes: the virgin mother (middle ages); the goddess of beauty (Botticelli to mannerism); the grand duchess (late Renaissance, Baroque); the lady, the woman (19th-20th centuries).

**OSPFLOR 35. European Economic and Monetary Integration. 5 Units.**

Historical overview of economic and monetary integration process in Western Europe. European Union institutions: the Commission, the Parliament, the European Council, the Council of Ministers, and the Court of Justice. Microeconomic theory of inter-industry and intra-industry trade and the case of EU. Microeconomics of integration: the costs and benefits, also applicable to NAFTA. The Lisbon Strategy as a European response to the challenges of globalization. The euro, the dollar and the international monetary system. Monetary and fiscal policies in EMU: the European Central Bank and the Stability and Growth Pact. Prerequisites: ECON 51, 52 or equivalent.

**OSPFLOR 41. The Contemporary Art Scene in Tuscany: Theory and Practice. 3-5 Units.**

The ever-changing and multifaceted scene of contemporary art through visual and sensorial stimulation. How art is thought of and produced in Italy today. Hands-on experience. Sketching and exercises on-site at museums and exhibits, plus workshops on techniques. Limited enrollment.

**OSPFLOR 42. Academic Internship. 1-5 Units.**

Mentored internships in banking, education, the fine arts, health, media, not-for-profit organizations, publishing, and retail. May be repeated for credit.

**OSPFLOR 44. The Revolution in Science: Galileo and the Birth of Modern Scientific Thought. 5 Units.**

Galileo's life and scientific progress starting from his student years at the University of Pisa. Departure from traditional natural philosophy leading to radical reformation of cosmology and physics, emphasizing the science of motion. His innovative use of observation and measurement instruments, emphasizing the telescope. Cultural and social context.

**OSPFLOR 48. Sharing Beauty: Florence and the Western Museum Tradition. 4 Units.**

The city's art and theories of how art should be presented. The history and typology of world-class collections. Social, economic, political, and aesthetic issues in museum planning and management. Collections include the Medici, English and American collectors of the Victorian era, and modern corporate and public patrons.

**OSPFLOR 49. The Cinema Goes to War: Fascism and World War II as Represented in Italian and European Cinema. 5 Units.**

Structural and ideological attributes of narrative cinema, and theories of visual and cinematic representation. How film directors have translated history into stories, and war journals into visual images. Topics: the role of fascism in the development of Italian cinema and its phenomenology in film texts; cinema as a way of producing and reproducing constructions of history; film narratives as fictive metaphors of Italian cultural identity; film image, ideology, and politics of style.

**OSPFLOR 50M. Introductory Science of Materials. 4 Units.**

Topics include: the relationship between atomic structure and macroscopic properties of man-made and natural materials; mechanical and thermodynamic behavior of surgical implants including alloys, ceramics, and polymers; and materials selection for biotechnology applications such as contact lenses, artificial joints, and cardiovascular stents. No prerequisite.

**OSPFLOR 51. Italian Foreign Policy and the Global Players. 5 Units.**

Reshaping of foreign policy and its governing principles with the new balance of power of the early 21st century. Strategies underlying a country's long-term foreign policy, especially with respect to diplomatic models. Role of need for energy resources in foreign policy. Geographical and historical boundaries behind a foreign policy vision. Effect of foreign policy stance on the outcome of elections. Foreign policy shaping in Italy and its relationship between the Mediterranean and the rest of Europe.

**OSPFLOR 54. High Renaissance and Maniera. 5 Units.**

The development of 15th- and early 16th-century art in Florence and Rome. Epochal changes in the art of Michelangelo and Raphael in the service of Pope Julius II. The impact of Roman High Renaissance art on masters such as Fra' Bartolomeo and Andrea del Sarto. The tragic circumstances surrounding the early *maniera*: Pontorno and Rosso Fiorentino and the transformation of early Mannerism into the elegant style of the Medicean court. Contemporary developments in Venice.

**OSPFLOR 55. Academy of Fine Arts: Studio Art. 1-5 Units.**

Courses through the *Accademia delle Belle Arti*. Details upon arrival. Minimum Autumn and Winter Quarter enrollment required; 1-3 units in Autumn. May be repeated for credit.

**OSPFLOR 56. University of Florence Courses. 1-5 Units.**

May be repeated for credit.

**OSPFLOR 57. Global Change and Italian Ecosystems: Management and Conservation for Mitigation. 4 Units.**

Introduction to state of the art of global climate change science, with a focus on the effects of global change on ecosystem functions and services, and on Europe as a regional case study. Conservation and management issues related to vulnerable Italian ecosystems through both lectures and field trips. Conservation practices and specific management issues focused on Tuscany, with ecosystems, ranging from the Thyrrenian shores, surrounded by the typical Mediterranean chaparral to the sub-alpine environments on the Apennine mountains.

**OSPFLOR 58. Space as History: Urban Change and Social Vision in Florence 1059 to the Present. 4 Units.**

A thousand years of intentional change in Florence. Phases include programmatic enlargement of ecclesiastical structures begun in the 11th century; aggressive expansion of religious and civic space in the 13th and 14th centuries; aggrandizement of private and public buildings in the 15th century; transformation of Florence into a princely capital from the 16th through the 18th centuries; traumatic remaking of the city's historic core in the 19th century; and development of new residential areas on the outskirts and in neighboring towns in the 20th and 21st centuries.

**OSPFLOR 67. Women in Italian Cinema: Maternity, Sexuality, and the Image. 4 Units.**

Film in the social construction of gender through the representation of the feminine, the female, and women. Female subjects, gaze, and identity through a historical, technical, and narrative frame. Emphasis is on gender, identity, and sexuality with references to feminist film theory from the early 70s to current methodologies based on semiotics, psychoanalysis, and cultural studies. Advantages and limitations of methods for textual analysis and the theories which inform them. Primarily in Italian.

**OSPFLOR 68. Constitutional Theory: From Machiavelli to The Federalist to Today. 4-5 Units.**

Three influential works in constitutional design: Niccolo Machiavelli's Discourses on the Ten Books of Livy; the Federalist Papers written in support of the U.S. Constitution by James Madison, Alexander Hamilton, and John Jay; and Democracy and Distrust, written by the late Stanford Law School Dean, John Hart Ely. Authors' treatment of three values that inform discussion of constitutional design for democratic republics: liberty, security, and equality. Central questions in constitutional theory: How to design a government that respects these values; How to negotiate the potential tradeoffs among these values. Discussion tied to contemporary issues in U.S. constitutional law.

**OSPFLOR 69. The "You" No One Knows: Self Expression through Abstract Art. 4 Units.**

Overview of the birth and evolution of abstract art with visual background necessary to produce works of art free of a realistic representation. Movements and trends in abstract art; experimentation with different media and techniques.

**OSPFLOR 71. Becoming an Artist in Florence: Contemporary Art in Tuscany and New Tendencies in the Visual Future. 3-5 Units.**

Recent trends in art, current Italian artistic production, differences and the dialogue among visual arts. Events, schools, and movements of the 20th century. Theoretical background and practical training in various media. Work at the Stanford Center and on site at museums, exhibits, and out in the city armed with a sketchbook and camera. Emphasis is on drawing as the key to the visual arts. Workshops to master the techniques introduced. Limited enrollment.

**OSPFLOR 75. Florence in the Renaissance. 5 Units.**

Using a series of texts written by 14th and 15th century Florentines, look at the urban values of the city's citizens. Topics include: thinking about urban space; social relations; the values attached to politics, money, family, religion. How meanings of words such as *state*, *government*, and *family* might have changed over time.

**OSPFLOR 78. An Extraordinary Experiment: Politics and Policies of the New European Union. 5 Units.**

Institutional design of EU, forthcoming changes, and comparison of the old and new designs. Interactions between the EU, member states, organized interests, and public opinion. Major policies of the EU that affect economics such as competition or cohesion policies, market deregulation, and single currency. Consequences of the expansion eastwards. The role of institutions as a set of constraints and opportunities for the economic actors; relationships between political developments and economic change in the context of regional integration; lessons for other parts of the world.

**OSPFLOR 79. Migration, Media and Identity in Italy. 5 Units.**

Media as an arena where Italian national and individual identities (of both migrants and natives) are being redefined. The incorporation of a global phenomenon like migration into Italian public discourse and media narratives. The life of migrants and the development of strategies and practices to advocate for civil and political rights. Strong focus on Muslim migrant communities and media representations of migration flows during the last decade. Preparation for participation in the BOSP workshop in France: "How Is Immigration Changing Europe".

**OSPFLOR 80. Independent Study Topics in Art and Vision. 2-4 Units.**

Possible topics include: (1) The aging artist; (2) History of visual science; (3) History of eye disease and its management; (4) Development and role of perspective in art of different cultures; (5) Portrayal and symbolism of eyes in art; (6) Development and technology of eyeglasses (incl. Italian glass). Additional topics possible. Regular meetings to discuss progress.

**OSPFLOR 83. The Art of Vision. 3 Units.**

Focus on eyes and art. How eyes are built, how they process visual information, and how they are affected by diseases that are major problems in our society. These topics illustrated through fine art and famous artists with exploration of the implications of both normal and abnormal vision for art. Animal eyes and the role of vision in music, literature and sports. Art in Florence will be emphasized for examples and field trips. Same as HUMBIO 167.

**OSPFLOR 85. Bioethics: Between Human Rights, Responsibility, and Care Ethics. 4 Units.**

Birth and development of the philosophical field of bioethics based on advances in several fundamental fields of science and technology, including molecular and cell biology, information technology, neurosciences and converging technologies. Challenges for society and ethical and political issues created by new advances and opportunities for individuals and populations. Philosophical approaches developed in the Italian as well as in the European debate; special attention to controversy about the freedom of scientific research, new conditions of procreation, birth, cures, and death. Complexity of the challenges posed by the biotechnological revolution.

**OSPFLOR 87. International Comparison of Health Care Systems: The Italian Profile. 4 Units.**

Definition of a health care system and fundamental components such as service delivery system, financing, government control and patients' rights. Performance of health systems in terms of effectiveness, equity and efficiency; recent work of the World Health Organization and Organization for Economic Co-operation and Development with respect to the performance, measurement, and management of European health systems. Underlying similarities and differences of Italian System, compared to the U.S. Organization of typical Italian University medical center.

**OSPFLOR 88. Independent Study: Group Design of a Scientific Exhibit. 3-5 Units.**

Team-based project to study a specific technological discovery or invention of 15th -17th century mechanics, biomechanics or medicine, and to create a virtual exhibit and/or prototype physical exhibit that would enhance the Museo Galileo (Istituto e Museo di Storia della Scienza). Identify critical aspects required for an exhibit to capture the interest and educate museum visitors. Integrate aspects of historical context for the discovery, an explanation of the discovery, a physical demonstration, and the modern analog or implications, all presented in a technically accurate yet widely accessible manner.

**OSPFLOR 89. Body as Machine: Roots of Modern Biomechanics in Tuscany. 3-5 Units.**

Relationship between modern work in biomechanics (in particular, musculoskeletal mechanics) and the work of Leonardo da Vinci, Galileo Galilei and Giovanni Alfonso Borelli. Leonardo da Vinci's sketches of the human form and anatomical studies of the skeleton, musculature and vasculature. Galileo Galilei's empirical approach to scientific discovery, contributions to physics and the basis for engineering mechanics, including the strength of beams and bones. Giovanni Alfonso Borelli investigations into muscular contraction and studies on the mechanics of human movement. Visits to art and science museums with relevant exhibits.

**OSPFLOR 111Y. From Giotto to Michelangelo: Introduction to the Renaissance in Florence. 4 Units.**

Lectures, site visits, and readings reconstruct the circumstances that favored the flowering of architecture, sculpture, and painting in Florence and Italy, late 13th to early 16th century. Emphasis is on the classical roots; the particular relationship with nature; the commitment to human expressiveness; and rootedness in the real-world experience, translated in sculpture and painting as powerful plasticity, perspective space, and interest in movement and emotion.

**OSPFLOR 115Y. The Duomo and Palazzo della Signoria: Symbols of a Civilization. 4 Units.**

The history, history of art, and symbolism of the two principal monuments of Florence: the cathedral and the town hall. Common meaning and ideological differences between the religious and civic symbols of Florence's history from the time of Giotto and the first Guelph republic to Bronzino and Giovanni da Bologna and the Grand Duchy.

**OSPFLOR 134F. Modernist Italian Cinema. 5 Units.**

As the embodiment of modernity, cinema develops in the wake of modernism proper, but can be understood as one of its technological and aesthetic expressions. Topics: cinema's archaeology in futurist texts and theories with their nationalistic political flavor and their iconoclastic, radical, and interdisciplinary rethinking of the language and form of all the arts (Marinetti, Pirandello, D'Annunzio).

**OSPFLOR 199A. Directed Reading A. 1-4 Units.**

Course may be repeated for credit.

**OSPFLOR 199B. Directed Reading B. 1-4 Units.**

Course may be repeated for credit.

## Overseas Studies in KCJS Kyoto Courses

**OSPKYOCT 103A. Third-Year Japanese I. 12 Units.**

Preparation for function beyond basic level in a Japanese-speaking environment by developing and enhancing communicative competence through: review of basic grammar; new grammar; reading short essays and articles with help of dictionary; short writing and speaking assignments using formal style to describe, explain, and discuss sociocultural topics; enhancing listening comprehension.

**OSPKYOCT 103B. Third-Year Japanese II. 12 Units.**

Preparation for function beyond basic level in a Japanese-speaking environment by developing and enhancing communicative competence through: review of basic grammar; new grammar; reading short essays and articles with help of dictionary; short writing and speaking assignments using formal style to describe, explain, and discuss sociocultural topics; enhancing listening comprehension.

**OSPKYOCT 104A. Fourth-Year Japanese I. 12 Units.**

Emphasis on applications of correct grammar and strengthening academic communication skills through: reading longer essays, articles, and novels with some dictionary work; reading and writing assignments in paragraph format using formal style to describe, explain and discuss sociocultural topics; developing listening comprehension.

**OSPKYOCT 104B. Fourth-Year Japanese II. 12 Units.**

Emphasis on applications of correct grammar and strengthening academic communication skills through: reading longer essays, articles, and novels with some dictionary work; reading and writing assignments in paragraph format using formal style to describe, explain and discuss sociocultural topics; developing listening comprehension.

**OSPKYOCT 105A. Fifth-Year Japanese I. 12 Units.**

For students with advanced proficiency. Goals include advanced command of grammar, composition, and stylistics. Emphasis is on academic Japanese preparing students to audit classes at a Japanese university.

**OSPKYOCT 105B. Fifth-Year Japanese II. 12 Units.**

For students with advanced proficiency. Goals include advanced command of grammar, composition, and stylistics. Emphasis is on academic Japanese preparing students to audit classes at a Japanese university.

**OSPKYOCT 107. Language Use in the Anime of Miyazaki Hayao. 6 Units.**

Japanese language in action. How language usage can vary by situation such as relative social distance between participants, type of interaction or event, in/out group membership, and attitudinal stance on discussion topic. How linguistic behavior of a character contributes to overall portrayal and identity in a film. Film dubbings and subtitles. Multimedia projects.

**OSPKYOCT 108. Lost in Translation. 6 Units.**

The art and practice of translating literary texts from a variety of periods and genres. Strategies for translation and essays on translation by literary translators and theorists. Notable translations of Japanese literature in connection with the original texts. Students develop individual translation projects.

**OSPKYOCT 109. Exploring Language and Food in Kyoto. 6 Units.**

How local Kyoto food purveyors use language to market and present their wares and how they communicate with customers. Readings on Japanese food culture from anthropology, history and literature as well as topics in linguistics. Students will also take notes on spoken language use by staff and customers and gather samples of written language from selected shops and restaurants.

**OSPKYOCT 120. Power, Culture, and Transformation in Pre-Modern Japan. 6 Units.**

History of various peoples living in Japanese archipelago from 1200 to 1800. Different ways that people identified themselves and how multiple identifications engendered conflict and dynamic power relations in society.

**OSPKYOCT 121. History and Memory in the Nanking Massacre and Comfort Women Discourses. 6 Units.**

Critical discussion of ethical, political, and epistemological problems in the historical representation of the Nanjing Massacre and the "comfort-women" system of military sexual slavery. Issues of historical interpretation and paradox of attempting to speak for people whose experiences have been erased from the realm of the representable.

**OSPKYOCT 122. The Rise of Modern Japan: Politics of Space and Time. 6 Units.**

Japan's transformation into a modern nation-state from the late Tokugawa period (1800) into the 1980's.

**OSPKYOCT 128. Families and Work in Post-war Japan. 6 Units.**

Factors that promoted both change and continuity in the social division of labor between the interdependent spheres of work and family. How cultural strategies for organizing contemporary Japanese social life were conditioned 1) by rapid industrialization and growth and 2) by later economic stasis. Class, gender, and regional variations; role of social psychology in Japanese responses to work-family conflicts.

**OSPKYOCT 164. Kansai Area Arts. 6 Units.**

Kansai area, in particular the golden triangle formed by cities of Kyoto, Osaka, and Nara, as the center of Japanese art production from 4th century until the 17th century when patronage shifted to Tokyo. Focus is on painting and sculpture through readings, classroom discussion, and field trips.

**OSPKYOCT 179. Kyoto Artisans and their Worlds. 6 Units.****OSPKYOCT 185. Noh and Kyogen. 6 Units.**

Noh drama as a mirror of Muromachi period culture. Broad literary heritage and Buddhist precepts reflected in plays. Performance traditions such as Shinto ritual, court dance, harvest festivals, exorcism rites, and narrative entertainment. Wider context of world drama and dramatic theories of the creators of Noh. Close reading of representative plays and first hand experience of performance.

**OSPKYOCT 197. Independent Studies. 6 Units.**

Focused research using the Japanese language and taking advantage of local Kyoto resources. Directed reading and research, weekly meetings with professor, and final research paper. For full-year students with language skills adequate for the proposed research.

**OSPKYOCT 198. Gender Issues in Japan. 6 Units.**

Women's issues as related to men's issues in Japan. The house system and the legalized prostitution system in modern Japan. Topics include marriage, gender division of labor, child bearing, contraception, and domestic violence. How the private sphere is influenced by the public sphere including politics, economy, and culture. In Japanese.

## Overseas Studies in Kyoto Courses

**OSPKYOTO 2K. First-Year Japanese Language, Culture, and Communication, Second Quarter. 5 Units.**

Continuation of JAPANLNG 1. First-year sequence enables students to converse, write, and read essays on topics such as personal history, experiences, familiar people. Prerequisite: JAPANLNG 1 if taken 2012-13 or later (JAPANLNG 7 if taken 2011-12 or earlier).

**OSPKYOTO 3K. First-Year Japanese Language, Culture, and Communication, Third Quarter. 5 Units.**

(Formerly OSPKYOTO 9K). Continuation of 2K. First-year sequence enables students to converse, write, and read essays on topics such as personal history, experiences, familiar people. Fulfills University Foreign Language Requirement. Prerequisite: JAPANLNG 2 or OSPKYOTO 2K if taken 2012-13 or later (JAPANLNG 8 if taken 2011-13 or earlier).

**OSPKYOTO 12. Governing Japan: A Comparative Perspective. 4-5 Units.**

Why the Japanese political system is so different from those of other democratic nations? Attention to such factors as culture, history, and the nation's extreme dependence on international trade, but also to considerations of sheer institutional power, how it develops and perpetuates itself. How politics works in modern day Japan; institutional arrangements that heavily shape (and thus help explain) the incentives and behaviors of key political players. Comparisons to the American separation of powers system and also to government and politics in Britain and other countries that have more standard parliamentary systems.

**OSPKYOTO 13. Contemporary Japanese Religion. 4-5 Units.**

Japanese attitudes to religion and popular forms of religiosity. Syncretic nature of beliefs and practices drawn on a variety of interwoven concepts, beliefs, customs and religious activities of native Japanese, Korean, Chinese, and Indian origins as background. Topics include: pursuit of worldly benefits, religion and healing, fortune-telling, ascetic practices, pilgrimage, festivals (matsuri), new religions and their image, impact of the internet, response of religion in times of crisis.

**OSPKYOTO 14. The Japanese Education System: A Model for the U.S.?. 4-5 Units.**

Basic aspects of both the Japanese and American education systems, from how they are structured and funded to how the schools operate from day to day. Emphasis on understanding schools as government agencies, which they are, and thus on understanding how, in both countries, politics shapes the most fundamental features of schooling. Does politics work differently in Japan than in the U.S. and if so, how does it affect the schools, their performance, and their prospects for improvement?.

**OSPKYOTO 15. Postwar Japanese Society. 4-5 Units.**

Changes in Japan from a defeated nation to an economic superpower. Social and cultural changes during this transformation. Topics: legacy of wartime experience; impact of American occupation; postwar radicalism and social unrest; turn to conservatism; dynamics of rapid economic growth; emergence of middle class society; urbanization and environmental change; consumerism and popular culture; changes in family structure, youth culture and gender relations.

**OSPKYOTO 16. Minorities and Immigrants in Contemporary Japan. 4-5 Units.**

Japanese society, its historical development, social transformation and challenges in an age of globalization as seen through study of minorities and immigrants in contemporary Japan. Issues of labor markets and economic vitality, citizenship, identity, and human rights in the face of Japan's declining and aging population. Visits to minority communities; individual and group field research on the lives of Japan's domestic and foreign minorities, policy initiatives, and issues of individual, group and national identity.

**OSPKYOTO 17R. Religion and Japanese Culture. 4-5 Units.**

Major religious traditions of Japan. Topics include: relation between religion and culture; ancient Japanese religion and Shinto; Buddhist schools of Heian Japan; Zen Buddhism as it flourished in the Kamakura period; Confucianism, as originally conceived in ancient China and as transmitted to Japan in the Edo period in its neo-Confucian form; characteristic modern practices. Field trips to religious centers to observe current religious practices.

**OSPKYOTO 21K. Second-Year Japanese Language, Culture, and Communication, First Quarter. 5 Units.**

(Formerly OSPKYOTO 17K.) Goal is to further develop and enhance spoken and written Japanese in order to handle advanced concepts such as comparison and contrast of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. Prerequisite: JAPANLNG 3 if taken 2012-13 or later (JAPANLNG 7 if taken 2011-12 or earlier).

**OSPKYOTO 22K. Second-Year Japanese Language, Culture, and Communication, Second Quarter. 5 Units.**

(Formerly OSPKYOTO 18K). Continuation of JAPANLNG 21. Goal is to further develop and enhance spoken and written Japanese in order to handle advanced concepts such as comparison and contrast of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. Prerequisite: JAPANLNG 21 if taken 2012-13 or later (JAPANLNG 17 if taken 2011-12 or earlier).

**OSPKYOTO 23K. Second-Year Japanese Language, Culture, and Communication, Third Quarter. 5 Units.**

(Formerly OSPKYOTO 19K). Goal is to further develop and enhance spoken and written Japanese in order to handle advanced concepts such as comparison and contrast of the two cultures, descriptions of incidents, and social issues. 800 kanji, 1,400 new words, and higher-level grammatical constructions. Readings include authentic materials such as newspaper articles, and essays. Prerequisite: JAPANLNG 22 or OSPKYOTO 22K if taken 2012-13 or later (JAPANLNG 18 if taken 2011-12 or earlier).

**OSPKYOTO 40K. Introductory Electronics. 5 Units.**

Electrical quantities and their measurement, including operation of the oscilloscope. Function of electronic components including resistor, capacitor, and inductor. Analog circuits including the operational amplifier and tuned circuits. Digital logic circuits and their functions. Lab assignments. Prerequisite: PHYSICS 43.

**OSPKYOTO 60. Japan in World War II: Experiences and Memory. 4-5 Units.**

How various segments of Japanese society view the war in Asia, where fault lines lie, and what attempts have been made to achieve reconciliation. Topics include: origins of the Asia-Pacific War; foreign and domestic images of Japan's wartime actions; American Occupation policy and the Tokyo war crimes trial; impact of peace movements and the Cold War; the emergence of conflicting postwar narratives about the war; Asian perceptions of postwar Japan; the institutionalization of public memory; attempts and failures at reconciliation with Japan's neighbors; comparisons with Europe.

**OSPKYOTO 61. The Fourier Transform and its Applications. 3 Units.**

The Fourier transform as a tool for solving physical problems. Fourier series, the Fourier transform of continuous and discrete signals and its properties. The Dirac delta, distributions, and generalized transforms. Convolutions and correlations and applications; probability distributions, sampling theory, filters, and analysis of linear systems. The discrete Fourier transform and the FFT algorithm. Multidimensional Fourier transform and use in imaging. Further applications to optics, crystallography. Emphasis on relating the theoretical principles to solving practical engineering and science problems. Prerequisites: Math through ODEs, Fourier series at the level of 102A, and linear algebra. Same as EE 261.

**OSPKYOTO 64. Japanese Popular Culture. 4 Units.**

Origin, history and production of genres of Japanese popular culture such as manga, anime, popular music, television drama, film and new media, and their link to current phenomena. Themed units: disaster anime; politics of shojo; otakuology; keitai studies. Analysis of media texts and how age, gender, race, ethnicity and socio-economic class are represented. Social context in which popular culture is produced and consumed. Local field trips.

**OSPKYOTO 102K. Third-Year Japanese Language, Culture, and Communication, Second Quarter. 5 Units.**

Continuation of JAPANLNG 101. Goal is to express thoughts and opinions in paragraph length in spoken and written forms. Materials include current Japanese media and literature for native speakers of Japanese. Cultural and social topics related to Japan and its people. Prerequisite: JAPANLNG 101 if taken 2012-13 or later (JAPANLNG 117 if taken 2011-12 or earlier).

**OSPKYOTO 103K. Third-Year Japanese Language, Culture, and Communication, Third Quarter. 5 Units.**

(Formerly OSPKYOTO 119K). Continuation of 118K. Goal is to express thoughts and opinions in paragraph length in spoken and written forms. Materials include current Japanese media and literature for native speakers of Japanese. Cultural and social topics related to Japan and its people. Prerequisite: JAPANLNG 102 or OSPKYOTO 102K if taken 2012-13 or later (JAPANLNG 118 if taken 2011-12 or earlier).

**OSPKYOTO 199. Directed Reading. 1-4 Units.**

Course may be repeated for credit.

**OSPKYOTO 210K. Advanced Japanese. 5 Units.****OSPKYOTO 215X. The Political Economy of Japan. 4-5 Units.**

Institutions and processes in the political organization of economic activity in modern Japan. The interaction of public and private sector institutions in the growth of Japan's postwar economy. The organization and workings of key economic ministries and agencies of the government, private sector business groupings, government interaction, and public policy making. The transformation of Japanese industrial policy from the rapid growth of heavy and chemical industries to the promotion of high technology and communications industries. The international, political, and economic ramifications of the structure and importance of Japanese capitalism.

# Overseas Studies in Madrid Courses

## **OSPMADRD 14. Introduction to Spanish Culture. 1 Unitss.**

Required for Madrid students. Spain's historical, physical, and sociocultural diversity. Includes a weekend study trip and other cultural encounters. Linguistic skills and cultural knowledge through museum visits, readings, and writing a paper in Spanish. Study trips: Autumn Quarter to Cantabria-León and Basque country; Winter Quarter to Andalusia and Extremadura; Spring Quarter to Catalonia and Galicia.

## **OSPMADRD 15. Flamenco Dance. 1 Unitss.**

Practical instruction. The rhythms and styles of flamenco and the expression of feelings proper to this art form which synthesizes song, music, and dance. *Zapateado* (footwork), *braceo* (arm positions and movement technique), and choreographies, including Rumba flamenca and Sevillanas. Enrollment limited. May be repeated for credit.

## **OSPMADRD 27. The Political and Economic Geography of Cities: Madrid in Comparative Perspective. 4 Units.**

Variation in urban form across a diverse set of cities: segregation; spatial distribution of income, class, race, and other social groups; suburbanization; transportation technology. Long-term developments in urban form and differential patterns of segregation as they connect to political geography. Implications of urban form for political segregation, and implications of this segregation for electoral politics and representation. Comparison to larger group of Spanish cities as well as some in Europe and N. America. Work with GIS software and low-level census and electoral data.

## **OSPMADRD 29. Independent Studies in Political Science. 4 Units.**

Develop independent study curriculum on one of the following topics: the political economy of institutions, the European Union, or federalism, devolution, and multi-layered government. Meet with instructor before the quarter begins to craft a syllabus. Periodic meeting with the instructor to discuss readings and prepare a final research paper.

## **OSPMADRD 33. Spanish Language Tutorial. 2 Units.**

May be repeated for credit. Prerequisite: three years of Spanish at Stanford or placement.

## **OSPMADRD 40. Introduction to Literary and Cultural Analysis in the Spanish World. 4-5 Units.**

Technical and cultural vocabulary and methods to examine literary criticism in the literary genres, movements, and history of literature written in Spanish. Skills to consider Spanish texts critically.

## **OSPMADRD 41. Dissidence and Continuity: Spanish Theater, 1907 to the Present. 4-5 Units.**

Tradition, transformation, experimentation, rupture, renovation, and innovation in the theater in Spain as a reflection of the artistic, social and historical commotion that led to the Spanish Civil War, Franco, and the present democratic monarchy. Ortega y Gasset, Benavente, Grau, Valle-Inclán, García Lorca, Buero Vallejo, Sastre, Arrabal, Fernán Gómez, Paloma Pedrero, Yolanda Pallín or other playwrights who may be staged in Madrid theaters.

## **OSPMADRD 42. A European Model of Democracy: The Case of Spain. 5 Units.**

Current Spanish political system, its main judicial and political institutions, outstanding actors' and the political process of the last decade. Historic antecedents; immediate precedents; and the current political system and life. Relation between the elements that constitute a political system; results of the process of democratization; integration to the EU.

## **OSPMADRD 43. The Jacobean Star Way and Europe: Society, Politics and Culture. 5 Units.**

The Saint James' Way as a tool to understand historic dynamics from a global perspective. Its effect on the structures that form a political and institutional system, and its society, economy, and ideology.

## **OSPMADRD 45. Women in Art: Case Study in the Madrid Museums. 4 Units.**

Viewing the collections at the Prado Museum through study and analysis of the representations of women. Contemporary literary texts and images that situate paintings in the historical, social, and political conditions that produced the works.

## **OSPMADRD 46. Drawing with Four Spanish Masters: Goya, Velázquez, Picasso and Dali. 3 Units.**

Approaches, techniques, and processes in drawing. Visits to Madrid museums to study paintings and drawings by Goya, Velázquez, Picasso, and Dalí and to explore the experience of drawing. Subject matter: the figure, still life, interiors, landscape, and non-representational drawing. No previous experience required. Enrollment limited.

## **OSPMADRD 48. Spain: A country of New Immigrants. 3 Units.**

Open only to students participating in the Marseille Workshop on Immigration. Dimensions of recent migratory phenomena in Spain. Changes in past decade from a country of emigration to one of immigration, especially from North Africa, Latin America, and Eastern Europe. Social concern and public debate resulting from this change. Permission of instructor required.

## **OSPMADRD 50. Flirting with Spanish Metafiction: Cervantes, Velázquez, Fuentes, Almodóvar. 4-5 Units.**

Literary theory and critical analysis of peninsular and Latin American texts. Emphasis is on the origins and development of self-conscious fiction (metafiction). Works by Cervantes, Velázquez, Unamuno, Borges, Fuentes, Torrente Ballester, and Almodóvar. Attendance at music, art, cinema, and Spanish novelist events. In Spanish.

## **OSPMADRD 54. Contemporary Spanish Economy and the European Union. 5 Units.**

Concepts and methods for analysis of a country's economy with focus on Spain and the EU. Spain's growth and structural change; evolution of Spain's production sectors, agriculture, industry, and services; institutional factors such as the labor market and public sector; Spain's economic international relations, in particular, development of the EU, institutional framework, economic and monetary union, policies related to the European economic integration process, and U.S.-EU relationship.

## **OSPMADRD 57. Health Care: A Contrastive Analysis between Spain and the U.S.. 5 Units.**

History of health care and evolution of the concept of universal health care based on need not wealth. Contrast with system in U.S. Is there a right to health care and if so, what does it encompass? The Spanish health care system; its major successes and shortcomings. Issues and challenges from an interdisciplinary perspective combining scientific facts with moral, political, and legal philosophy.

## **OSPMADRD 60. Integration into Spanish Society: Service Learning and Professional Opportunities. 5 Units.**

Engagement with the real world of Madrid through public service work with NGOs and public service professions such as teaching. Depending on availability, topics relevant to present-day Spain may include: the national health plan, educational system, immigration, prostitution, refugees, youth, and fair trade. Fieldwork, lectures, and research paper. Limited enrollment. May be repeated for credit. Prerequisite: two years of college level Spanish or equivalent.

**OSPMADR 61. Society and Cultural Change: The Case of Spain. 5 Units.**

Complexity of socio-cultural change in Spain during the last three decades. Topics include: cultural diversity in Iberian world; social structure; family in Mediterranean cultures; ages and generations; political parties and ideologies; communication and consumption; religion; and leisure activities.

**OSPMADR 62. Spanish California: Historical Issues. 5 Units.**

Spanish exploration and colonization of California from the 16th century to the end of the Spanish colonial period in 1821. Themes include: geographical explorations in the context of European colonial expansion; demographic evolution of Native American inhabitants and immigrant population; general social and economic development of the colony; controversies surrounding the mission system; role of the Pacific coasts of North America in the Spanish enlightenment and in strategies for imperial defense and development in the revolutionary era of the late 18th and early 19th centuries.

**OSPMADR 71. Sociology of Communication. 5 Units.**

Understanding the sociocultural diversity of communication in Spain with the help of theoretical and practical tools. How communication happens through language and other means; significance of images in today's world; vision of the world produced by media; problems of social communication from perspective of reception. Offered at the Universidad Complutense with an additional tutorial for Stanford students.

**OSPMADR 72. Issues in Bioethics Across Cultures. 5 Units.**

Ethical dilemmas concerning the autonomy and dignity of human beings and other living creatures; principles of justice that rule different realms of private and public life. Interdisciplinary approach to assessing these challenges, combining scientific facts, health care issues, and moral philosophy. Sources include landmark bioethics papers.

**OSPMADR 74. Islam in Spain and Europe: 1300 Years of Contact. 5 Units.**

Primary problems and conflicts in the contemporary Islamic world and its relations with the West, as well as the relationship between Spain and Islam throughout history. Special attention to the history of al-Andalus, an Islamic state in the Iberian Peninsula during the Middle Ages, evaluating the importance of its legacy in Europe and in contemporary Spain. Spain's leading role in relations between Europe and the Mediterranean Islamic states from the Modern Era to the present day.

**OSPMADR 75. Sefarad: The Jewish Community in Spain. 5 Units.**

The legacy of Sefarad, the Jewish community in Spain. Historical evolution of the Sephardic community, under both Muslim and Christian rule, including the culmination of Anti-Semitism in 1492 with the expulsion of the Jews. Cultural contribution of the Hebrew communities in their condition as a social minority, both in al-Andalus, the peninsular Islamic State, and in the peninsular Christian kingdoms.

**OSPMADR 102M. Composition and Writing Workshop for Students in Madrid. 3-5 Units.**

Advanced. Writing as craft and process, emphasizing brainstorming, planning, outlining, drafting, revising, style, diction, and editing. Students choose topics related to their studies. Prerequisite: 13, 23B, or equivalent placement.

**OSPMADR 120. The Sounds of Spanish. 5 Units.**

Introduction to phonetics and phonology based on data from Spanish. Sound system of Spanish and its acquisition as first and second language. How sounds of Spanish have changed over time and how they differ depending on where the language is spoken. Special emphasis on correct articulation of Spanish sounds and on differences between English and Spanish pronunciation. Also some phonetic methods and techniques such as articulatory description and phonetic transcription.

**OSPMADR 199A. Directed Reading. 1-5 Units.**

## Overseas Studies in Moscow Courses

**OSPMOSC 10M. Intensive First-Year Russian. 8 Units.****OSPMOSC 15. Academic Internship. 2-3 Units.**

Placements in areas such as banking, finances, consulting, journalism, language teaching, and technology. Introduction to Russian society and work experience. Evaluation and analysis of experience in final academic paper.

**OSPMOSC 40. The Challenge of Immigration: Social, Political and Cultural Dimensions. 2-3 Units.**

How immigration of the last decades has changed European nations, including Russia. Topics include: Global migration in the contemporary scholarly discussion; 'old' and 'new' immigration countries; citizenship politics in Europe, Russia and FSU countries; national and regional immigration patterns; diversity management on administrative and public level; transformation of cultural landscape caused by immigration.

**OSPMOSC 51M. Second-Year Russian. 5 Units.****OSPMOSC 62. Economic Reform and Economic Policy in Modern Russia. 5 Units.**

Russian economic history in the 20th century. Reasons and logic for economic transformation, major components of postcommunist economic transformation doctrine, and results of practical implementation. Mechanisms of economic policy decision making in modern Russia, and patterns of and alternatives in economic development.

**OSPMOSC 68. From Science to Market: Technical Innovation Policy in Post-Soviet Russia. 5 Units.**

Evolution and nature of government science and innovation policy beginning after the breakup of the Soviet Union and its impact, aiming to understand why science did not turn into business. Among topics explored are: what has been inherited from the Soviet times and why the legacy is so strong; what was Russian government trying to reform in science; birth of innovation policy and its relation to science policy in Russia; results that have been achieved; what could be done; and what may be learned about Russia from the science and innovation perspective.

**OSPMOSC 71. Independent Study on Organization, Culture, and Russian Society. 2-4 Units.**

Students select topics in area of interest such as Comparative Study of Organizations an Management, National Culture and the Organization of Work, Legacy of State Socialism and Social Change in Russia, or Russia in Literature and History.

**OSPMOSC 72. Space, Politics, and Modernity in Russia. 5 Units.**

The idea of space as a key to understanding Russian politics and governance, economy, society, and culture. Phenomenology of Russian space: structure, topology, and features, including notions of enormity. Space in its relation to state power; how geography shaped Russian history and politics. Reification of space-state relationship on levels such as economy, politics and administration, security and social mobility, nationalism and imperialism, culture and language, and habits and ways.

**OSPMOSC 73. Formal Organizations. 5 Units.**

Basic concepts and theoretical logics for analyzing formal organizations such as schools, hospitals, firms, and government agencies. Multidisciplinary approach to interpret and explain organizational phenomena, with special attention to complementary perspectives drawn from sociology, economics, and psychology. Organization research literature and specific cases, especially those related to Russian and related societal contexts, to illustrate the applications of the analytic models and concepts in real world organizations.

**OSPMOSC 74. Post-Soviet Eurasia and SCO: Society, Politics, Integration. 5 Units.**

Analysis of the opportunities and challenges for political, economic, and military cooperation within the Shanghai Cooperation Organization (SCO). Likelihood of SCO's aspirations being realized and the potential of its becoming a political and military counterbalance to the West. Issues related to national security and security perceptions of post-Soviet states and China, their economic and energy ambitions and needs, and the role of external players in the region.

**OSPMOSC 111M. Third-Year Russian. 5 Units.****OSPMOSC 177M. Fourth-Year Russian. 5 Units.****OSPMOSC 181M. Fifth-Year Russian. 5 Units.**

Same as: SLAVLANG 181M.

**OSPMOSC 199A. Directed Reading. 2-5 Units.**

## Overseas Studies in Oxford Courses

**OSPOXFRD 15. British Architecture and the Renaissance: 1500-1850. 4-5 Units.**

The influence of classicism and the Renaissance. Insights into European art and architecture and the history of Britain from the Tudor era to the Industrial Revolution. Study trips to London and elsewhere in England.

**OSPOXFRD 17. Novels of Sensation: Gothic, Detective Story, Prohibition, and Transgression in Victorian Fiction. 5 Units.**

Literary and moral value of transgressive sub-genres of the novel; what they reveal about Victorian society's anxiety over prohibited elements in the domestic and public spheres. Sources include gothic and detective novels.

**OSPOXFRD 18. Making Public Policy: An Introduction to Political Philosophy, Politics, and Economics. 4-5 Units.**

UK and U.S. What should society look like? How should incomes be distributed? How should it be taxed? How much inequality is acceptable? The overlap of economics with practical politics through political philosophy behind the government decisions; how public policy ought to be formulated. Issues include poverty, environmental policy, trade and globalization, and transport.

**OSPOXFRD 24. British and American Constitutional Systems in Comparative Perspective. 4-5 Units.**

Introduction to the study of constitutions and constitutional systems of government. The workings of the British and American systems of government. Comparative study of the most important constitutional issues facing Britain and the U.S. such as how suspected terrorists should be treated in a time of war. How to think about fundamental constitutional questions.

**OSPOXFRD 35. Modern UK and European Government and Politics. 4-5 Units.**

Background of main political systems in Europe and recent developments in European politics. Topics: Blair's constitutional reforms; the consequences of the German reunification; Berlusconi's rise to power in Italy; the extreme right in France and elsewhere; the single currency; the enlargement of the EU; and proposals for a constitution and their recent rejection by the French and Dutch electorates.

**OSPOXFRD 43. Anthropology, Material Culture, and the Meanings of Space. 4 Units.**

Local and global consequences of the use of space. Effects of transition; experiences of individual and societal realms of perception and reception of material culture. Material culture found in museums and archive collections in Oxford, including objects, paintings, photographs and film footage, as well as the structures that house them. Notion of representation, how we interact with tangible and intangible spaces, and how we position ourselves in the process.

**OSPOXFRD 45. British Economic Policy since World War II. 5 Units.**

Development of British economic policy making from 1945, focusing on political economy including: ideological motives of governments; political business cycle; and the influence of changing intellectual fashions. Policy areas: attitude to the pound; control of the business cycle; and the role of the state in the economy. Prerequisite: ECON 50.

**OSPOXFRD 46. Organizations and Society. 3 Units.**

Shared structural elements of entities as diverse as churches, museums, multinational corporations, and social service agencies. Apply sociological theories to understand these common elements, as well as to examine sectoral and national differences in the rate of formation of new organizations.

**OSPOXFRD 52. The Education of Immigrant and Minority Populations in England. 4-5 Units.**

The education of Irish, Caribbean, and South Asian immigrants in English schools. Defining the historical circumstances of each group's entrance to and reception by their new country. Special attention to two contrast cases: first, the social circumstances of minority education in the United States and, second, the history of Jewish education in England. Fieldwork in local schools, community groups, or families required.

**OSPOXFRD 54. Understanding Learning Spaces. 4-5 Units.**

Learning space designs through the centuries as seen in Oxford's architecture, from gothic and historical to modern, post-modern, and virtual spaces. Examination of the traditional Oxford tutorial and its environs, as well as learning pedagogies and spaces that are forward looking, to see how form and function meld to meet needs of teaching and learning. Reading, discussion, exploration, and design of spaces. Frameworks and methods that support breakthrough thinking about learning and space.

**OSPOXFRD 56. Global Trends and National Decisions. 4-5 Units.**

Trends and drivers that will shape events, and constrain or expand opportunities for selected countries or regions during the period between 2012 and 2025. Trends and drivers to be examined include demography; climate change; competition for energy, water, and other resources; globalization; the rise of China, India, and others; nuclear power and nuclear proliferation; growing wealth and growing inequality; and decreasing capabilities of governments to manage developments inside (and across) their administrative boundaries. Analysis informed by studies in the National Intelligence Council's Global Trends series, prepared by the non-partisan Foreign Policy Association for its Great Decisions series.



**OSPOXFRD 57. The Rise of the Woman Writer 1660-1860. 5 Units.**  
Emergence and rise of the professional woman writer from playwright and Royalist spy Aphra Behn (1640-89) to novelist and proto-feminist Charlotte Bronte (1816-55). How women writers dealt with criticism for writing publicly, placing each author and text in its historical and literary context. Range of poets, playwrights, and novelists including Eliza Haywood, Frances Burney, and Mary Elizabeth Braddon. Topics: gender roles and proto-feminism, the public versus the private sphere, sexuality, courtship and marriage.

**OSPOXFRD 60. Shakespeare and his Contemporaries. 5 Units.**  
Study of Shakespeare's work alongside that of his contemporaries. Characteristics of his art as well as insight into this period of British history. Visits to performances of plays.

**OSPOXFRD 64. Directed Reading on Intelligence and National Security. 3 Units.**  
Roles and limitations of intelligence in understanding the objectives, priorities, approaches, and instruments of American foreign policy. Focus on selected roles, missions, and methods of the US Intelligence Community and how intelligence professionals, primarily analysts, interact with national decision makers.

**OSPOXFRD 75. Islam in the Public Sphere: the Dialogue Between the Sacred and the Secular. 3 Units.**  
Case studies from different European countries addressing topics including success or failure of each country in responding to different religious traditions; influence of movements such as Sufism; debate over multiculturalism.

**OSPOXFRD 92. Britain and the Second World War. 5 Units.**  
Britain's economy, society, and culture after its participation throughout the whole length of the war, 1939-1945; subsequent relations with rest of the world. Chronological account and interpretation of participation; effect of the war on British people, especially civilians. Historical scholarship, contemporary writings, propaganda films and feature films, art and photography, and recent television documentaries with reminiscences of participants.

**OSPOXFRD 98. Creative Writing Workshop. 3 Units.**  
Selection and combination; poetic language; metaphor and cohesion; setting and the pathetic fallacy; sentence variety; genres; dialogue; point of view; narrative positions; colors and senses; time management; plotting. Limited enrollment based on writing sample.

**OSPOXFRD 117W. Gender and Social Change in Modern Britain. 4-5 Units.**  
Changes in the social institutions, attitudes, and values in Britain over the past 20 years with specific reference to shifts in gender relations. Demographic, economic and social factors; review of theoretical ideas. Men's and women's shifting roles in a fast-moving society.

**OSPOXFRD 163X. Shakespeare: Critical Commentary. 5 Units.**  
Close reading technique. Topics include the use of soliloquy, epilogues, alternation of prose and verse, rhetoric, meta-theatricality.

**OSPOXFRD 195A. Tutorial in Anthropology. 6-7 Units.**

**OSPOXFRD 195B. Tutorial in Biology. 6-7 Units.**

**OSPOXFRD 195C. Tutorial in Classics. 6-7 Units.**

**OSPOXFRD 195E. Tutorial in Drama. 6-7 Units.**

**OSPOXFRD 195F. Tutorial in Economics. 6-7 Units.**

**OSPOXFRD 195G. Tutorial in Economic History. 6-7 Units.**

**OSPOXFRD 195J. Tutorial in Jurisprudence. 6-7 Units.**

**OSPOXFRD 195L. Tutorial in Health Care. 6-7 Units.**  
May be repeated for credit.

**OSPOXFRD 195M. Tutorial in History of Science. 6-7 Units.**

**OSPOXFRD 195N. Tutorial in Human Biology. 6-7 Units.**

**OSPOXFRD 195P. Tutorial: Interdisciplinary. 6-7 Units.**

**OSPOXFRD 195R. Tutorial in International Relations. 6-7 Units.**

**OSPOXFRD 195T. Tutorial in Literature. 6-7 Units.**

**OSPOXFRD 195U. Tutorial in Music. 6-7 Units.**

**OSPOXFRD 195V. Tutorial in Philosophy. 6-7 Units.**

**OSPOXFRD 195W. Tutorial in Physics. 6-7 Units.**

**OSPOXFRD 195Z. Tutorial in Political Science. 6-7 Units.**

**OSPOXFRD 196A. Tutorial in Psychology. 6-7 Units.**

**OSPOXFRD 196B. Tutorial in Religion. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196C. Tutorial in Sociology. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196E. Tutorial in History. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196F. Tutorial in History of Art. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196G. Tutorial in Chemistry. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196K. Tutorial in Zoology. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196M. Tutorial in Public Policy. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 196N. Tutorial in Mathematics. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197A. Tutorial in Anthropology. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197B. Tutorial in Biology. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197C. Tutorial in Classics. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197E. Tutorial in Drama. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197F. Tutorial in Economics. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197J. Tutorial in Jurisprudence. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197L. Tutorial in Health Care. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197M. Tutorial in History of Science. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197N. Tutorial in Human Biology. 6-7 Units.**  
Course may be repeated for credit.

**OSPOXFRD 197P. Tutorial: Interdisciplinary. 6-7 Units.**

Course may be repeated for credit.

**OSPOXFRD 197R. Tutorial in International Relations. 6-7 Units.**

Course may be repeated for credit.

**OSPOXFRD 197T. Tutorial in English Literature. 6-7 Units.**

Course may be repeated for credit.

**OSPOXFRD 197U. Tutorial in Music. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 197V. Tutorial in Philosophy. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 197Z. Tutorial in Political Science. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198A. Tutorial in Psychology. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198B. Tutorial in Religion. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198C. Tutorial in Sociology. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198E. Tutorial in History. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198F. Tutorial in History of Art. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198K. Tutorial in Zoology. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198M. Tutorial in Public Policy. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 198N. Tutorial in Mathematics. 6-7 Units.**

May be repeated for credit.

**OSPOXFRD 199A. Directed Reading A. 2-4 Units.**

Course may be repeated for credit.

**OSPOXFRD 199B. Directed Reading B. 2-5 Units.**

Course may be repeated for credit.

**OSPOXFRD 199D. Directed Reading. 1-3 Units.**

Course may be repeated for credit.

**OSPOXFRD 221Y. Art and Society in Britain. 4-5 Units.**

Themes in 18th-, 19th-, and 20th-century British art. Painting, sculpture, and design. Comparisons between the British experience and that of continental Europe and the U.S. Readings address questions related to the role of art in modern society. Limited Enrollment.

## Overseas Studies in Paris Courses

**OSPPARIS 5. French Language Intensive. 1 Unitss.****OSPPARIS 10. Engineering Research Internship. 6 Units.**

For Paris Program students with academic experience in electronics, telecommunications or signal and image processing. Under direct guidance of researchers at Institut Supérieur d'Electronique de Paris (ISEP), and where applicable, in collaboration with other French and international graduate students, contribute to the ISEP's ongoing research projects.

**OSPPARIS 11. Special Internship. 1-6 Units.**

Often initiated by special contacts between students and professionals in France. Involvement may be based more on field work, and activity, rather than on fulfilling traditional academic requirements. Prerequisites: Written permission from the program director.

**OSPPARIS 12. Paris Photography Workshop. 3 Units.**

Exploration of Paris through camera and lab techniques. Both theoretical and practical aspects of creative photography. Extensive field work. Enrollment limited.

**OSPPARIS 12B. Music Workshop: Singing in French. 3 Units.**

French culture through group singing. Collaborative project provides practice in pronunciation, exposure to subtleties of the language, and an introduction to French culture. French songs from the past one hundred years. Possible performance at the end.

**OSPPARIS 13. Biology Research Internship. 6 Units.**

Laboratory of the National Museum of Natural History. Work with international research team on project elucidating the origin of the diversity of animal form. Modern techniques in functional genomics. Applied questions on human development in an environment where embryology, paleontology and medicine converge. Two days a week commitment required.

**OSPPARIS 14. Media Internship. 3 Units.**

Case studies and independent research as groundwork for comparative analysis of media on both sides of the Atlantic. Nature of media in the U.S. and in France. Media as a means for understanding culture.

**OSPPARIS 15. Hospital Internship. 3 Units.**

Observation of medical services in Paris hospitals. How hospital teams work in France; how medical decisions are made; how patients are treated by nurses and doctors.

**OSPPARIS 16A. French Schooling Internship. 2-3 Units.**

Working with French schoolchildren in one of three settings: a neighborhood support association in the outskirts of Paris; or two after-school support association in the city. Commitment for a minimum of three hours a week on site plus meetings with internship instructor and a final paper. Number of placements depends on the needs of the sponsoring institutions. Previous work with children advised.

**OSPPARIS 19. Arranged Internship 1. 3-6 Units.**

Two-quarter stay required. Internships can be arranged in a number of areas including the arts, architecture, politics, engineering, marketing and PR, media and journalism, health and psychological services, IT, NGO's, research, and hospitality administration.

**OSPPARIS 19B. Arranged Internship 2. 3-6 Units.**

Two-quarter stay required. Internships can be arranged in a number of areas including the arts, architecture, politics, engineering, marketing and PR, media and journalism, health and psychological services, IT, NGO's, research, and hospitality administration.

**OSPPARIS 22P. Intermediate French I. 5 Units.**

Prerequisite: one year of college French if completed within two quarters of arriving in Paris, or FRENLANG 21C.

**OSPPARIS 23P. Intermediate French II. 4-5 Units.**

Prerequisite: FRENLANG 21C within two quarters of arriving in Paris, or FRENLANG 22C or OSPPARIS 22P.

**OSPPARIS 24. Introduction to French Society. 1 Unitss.**

Required of Paris program participants. Engagement with French society through language immersion, lectures, projects with French students, encounters with prominent figures, and visits to French political and cultural institutions. May be repeated for credit.

**OSPPARIS 29. Colonization, Decolonization and Immigration in France. 5 Units.**

Social and historical phenomena of colonization and decolonization in France during the 20th century, and their relation to the migratory movements that took shape after the Second World War. Case study of Algeria. Topics include: phenomenon of colonization in its administrative, judicial, social, economic and political context; conflicts leading to independence of colonized territories; migration of population before and after decolonization.

**OSPPARIS 30. The Avant Garde in France through Literature, Art, and Theater. 4 Units.**

Multiple artistic trends and esthetic theories from Baudelaire to the Nouveau Roman, from the Surrealists to Oulipo, from the theater of cruelty to the theater of the absurd, from the Impressionists to Yves Klein. Interdisciplinary approach to reflect on the meaning of avant garde and modernity in general, and on the question of why revolutionary artists in France remained in search of institutional recognition, nonetheless.

**OSPPARIS 32. Understanding French Politics. 4-5 Units.**

Key aspects of French politics including the constitutional framework, institutions, political parties and ideology, elections, political cultures, religion and politics, political elites and public policy-making, grass-root citizen participation, decentralization and local politics, and the major issues that structure and inform public debate, including attitudes and policies vis-à-vis the US.

**OSPPARIS 36. French Writing Workshop. 3 Units.**

Offered upon request for students who have completed an Advanced French course. Focus on French writing style, enabling students to understand and master the subtleties of French writing.

**OSPPARIS 40P. Introductory Electronics. 5 Units.**

Electrical quantities and their measurement, including operation of the oscilloscope. Function of electronic components including resistor, capacitor, and inductor. Analog circuits including the operational amplifier and tuned circuits. Digital logic circuits and their functions. Lab assignments. Prerequisite: PHYSICS 43.

**OSPPARIS 41. EAP: Perspective, Volume, and Design. 2 Units.**

May be repeated for credit.

**OSPPARIS 42. EAP: Drawing with Live Models. 2 Units.**

May be repeated for credit.

**OSPPARIS 43. EAP: Painting and Use of Color. 2 Units.**

May be repeated for credit.

**OSPPARIS 44. EAP: Analytical Drawing and Graphic Art. 2 Units.**

May be repeated for credit.

**OSPPARIS 50M. Introductory Science of Materials. 4 Units.**

Topics include: the relationship between atomic structure and macroscopic properties of man-made and natural materials; mechanical and thermodynamic behavior of surgical implants including alloys, ceramics, and polymers; and materials selection for biotechnology applications such as contact lenses, artificial joints, and cardiovascular stents. No prerequisite.

**OSPPARIS 54. The Artist's World: The Workshop, Patronage and Public in 19th and 20th Century France. 4 Units.**

Synergy between artists, their workshops, patrons, models and the public in 19th and 20th century France. Weekly sessions in museums, artists' studios, and special venues within and around Paris, attempting to understand the world of the artist, and how, in many cases, this world became not only a place of refuge, but a metaphor of the artistic creation itself.

**OSPPARIS 60. Representations of Women in Christian Art: Boldness and Virtue. 4 Units.**

Representation of women as biblical heroes and saints in Christian art. Codes of iconography and the attributes of women saints from the Renaissance to the 19th century; underlying social and moral force of these women figures throughout history. Class sessions in Paris museums.

**OSPPARIS 70. Reading and Writing Poetry about Visual Art. 3 Units.**

Study recent poetry written in response to visual art and write such poems. Through study of an array of these poems, learn to identify poetic uses of comparison, resonance, irony, associative leaps, patterns of sound and imagery, shifts in tone and address, and the interplay of line and syntax. On writing trips in the city, collect examples and materials for developing your own poetry.

**OSPPARIS 71. Le meilleur des mondes possibles: French utopias in theory and practice. 4 Units.**

Development of utopian writing in France and what influence those ideas might have had in shaping French history. Readings include selections from Voltaire, Henri de Saint-Simon, Charles Fourier, Étienne Cabet, Flora Tristan, and Pierre-Joseph Proudhon, along with short historical selections that describe the utopian communities that arose in response to these ideas, both in France and in the United States.

**OSPPARIS 72. The Ceilings of Paris. 4 Units.**

Seventeenth century transformation of the ceilings of Paris, religious, private and public. Itinerary of this transformation from artists' initial drawings to their finished work. In conjunction with an exhibition in the Louvre on this topic, study the original drawings as well as the venues in and around Paris. Sites vary from the most illustrious (Versailles) to the lesser known (Hôtel Lauzun). Reflection on the changing religious, social and political aspirations as represented in these new artistic forms.

**OSPPARIS 74. Climate Change Challenges in France and Europe: from Project to Policy. 4 Units.**

Challenge of Climate Change policy-making in conceiving of a project that must be understood and accepted by politicians, and applied on site by the decision makers and managers in today's industrial world. All stages from conception to case studies on the ground. Hands-on class with an engineering perspective focuses on three issues: scientific aspects of tackling climate change; climate change policies, with a strong focus on Europe and France; and low-carbon projects, with a focus on their technical and financial challenges. Operational aspects and tools: climate modeling; monitoring, reporting and verification of greenhouse gases emissions; low-carbon projects at work and their financial closure. Visits to factories.

**OSPPARIS 75. Filming France. 3 Units.**

Documentary HD video production. Study excerpts of documentary films shot in France to understand techniques and directorial choices made at every step of film production (writing, filming, sound recording, editing), while exploring different facets of French culture. Class culminates in the production of a 3-5 minute portrait-film, for which all students will be assigned precise roles in the production of the film. Critique of creative work at different steps of the production process emphasizing technical, aesthetic, and ethical aspects of documentary production.

**OSPPARIS 76. French Existentialism. 3-5 Units.**

Key works by the French existentialists and related figures in order to gain an understanding of this postwar movement. The notions of commitment, the moral of ambiguity, the project of the self, and the critique of humanism as seen in French postwar fiction and philosophy through the works of Albert Camus, Jean-Paul Sartre, Simone de Beauvoir, Gabriel Marcel, and Merleau-Ponty.

**OSPPARIS 77. Paris in the Masterpieces of XIXth Century French Literature. 3-5 Units.**

Through the literature of the time, focus on the location of the action in Paris and the urban changes underway in the century since Baron Haussmann's renovation in the 1860s. A dynamic view of the city as it changed from the middle to the end of the 19th Century through the works of Balzac, Stendhal, Flaubert, Baudelaire and Zola.

**OSPPARIS 81. France During the Second World War: Between History and Memory. 5 Units.**

French politics and society from the causes of the collapse of the French Third Republic and the emergence of the French State at Vichy. The political and cultural measures of this regime in the shadow of Nazi Germany. Anti-Jewish laws and action; deportations by Vichy, the Germans, the French Fascists, and reactions to the fate of the Jews. Visions of the Resistance, the combat for liberation, and WW II in the collective memory of France.

**OSPPARIS 91. Globalization and Its Effect on France and the European Union. 5 Units.**

Economic and political impact of globalization on France and the EU and influence of France and the EU on the process of globalization. Issues of sovereignty and national identity for France; protection from versus integration into the network of globalization.

**OSPPARIS 92. Building Paris: Its History, Architecture, and Urban Design. 4 Units.**

The development of Parisian building and architecture from the 17th century to the present. Interaction of tradition and innovation in its transformation and its historical, political, and cultural underpinnings. Visits and case studies throughout Paris illustrate the formation of the city landscape and its culture.

**OSPPARIS 103A. French Lecture Series 1. 1 Unitss.**

May be repeated for credit.

**OSPPARIS 104A. French Lecture Series 2. 1 Unitss.**

May be repeated for credit.

**OSPPARIS 105A. French Lecture Series 3. 1 Unitss.**

May be repeated for credit.

**OSPPARIS 122X. Challenges of Integration in the European Union. 4-5 Units.**

European integration is now an economic, social, and political reality. This integration has a history of mutation and a transformation of its very foundation. Topics: the evolution of welfare states, elites, political parties, and systems in Europe; lobbies, trade unions, voluntary associations, social movements, popular protest, citizenship, democracy.

**OSPPARIS 124P. Advanced French I. 4-5 Units.**

Prerequisite: FRENLANG 23C or OSPPARIS 23P or equivalent placement.

**OSPPARIS 124X. Building the European Economy: Economic Policies and Challenges Ahead. 5 Units.**

Issues and challenges of European economic construction. The European Economic Union at the end of the 50s; European industrial, agricultural, social, and monetary economic policies. Topics: wider definitions of Europe, its relations with industrial and developing countries, and its challenges in confronting global economic crises.

**OSPPARIS 125P. Advanced French II. 4-5 Units.**

Prerequisite: FRENLANG 23C, or OSPPARIS 23P or equivalent placement.

**OSPPARIS 153X. Health Systems and Health Insurance: France and the U.S., a Comparison across Space and Time. 5 Units.**

Should health systems be organized or left to the free market? What is the role of the state in the delivery of health care? The evolution of the health profession, health policy, and reform in France and the U.S.; measures restraining professional autonomy such as prescription guidelines in the French Medical Convention. Is the solution to the increase of health expenditures and reduced access to health care the end of autonomy for the medical profession?.

**OSPPARIS 180. Paris Special Topics. 1-6 Units.**

May be repeated for credit.

**OSPPARIS 186F. Contemporary African Literature in French. 4 Units.**

Focus is on African writers and those of the diaspora, bound together by a common history of slave trade, bondage, colonization, and racism. Their works belong to the past, seeking to save an oral heritage of proverbs, story tales, and epics, but they are also contemporary.

**OSPPARIS 195C. Paris University: Health and Science 1. 1-6 Units.**

May be repeated for credit.

**OSPPARIS 195D. Paris University: Health and Science 2. 1-6 Units.**

May be repeated for credit.

**OSPPARIS 196C. Paris University: Humanities 1. 1-6 Units.**

May be repeated for credit.

**OSPPARIS 196D. Paris University: Humanities 2. 1-6 Units.**

May be repeated for credit.

**OSPPARIS 196E. Paris University: Humanities 3. 1-6 Units.**

May be repeated for credit.

**OSPPARIS 197C. Paris University: Social Science 1. 1-6 Units.****OSPPARIS 197D. Paris University: Social Science 2. 1-6 Units.****OSPPARIS 198C. Paris University: Engineering 1. 1-6 Units.****OSPPARIS 198D. Paris University: Engineering 2. 1-6 Units.**

## Overseas Studies in Santiago Courses

**OSPSANTG 10. Borges and Argentina. 4-5 Units.**

His work and readings of other key figures of Argentine literature during the period. Close reading technique. Readings in the context of the main developments in Argentine history, and in relationship to the major literary and philosophical trends of the 20th century. Topics include Borges' rejection of the novel, storytelling as a reaction against romanticism, philosophical concerns, paradoxical plot devices, humor, and influence in Latin America. Readings include short stories such as *The Library of Babel* and *The Aleph*, poems and essays, and texts by key Argentine writers of the period including Arlt, Bioy Casares, Silvina Ocampo, and Cortázar.

**OSPSANTG 12S. Accelerated Second-Year Spanish, Part I: Chilean Emphasis. 5 Units.**

Intensive sequence integrating language, culture, and sociopolitics of Chile. Emphasis is on achieving advanced proficiency in oral and written discourse including formal and informal situations, presentational language, and appropriate forms in academic and professional contexts. Prerequisite: one year of college Spanish, or 11 or 21B if taken more than two quarters prior to arriving in Santiago.

**OSPSANTG 13S. Accelerated Second-Year Spanish, Part II: Chilean Emphasis. 5 Units.**

Intensive sequence integrating language, culture, and sociopolitics of Chile. Emphasis is on achieving advanced proficiency in oral and written discourse including formal and informal situations, presentational language, and appropriate forms in academic and professional contexts. Prerequisite: 11 or 21B within two quarters of arriving in Santiago, or 12 or 22B.

**OSPSANTG 14. Women Writers of Latin America in the 20th Century. 4-5 Units.**

Key figures in poetry, narrative fiction, theater, and testimonio, such as Mistral, Garro, Lispector, Poniatowska, Valenzuela, Eltit and Menchú. Close reading technique. Issues raised in literary texts that reflect the evolution of the condition of women in Latin America during the period. Topics include gender differences and relationships, tradition versus transgression, relationship between changes in the status of women and other egalitarian transformations, and women writers and the configuration of literary canons.

**OSPSANTG 24. A Cultural History of Soccer in South America. 3-5 Units.**

History and identity of soccer in South America and its role in the continent's cultural identity. What has been specific - unlike in Europe - about the history of soccer in South America? Is it possible to identify, from an aesthetic point of view, a particular South American continental style - and, within such a South American style, nationally different styles of playing soccer? Soccer as a lens of condensation of South American cultural history.

**OSPSANTG 26. Typology of the "Intellectual" in South America. 3-5 Units.**

Beginning with the early nineteenth century movements of national independence, the influence and actions of public intellectuals in shaping the political history of South American nations. The importance of an intellectual identity for success in South American politics. Which nationally different roles and images has this tradition produced? Is the important role played by public intellectuals in South American politics a symptom of a problem specific to that Continent, or a promising potential for the future?

**OSPSANTG 29. Sustainable Cities: Comparative Transportation Systems in Latin America. 4-5 Units.**

Energy and environmental challenges resulting from the growing size and complexity in Latin American cities. Key issues: way in which public authorities deal with the dynamics of urban growth and complexity; related environmental and energy issues, particularly related to different public transportation models. Systemic approach as seen in Curitiba, Bogota, Santiago, and Medellin. Analysis centering on different approaches used to tackle these related issues; different institutional strategies.

**OSPSANTG 33. Spanish Language Tutorial. 2 Units.**

Prerequisite: two years of college Spanish or equivalent placement. May be repeated for credit.

**OSPSANTG 40. Academic Internship. 2-3 Units.**

May be repeated for credit.

**OSPSANTG 58. Living Chile: A Land of Extremes. 5 Units.**

Physical, ecological, and human geography of Chile. Perceptions of the Chilean territory and technologies of study. Flora, fauna, and human adaptations to regional environments. Guest lectures; field trips; workshops.

**OSPSANTG 62. Topics in Chilean History. 5 Units.**

Independent study topic concerning any aspect of Chilean history such as independence and nation building, social and economic development, ideas and culture, dictatorship and democracy. Research paper based on primary and secondary sources.

**OSPSANTG 68. The Emergence of Nations in Latin America. 4-5 Units.**

Major themes of 19th-century Latin American history, including independence from Spain, the emergence of nation states, and the development of a new social, political, and economic order.

**OSPSANTG 71. Santiago: Urban Planning, Public Policy, and the Built Environment. 4-5 Units.**

Santiago's growth and development over time and in comparison to other mega cities in the world; impact of urban highways on the built environment; shopping malls and the development of new urban sub-centers. Topics: brief history of the city, from 1541 to 1940; urban development since 1940; the 1960 Inter-communal Urban Plan; planning and the configuration of modern Santiago; housing policy as an instrument to combat poverty; social housing policy and Santiago's built environment.

**OSPSANTG 73. An Approach to Cultural History in Latin America through Films. 5 Units.**

Aspects of Chilean culture from different angles, taking into account its history, its cultural environment, and its socio-political situation through films by Chilean directors such as Raúl Ruiz, Alessandro Jodorowski, Miguel Littin and Andrés Wood. Link to South-American continent in general through films by directors such as Nelson Pereira and Arnaldo Jabord from Brasil, Jugo Santiago, Fernando Solanas, and Juan Jose Capanella from Argentina, and Luis Bunuel, Guillermo del Toro and Alfonso Arau from Mexico.

**OSPSANTG 74. Independent Studies in Latin American Literature and Culture. 2-4 Units.**

Major authors such as Pablo Neruda, Jorge Luis Borges, Gabriel Garcia Márquez, Alejo Carpentier or Adolfo Bioy Casares or cultural themes such as Anthropophagia and Carnival in Brazil or Surrealism in Chile.

**OSPSANTG 76. Ecology and Biodiversity of Latin America. 4 Units.**

Significance of the biodiversity of Latin America at the global level for both scientists and society at large. How biodiversity represents natural capital, important for human wellbeing. Challenges to natural capital in the face of current global environmental changes. Field trips to two conservation areas in Chile to understand conservation efforts and challenges.

**OSPSANTG 77. Independent Studies in Biodiversity in Latin America. 3 Units.**

Independent work in biodiversity science or conservation biology in relation to Latin America.

**OSPSANTG 85. Marine Ecology of Chile and the South Pacific. 5 Units.**

Relationships among physical processes in the ocean, biological productivity, and the exploitation of resources by high-trophic-level predators including human beings. Characterization of ecological patterns; identification of processes operating on marine systems. Open ocean ecosystems, intertidal and benthic regions of the world's oceans, and ecological research developed along coastal regions, focusing on Chile's 4,000 km coastline.

**OSPSANTG 102S. Composition and Writing Workshop for Students in Santiago. 3-5 Units.**

Advanced. Writing as craft and process: brainstorming, planning, outlining, drafting, revising, style, diction, and editing. Non-Spanish majors or minors may choose topics related to their studies. Prerequisite: SPANLANG 13C, 13R, 13S, 23B, or equivalent.

**OSPSANTG 116X. Modernization and its Discontents: Chilean Politics at the Turn of the Century. 5 Units.**

Chile's strides towards becoming a developed country have engendered high levels of alienation and disaffection among significant sectors of the population. The roots of this apparent paradox of modernization, focusing on newly emerging actors in the Chilean political scene: Mapuche organizations, women's groups, the environmental movement, and new features of the established ones like trade unions and human rights activists.

**OSPSANTG 118X. Artistic Expression in Latin America. 5 Units.**

Elite, mass-media, and popular cultural changes in Chile under conditions of economic and political liberalization. The reception of cultural meanings from the center of the world social system (U.S., EU, and Japan), reformulation to respond to local conditions, and export in the shape of cultural artifacts. Innovative elements rooted in the regional and local culture.

**OSPSANTG 119X. The Chilean Economy: History, International Relations, and Development Strategies. 5 Units.**

The Chilean economy in five stages, taking into account: the international economic position of Chile; internal economic structures closely related to the inherited historical conditions and to the changing international economic position of the country; and the economic strategies prevalent during the period and the concrete development policies conducted by government authorities.

**OSPSANTG 129X. Latin America in the International System. 4-5 Units.**

Latin America's role in world politics, with emphasis on the history of and models for explaining U.S.-Latin American relations. Latin America's evolving relationship in the international system.

**OSPSANTG 130X. The Chilean Economy in Comparative Perspective. 5 Units.**

Introduction to the main debates and approaches developed to understand and analyze the economies of Latin America. Recent processes of transition to market economies. Common characteristics among countries of the region; the differences and special traits of individual countries. Historical, analytical, and empirical perspectives on topics at the center of controversies and specific policy problems over several decades. Recommended: ECON 1, 51, and 52.

## Pathology Courses

**PATH 101. Cancer Biology. 4 Units.**

Experimental approaches to understanding the origins, diagnosis, and treatment of cancer. Focus on key experiments and discoveries with emphasis on genetics, molecular biology, and cell biology. Topics include carcinogens, tumor virology, oncogenes, tumor suppressor genes, cell cycle regulation, angiogenesis, invasion and metastasis, cancer genomics, cancer epidemiology, and cancer therapies. Discussion sections based on primary research articles that describe key experiments in the field. Satisfies Central Menu Areas 1 or 2 for Bio majors. Prerequisite: Biology or Human Biology core or equivalent, or consent of instructor. Same as: CBI0 101.

**PATH 103Q. Lymphocyte Migration. 1 Unit.**

Preference to sophomores. Lymphocytes migrate from blood vessels into tissues to participate in immune surveillance and the development of inflammation. The lymphocyte and blood vessel endothelial molecules that control lymphocyte migration, and are implicated in the development of human diseases such as asthma, type 1 diabetes, and multiple sclerosis are discussed.

**PATH 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**PATH 206. Epigenetics. 2 Units.**

For graduate students in the Biosciences and upper level Biology undergraduates. Mechanisms by which phenotypes not determined by the DNA sequence are stably inherited in successive cell divisions. From the discovery of position-effect variegation in *Drosophila* in the 1920s to present-day studies of covalent modifications of histones and DNA methylation. Topics include: position effect, gene silencing, heterochromatin, centromere identity, genomic imprinting, histone code, variant histones, and the role of epigenetics in cancer. Prerequisite: BIO41 and BIO42, or GENE 203, or consent of instructor. Same as: BIO 156, BIO 256, GENE 206.

**PATH 210. Stem Cells in Development and Disease. 1-2 Units.**

Molecular and cellular mechanisms underlying the basic self-renewal and differentiation properties of stem cells in multiple tissues and organisms. How abnormal stem cell behavior may contribute to diseases such as cancer. How to manipulate stem cell behavior in vitro or in vivo for therapeutic purposes. Classical papers and recent literatures in the field of stem cell biology. Open to graduate, medical, and advanced undergraduate students. Prerequisite: consent of instructor.

**PATH 213. Gross Autopsy Pathology Laboratory. 2-3 Units.**

Examine/discuss unfixated dissected organs from current autopsies and correlate morphologic findings with the clinical history. Students view postmortem examinations and may participate (in a small group) in one postmortem examination with the assistance of residents and staff, and present the case to the class. Class scheduling is flexible. Additional unit for participation in a postmortem examination. Class may not be repeated. Prerequisite: HHD221.

**PATH 218. Computational Analysis of Biological Information: Introduction to Python for Biologists. 2 Units.**

Physical and computational tools for acquisition, processing, interpretation, and archiving of biological images. Emphasis is on digital microscopy. Intended for biological and clinical trainees without substantial programming experience. Same as: GENE 218, MI 218.

**PATH 233. The Biology of Small Modulatory RNAs. 2 Units.**

Open to graduate and medical students. Explores recent progress and unsolved questions in the field of RNA interference and microRNA biology. Students are required to read assigned primary literature before each class and actively participate in guided discussions on related technical and conceptual issues during class meetings. Assignments include critiques of assigned papers and developing a novel research proposal. Same as: GENE 233, MI 233.

**PATH 234. Fundamentals of RNA Biology. 2 Units.**

For graduate or medical students and (if space allows) to active participants from other segments of the Stanford Community (e.g., TGR students); undergraduates by instructor consent. Fundamental issues of RNA biology, with the goal of setting a foundation for students to explore the expanding world of RNA-based regulation. Each week a topic is covered by a faculty lecture and journal club presentations by students. Same as: GENE 234, MI 234.

**PATH 240. Clinical Studies in Pathology I. 3-9 Units.**

A broad exposure to the practice of pathology in an academic medical center. Students are assigned a faculty mentor and work closely with pathology residents, fellows and faculty. Two months are spent in surgical pathology where students help examine surgical resection specimens and biopsies and participate in making a final diagnosis. One month is spent in autopsy pathology where students perform autopsy prosections and formulate final anatomic diagnoses under the supervision of faculty. This course must be combined with Clinical Studies in Pathology II, and two additional quarters of PATH 399, Directed Research, to fulfill a 12 month Post-Sophomore year Fellowship in Pathology. Prerequisite: MD candidate; instructor consent.

**PATH 241. Clinical Studies in Pathology II. 3-9 Units.**

An in-depth exposure to the practice of pathology for students who have completed Clinical Studies in Pathology I. Students are assigned a faculty mentor and work closely with pathology residents, fellows and faculty. Two months are spent in surgical pathology where students help examine surgical resection specimens and biopsies and participate in making a final diagnosis. One month is spent in sub-specialty areas of pathology that include dermatopathology, neuropathology, renal pathology, lymph node pathology or cytology. This course must be combined with Clinical Studies in Pathology I and two additional quarters of PATH 399, Directed Research, to fulfill a 12-month Post-Sophomore year Fellowship in Pathology. Prerequisite: consent of instructor and successful completion of Clinical Studies in Pathology I (PATH 240).

**PATH 280. Early Clinical Experience in Pathology. 1-2 Units.**

Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

**PATH 290. Pediatric Nonmalignant Hematology and Stem Cell Biology. 2 Units.**

Pediatric hematologic disorders provide an important paradigm to study other developmental systems. Subjects covered include hematopoiesis, basic stem cell biology, endothelial cell development, alternative models to study nonmalignant hematology and stem cell biology (zebrafish and drosophila), defects in white cell function, basic research in stem cell transplantation, state of the art methods in nonmalignant hematology and stem cell biology (genomics, proteomics, and gene therapy), and bioinformatics.

**PATH 299. Directed Reading in Pathology. 1-18 Units.**

Prerequisite: consent of instructor.

**PATH 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**PATH 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Opportunities at the molecular, cellular, and clinicopathologic levels. Prerequisite: consent of instructor.

## Pediatrics Courses

**PEDS 65N. Understanding Children's Health Disparities. 3 Units.**

The social and economic factors that affect children and their health status. The principal sources of disparities in the health of children in the U.S. are not biologic, but social and economic. Topics include ethnic, cultural, and behavioral factors that affect children's health, both directly and indirectly; lack of health insurance; and current proposals for health care reform, focusing specifically on how they will impact existing health disparities among children.

**PEDS 65Q. Understanding Children's Health Disparities. 3 Units.**

The social and economic factors that affect children and their health status. The principal sources of disparities in the health of children in the U.S. are not biologic, but social and economic. Topics include ethnic, cultural, and behavioral factors that affect children's health, both directly and indirectly; lack of health insurance; and current proposals for health care reform, focusing specifically on how they will impact existing health disparities among children. Includes instruction addressing written assignments and required oral presentations.

**PEDS 105. Health Promotion and the Campus Culture. 4 Units.**

Multidisciplinary perspectives of public health and health psychology. The prevalence of health risk behaviors on the contemporary college campus and the challenges of risk reduction. Students apply theoretical frameworks to peer health promotion campus projects. Limited enrollment. Prerequisite: consent of instructor following first meeting. Same as: PEDS 215.

**PEDS 106. Pursuit of Happiness and Health. 3 Units.**

Evidence-based research findings, theoretical concepts and applied experiences related to emotional well-being, and physical and mental health. Topics include basic cognitive neuroscience and psychological research in pro-social emotions, such as gratitude, compassion, forgiveness and mindfulness practice. Course offers lecture, readings, and applied practices that enhance mental health, resiliency and well-being. Emphasis on issues relevant to high-achieving young adults. Same as: PEDS 206.

**PEDS 116. Alcohol Issues and the Campus Culture. 4 Units.**

Multidisciplinary perspectives of public health, health psychology, and sociology. The prevalence and scope of alcohol-related problems; challenges of risk reduction and intervention strategies. Students apply theoretical frameworks to alcohol-related research topics and projects. Limited enrollment. Prerequisite: consent of instructor following first meeting.

**PEDS 130. Pediatrics Journal Club. 1 Unit.**

Open to MD, graduate, and undergraduate students. Each session focuses on a current article in pediatric medicine. Discussions led by faculty experts in the area covered that session. Topics may range widely, depending on the available literature and students' interests. Students are expected to review the chosen article before class and participate in discussion. Discussion includes methodology and statistical analysis of each study and its relevance to pediatric practice. Same as: PEDS 230.

**PEDS 150. Social and Environmental Determinants of Health. 3 Units.**

How race/ethnicity and SES contribute to health disparities, how vulnerable populations are uniquely at health risk, and how the built environment relates to health and wellness. Topics include: gender, age, race/ethnicity, language, education, individual SES and neighborhood SES as related to health; individual and structural race bias; health needs of vulnerable populations (e.g., the homeless, the incarcerated, immigrant populations, children, and uninsured/underinsured); and environmental forces (e.g., urban design/planning, traffic/car culture, green space, housing, food access/culture, law enforcement, and media). Same as: PEDS 250.

**PEDS 159A. Addressing Child Health Disparities through Community-based Service Learning. 2 Units.**

First quarter of a three-quarter service-learning practicum providing opportunities to engage in local community-academic projects aimed at reducing child health disparities. Stanford pediatric residents provide mentorship and guidance during the development and implementation of a community service and/or research project. Topics include principles of community engagement, community-engaged research methodologies, and practical aspects of working with community partners. Interest in health disparities, community engagement, community-based participatory research, reflective learning, and civic responsibility desired. Application required. Same as: PEDS 259A.

**PEDS 159B. Addressing Child Health Disparities through Community-based Service Learning. 2 Units.**

Second quarter of a three-quarter service-learning practicum providing opportunities to engage in local community-academic projects aimed at reducing child health disparities. Stanford pediatric residents provide mentorship and guidance during the development and implementation of a community service and/or research project. Topics include principles of community engagement, community-engaged research methodologies, and practical aspects of working with community partners. Interest in health disparities, community engagement, community-based participatory research, reflective learning, and civic responsibility desired. Prerequisite: PEDS 159A/259A.  
Same as: PEDS 259B.

**PEDS 159C. Addressing Child Health Disparities through Community-based Service Learning. 2 Units.**

Third quarter of a three-quarter service-learning practicum providing opportunities to engage in local community-academic projects aimed at reducing child health disparities. Stanford pediatric residents provide mentorship and guidance during the development and implementation of a community service and/or research project. Topics include principles of community engagement, community-engaged research methodologies, and practical aspects of working with community partners. Interest in health disparities, community engagement, community-based participatory research, reflective learning, and civic responsibility desired. Prerequisite: PEDS 159B/259B.  
Same as: PEDS 259C.

**PEDS 199. Undergraduate Directed Reading/Research. 1-18 Units.**

Prerequisite: consent of instructor.

**PEDS 206. Pursuit of Happiness and Health. 3 Units.**

Evidence-based research findings, theoretical concepts and applied experiences related to emotional well-being, and physical and mental health. Topics include basic cognitive neuroscience and psychological research in pro-social emotions, such as gratitude, compassion, forgiveness and mindfulness practice. Course offers lecture, readings, and applied practices that enhance mental health, resiliency and well-being. Emphasis on issues relevant to high-achieving young adults.  
Same as: PEDS 106.

**PEDS 211. Medical-Legal Issues in Children's Health. 2-4 Units.**

(Same as LAW 643) Explores the link between poverty and children's health and how the medical and legal fields can work together to improve health outcomes for low income children. Weekly class meetings covering medical legal issues such as asthma immigration, health insurance; intake interviews with patient families and analysis of their medical legal issues; group project focused on a medical legal policy issue; final paper cowritten by law and medical students. May be taken for 2 units (weekly 2.5 hour seminar meetings only), 3 units (participation in either intake interviews or policy work) or 4 units (full participation in all course components). Prerequisite: instructor consent. Preference to students committed to full participation.

**PEDS 212. Challenges of Human Migration: Health and Health Care of Migrants and Autochthonous Populations. 3 Units.**

An emerging area of inquiry. Topics include: global migration trends, health Issues/aspects of migration, healthcare and the needs of immigrants in the US, and migrants as healthcare providers: a new area of inquiry in the US. Class is structured to include: lectures lead by the instructor and possible guest speakers; seminar, discussion and case study sessions led by students.  
Same as: HUMBIO 122M.

**PEDS 214. Introduction to Pediatrics Lecture Series. 1 Units.**

Introduction to the various aspects of pediatrics, directed at pre-clinical MD students, undergraduates, or graduate students. Course composed of interactive lectures conducted by pediatric faculty on subjects ranging from normal development to topics in different pediatric subspecialties. current issues in the field, and opportunities for students considering this specialty. Speakers also touch on their career paths and choices and are available to answer questions about their areas of interest. By special arrangement students may have the opportunity to shadow general pediatricians or pediatric specialists. Intended to stimulate interest in pediatrics and to inform students about the breadth of the field.

**PEDS 215. Health Promotion and the Campus Culture. 4 Units.**

Multidisciplinary perspectives of public health and health psychology. The prevalence of health risk behaviors on the contemporary college campus and the challenges of risk reduction. Students apply theoretical frameworks to peer health promotion campus projects. Limited enrollment. Prerequisite: consent of instructor following first meeting.  
Same as: PEDS 105.

**PEDS 222. Beyond Health Care: Seeking Health in Society. 3 Units.**

Available evidence at the national and cross-country level linking social welfare interventions and health outcomes. If and how non-health programs and policies could have an impact on positive health outcomes. Evaluation of social programs and policies that buffer the negative health impact of economic instability and unemployment among adult workers and their children. Examination of safety nets, including public health insurance, income maintenance programs, and disability insurance. Prerequisites: HUMBIO 4B or equivalent, and background in research methods and statistics.  
Same as: HUMBIO 122.

**PEDS 223. Human Rights and Global Health. 3 Units.**

Open to medical students, graduate students, and advanced undergraduates. Examines the newly emerging field of human rights and global health, beginning with the essential background into the field of human rights, and the recent emergence of health as a human right. Emphasis is on the pioneering work of Dr. Paul Farmer and Partners in Health and the challenge he and his organization have posed to the conventional wisdom about approaches to combating poor health and disease worldwide. Topics include the "big three" infectious diseases -- tuberculosis, malaria, and HIV/AIDS -- as well as emerging infectious diseases, clean water and sanitation, and malnutrition and famine.

**PEDS 224. Genocide and Humanitarian Intervention. 3 Units.**

Open to medical students, graduate students, and undergraduate students. Traces the history of genocide in the 20th century and the question of humanitarian intervention to stop it, a topic that has been especially controversial since the end of the Cold War. The pre-1990s discussion begins with the Armenian genocide during the First World War and includes the Holocaust and Cambodia under the Khmer Rouge in the 1970s. Coverage of genocide and humanitarian intervention since the 1990s includes the wars in Bosnia, Rwanda, Kosovo, the Congo and Sudan.  
Same as: HISTORY 224C, HISTORY 324C.

**PEDS 225. Humanitarian Aid and Politics. 3 Units.**

Open to medical students, graduate students, and undergraduate students. Examines the moral dilemmas and political realities that complicate the delivery of humanitarian aid, especially when undertaken by the United Nations and non-governmental organizations (NGOs). Emphasis is on what humanitarians call "complex humanitarian emergencies": crises often characterized by famine and/or epidemic disease and typically the result of war and/or civil war. Provides background into the history of humanitarian aid, though focus is on the post-Cold War era, up to the recent crises in Libya and Syria.



**PEDS 226. Famine in the Modern World. 3 Units.**

Open to medical students, graduate students, and undergraduate students. Examines the major famines of modern history, the controversies surrounding them, and the reasons that famine persists in our increasingly globalized world. Focus is on the relative importance of natural, economic, and political factors as causes of famine in the modern world. Case studies include the Great Irish Famine of the 1840s; the Bengal famine of 1943-44; the Soviet famines of 1921-22 and 1932-33; China's Great Famine of 1959-61; the Ethiopian famines of the 1970s and 80s, and the Somalia famines of the 1990s and of 2011.

**PEDS 230. Pediatrics Journal Club. 1 Unitss.**

Open to MD, graduate, and undergraduate students. Each session focuses on a current article in pediatric medicine. Discussions led by faculty experts in the area covered that session. Topics may range widely, depending on the available literature and students' interests. Students are expected to review the chosen article before class and participate in discussion. Discussion includes methodology and statistical analysis of each study and its relevance to pediatric practice.

Same as: PEDS 130.

**PEDS 231. Medicine for Innovators and Entrepreneurs. 3-4 Units.**

Interdisciplinary, project-based course in which bioscience, bioinformatics, biodesign, bioengineering students learn concepts and principles to understand human disease and work together to propose solutions to medical problems. Diabetes mellitus is used as a paradigm for understanding human disease. Guest medical school and outside faculty. Field trips to Stanford clinics and biotechnology companies. Prerequisite: college level biology.

Same as: IMMUNOL 231.

**PEDS 250. Social and Environmental Determinants of Health. 3 Units.**

How race/ethnicity and SES contribute to health disparities, how vulnerable populations are uniquely at health risk, and how the built environment relates to health and wellness. Topics include: gender, age, race/ethnicity, language, education, individual SES and neighborhood SES as related to health; individual and structural race bias; health needs of vulnerable populations (e.g., the homeless, the incarcerated, immigrant populations, children, and uninsured/underinsured); and environmental forces (e.g., urban design/planning, traffic/car culture, green space, housing, food access/culture, law enforcement, and media).

Same as: PEDS 150.

**PEDS 251A. Medical Ethics I. 2 Units.**

Required for Scholarly Concentration in Biomedical Ethics and Medical Humanities. The field of bioethics, including theoretical approaches to bioethical problems. Contemporary controversies and clinical cases. Values that arise in different situations and clinical encounters. Issues include: genetics and stem cell research, rationing, ethical issues in care at the end of life, organ transplantation issues.

**PEDS 251B. Medical Ethics II. 2 Units.**

The integration of ethical theory with applications of theory or conceptual issues in medicine, health care, and the life and social sciences. Topic varies by year. Possible topics include: ethical issues in stem cell research; death and dying; genetics and ethics; concepts of health and disease; the ethics of international research; and ethical implications of new reproductive technology.

**PEDS 254. Pediatric Physical Findings Rounds. 1 Unitss.**

Pediatric patients with specific physical findings and hospitalized at LPCH are identified and introduced to students. Students in small groups examine patients at the bedside to note the physical finding and discuss it within the context of the patient's clinical problem. Emphasis is on basic science discussion to understand the cause of the finding.

**PEDS 259A. Addressing Child Health Disparities through Community-based Service Learning. 2 Units.**

First quarter of a three-quarter service-learning practicum providing opportunities to engage in local community-academic projects aimed at reducing child health disparities. Stanford pediatric residents provide mentorship and guidance during the development and implementation of a community service and/or research project. Topics include principles of community engagement, community-engaged research methodologies, and practical aspects of working with community partners. Interest in health disparities, community engagement, community-based participatory research, reflective learning, and civic responsibility desired. Application required.

Same as: PEDS 159A.

**PEDS 259B. Addressing Child Health Disparities through Community-based Service Learning. 2 Units.**

Second quarter of a three-quarter service-learning practicum providing opportunities to engage in local community-academic projects aimed at reducing child health disparities. Stanford pediatric residents provide mentorship and guidance during the development and implementation of a community service and/or research project. Topics include principles of community engagement, community-engaged research methodologies, and practical aspects of working with community partners. Interest in health disparities, community engagement, community-based participatory research, reflective learning, and civic responsibility desired. Prerequisite: PEDS 159A/259A.

Same as: PEDS 159B.

**PEDS 259C. Addressing Child Health Disparities through Community-based Service Learning. 2 Units.**

Third quarter of a three-quarter service-learning practicum providing opportunities to engage in local community-academic projects aimed at reducing child health disparities. Stanford pediatric residents provide mentorship and guidance during the development and implementation of a community service and/or research project. Topics include principles of community engagement, community-engaged research methodologies, and practical aspects of working with community partners. Interest in health disparities, community engagement, community-based participatory research, reflective learning, and civic responsibility desired. Prerequisite: PEDS 159B/259B.

Same as: PEDS 159C.

**PEDS 280. Early Clinical Experience. 2-4 Units.**

Provides students an opportunity to see patients and correlate clinical findings with preclinical coursework. Students spend a half day or a full day in a pediatric subspecialty clinic (e.g., infectious diseases, endocrine, gastroenterology), participate in conferences and accompany attending physicians. Students have directed reading and meet with faculty for one hour per week to discuss their reading.

**PEDS 281. Childhood Chronic Illness: Impact on Family Development. 1 Unitss.**

The Pals Program is a volunteer activity serving Lucile Packard Children's Hospital chronically ill patients and their siblings. Modeled after the Big Brother/Big Sister Program, Pals matches first- and second-year medical students with pediatric patients or their siblings. The patients and/or their siblings enjoy the support and companionship of their Pals, and the medical students learn firsthand about the emotional and social aspects of chronic illness during childhood. Pals meet regularly throughout the year to participate in fun activities such as movies, ball games, museums, and picnics. The activities and personal relationships are overseen by the LPCH Pals social worker. Bimonthly class meetings introduce the students to pediatric chronic diseases such as leukemia, cystic fibrosis and pulmonary hypertension. The class brings in physicians to give the medical perspective as well as patients and families to get their perspective. Prerequisite: approval of the LPCH social worker for Pals.

**PEDS 282. Pregnancy, Birth, and Infancy. 3 Units.**

Comprehensive clinical experience where pre-clinical medical students follow pregnant women receiving care at Stanford hospitals to attend prenatal visits, delivery, and postnatal visits. Continuity clinic format, combined with didactic lessons and discussion seminars. Students are exposed to clinical activities in a meaningful context, bolstering classroom studies in anatomy, physiology, embryology and human development, and emphasizing social, economic, and personal issues related to medicine. This program spans one quarter, covering topics related to pregnancy, labor and delivery and newborn care. In addition to clinic experiences, students are expected to spend 1-2 hours/week in lectures and to complete a reflection of their experiences in the course. Prerequisite: pre-clinical medical student. Same as: OBGYN 282.

**PEDS 299. Directed Reading in Pediatrics. 1-18 Units.**

Prerequisite: consent of instructor.

**PEDS 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**PEDS 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members.

## Philosophy Courses

**PHIL 1. Introduction to Philosophy. 5 Units.**

Is there one truth or many? Does science tell us everything there is to know? Can our minds be purely physical? Do we have free will? Is faith rational? Should we always be rational? What is the meaning of life? Are there moral truths? What are truth, reality, rationality, and knowledge? How can such questions be answered? Intensive introduction to theories and techniques in philosophy from various contemporary traditions.

**PHIL 2. Introduction to Moral Philosophy. 5 Units.**

A survey of moral philosophy in the Western tradition. What makes right actions right and wrong actions wrong? What is it to have a virtuous rather than a vicious character? What is the basis of these distinctions? Why should we care about morality at all? Our aim is to understand how some of the most influential philosophers (including Aristotle, Kant, and Mill) have addressed these questions, and by so doing, to better formulate our own views. No prior familiarity with philosophy required. Fulfills the Ethical Reasoning requirement.

Same as: ETHICSOC 20.

**PHIL 6N. Pictures and the Imagination. 3 Units.**

Paintings, drawings, and photographs often function as pictures or images of the preexisting things they take as subjects. They represent these subjects from specific spatial vantage points in ways that may be more or less definite, more or less detailed, and more or less faithful to what the subjects are actually like. One longs to know how this works: how vision, imagination, and background knowledge come together when we experience a picture as a picture. Certain forms of imagining and remembering involve mental picturing, mental imagery. Sometimes we imagine or remember things in visual terms from a specific spatial vantage point, with the result that we feel brought face to face with the things imagined or remembered, however far away they may actually be. How is the physical picturing that goes on in paintings, drawings, and photographs both like and unlike the mental picturing that goes on when things swim before the mind's eye? What role does mental picturing play in physical picturing? What kinds of artistic value and interest attach to paintings, drawings, and photographs in virtue of what they picture and how they picture it?.

**PHIL 8N. Free Will and Responsibility. 4 Units.**

In what sense are we, or might we be free agents? Is our freedom compatible with our being fully a part of the same natural, causal order that includes other physical and biological systems? What assumptions about freedom do we make when we hold people accountable morally and/or legally? When we hold people accountable, and so responsible, can we also see them as part of the natural, causal order? Or is there a deep incompatibility between these two ways of understanding ourselves? What assumptions about our freedom do we make when we deliberate about what to do? Are these assumptions in conflict with seeing ourselves as part of the natural, causal order? We will explore these and related questions primarily by way of careful study of recent and contemporary philosophical research on these matters.

**PHIL 9N. Philosophical Classics of the 20th Century. 4 Units.**

Last century's best and most influential philosophical writings. Topics include ethics (what is the nature of right and wrong?), language (how do meaning, reference, and truth arise in the natural world?), science (can science claim objectively accurate descriptions of reality?), existence (are there things that don't exist?), and the mind (could robots ever be conscious?). Authors include Bertrand Russell, Ludwig Wittgenstein, Rudolf Carnap, Willard Quine, Thomas Kuhn, John Rawls, and Saul Kripke. The lay of the land in contemporary philosophy.

**PHIL 10N. Traveling Through Time. 3 Units.**

Is time travel possible? Yes. We do it every day, at the rate of one minute per minute. Relativity theory even suggests a sense in which we could travel to the distant future. But could we travel to the past? If so, why aren't there any time travelers around? If not, is that because of some law of physics or because the very idea of time travel is incoherent? Suppose I were to go back in time and try to save JFK. Would I be bound to fail? What would stop me? Couldn't I just try again? If I eventually succeeded, would I thereby create a new branch in time? Or can we make sense of the idea of changing the past? What would happen if I tried to prevent my parents from having kids? What went on in the last season of *Lost*? We'll try to answer questions like these by looking at classic and contemporary work in the physics and philosophy of time, as well as pertinent case studies in fiction and film. Special guest speakers from the future are hereby invited.

**PHIL 15N. Freedom, Community, and Morality. 3 Units.**

Preference to freshmen. Does the freedom of the individual conflict with the demands of human community and morality? Or, as some philosophers have maintained, does the freedom of the individual find its highest expression in a moral community of other human beings? Readings include Camus, Mill, Rousseau, and Kant.

**PHIL 20S. Introduction to Moral Philosophy. 3 Units.**

What makes right actions right and wrong actions wrong? Must right actions promote some further good? What is the role of consequences in the evaluation of actions as right or good? Focus is on traditional attempts to account for what determines which actions are right, what is worth promoting, and what kind of person one ought to be. Readings from primarily historical figures such as Aristotle, Hume, Kant, Mill, and others.

**PHIL 23A. The Applicability of Mathematics in Natural Sciences: a Philosophical Problem. 2 Units.**

Why does mathematics work so well in describing some parts of the world? Can we give an explanation for its effectiveness or is it a completely unreasonable phenomenon? The purpose of this tutorial is to examine two classes of questions concerning the effectiveness and the reasonableness of the widespread employment of mathematics in the study of nature (e.g. chemistry, biology, and esp. physics). We will start our discussion by Eugene Wigner's seminal paper, "The unreasonable Effectiveness of Mathematics in Natural Sciences" (1960), in which he suggests that the unreasonable effectiveness of mathematics in the natural sciences borders on a mystery and a miracle. Following that, we will read Hamming's (1980) much cited rejoinder to Wigner, where he attempts to give a more clear philosophical formulation of the phenomenon. Neither Wigner, nor Hamming, claimed to have done much to resolve the problem but rather to give illustration to the phenomenon. The issue remains intriguing, controversial, and instructive. In recent years Mark Colyvan (2009) and Penelope Maddy (2009) have made substantial contributions to Wigner's problem, drawing attention to interdisciplinary nature of the problem and the need for further study of relevant history (Quantum mechanics, Maxwell equations etc).

**PHIL 23B. Truth and Paradox. 2 Units.**

Philosophical investigation of the concept of truth is often divided along two dimensions: investigation of the nature of truth and investigation of the semantics of truth claims. This tutorial will focus on the second kind of concern. One key impetus for a philosophical interest in the semantics and definability of truth is the challenge posed by semantic paradoxes such as the Liar paradox and Curry's paradox. Despite each having the initial appearance of a parlor trick, philosophers and logicians have come to appreciate the deep implications of these paradoxes. The main goal of this tutorial is to gain an appreciation of the philosophical issues - both with respect to formal and natural languages which arise from consideration of the paradoxes. To this end, we will study some of the classic contributions to this area including Tarski's famous result that, in an important sense, the semantic paradoxes render truth undefinable, and Kripke's much later attempt to provide a definition of truth in the face of Tarski's limitative result. Further topics include the debate between paracomplete and paraconsistent solutions to the semantic paradoxes (notably defended by, respectively, Field and Priest); the relationship between deflationism about truth and the paradoxes; and the notion of revenge problems (roughly, the claim that any solution to the paradoxes can be used to construct a further paradox). The tutorial will avoid excessive technical discussions, but will aim to engender appreciation for some philosophically interesting technical points and will assume a logic background of PHIL150 level.

**PHIL 23C. Counterfactuals. 2 Units.**

Reasoning about counterfactual conditionals plays an important role in contemporary philosophy. Not only have counterfactual analyses been proposed for central philosophical notions, including causation, laws of nature, free will, and knowledge, but also counterfactuals have become objects of interest in their own right, both in the philosophy of language and in logic. This tutorial will introduce the standard approaches to the semantics of counterfactuals, focusing on the work of David Lewis and Robert Stalnaker. Prerequisite: one logic course (e.g., 50, 150, or 151) or consent of instructor.

**PHIL 23E. Embodied Cognition. 2 Units.**

Where does the mind stop and the world begin? A standard assumption is that thinking is somehow local to the central nervous system; that is, cognition just amounts to brain activity. A wave of recent work in philosophy and cognitive science has questioned this assumption, insisting that the mind cannot be understood outside the context of a living body interacting dynamically with an environment. To put it more dramatically, the mind extends out into the world. We shall read some of the main proponents of this move toward embodied and embedded cognition, and try to assess the extent to which it seriously calls into question more traditional views about how mind, brain, body, and world fit together.

**PHIL 23F. Forgive and Punish. 2 Units.**

Are we ever justified in forgiving those who wrong us? Do we have more reason to seek revenge and/or punishment than we do to forgive? Does it matter if wrongdoers apologize and repent for their offenses? Are there some acts and/or persons that shouldn't be forgiven? This tutorial will take up these questions by examining (mostly recent) philosophical writings about: forgiveness, retribution, the reactive attitudes (such as resentment and hatred), and, more generally, how humans should (and shouldn't) respond to wrongdoing.

**PHIL 23G. Pessimism, Philosophy, and Human Nature. 2 Units.**

In different ways, Thucydides, Hobbes, Rousseau, Kant, and Schopenhauer all emphasize a just so, descriptive account of humankind that, on the surface at least, reveals a profound pessimism with respect to their views about human nature. But for these thinkers pessimism represents a sort of intellectual honesty about human nature, and these insights invariably underscore a profound optimism, in spite of their pessimism, with respect to what they view as the more pressing question concerning what humankind can make itself to be. Our guiding question will be to explore whether and how each of these thinkers reconciles their philosophical optimism with their psychological pessimism about human nature.

**PHIL 23H. Perfectionism: The Idea of the Perfect in Nature, Ethics, and Politics. 2 Units.**

Perfection is the full realization of what is best or most excellent. In this tutorial course we will explore philosophical thought on perfection in three different contexts: natural teleology, individual ethical life, and utopian and anti-utopian social thought. Throughout the course, we will ask the following questions: What is a perfect being? Why is perfection per se good or desirable? Do evaluative comparisons presuppose some absolute standard of perfection? Does it make sense to aim at perfection in ethical and political life? What are the virtues of imperfection? What are the hazards of pursuing perfection in the political realm? Is perfectionism compatible with pluralism about values? Is perfectionism compatible with government based on popular will? The primary emphasis is on close reading and discussion of classic texts in ethical theory, including selections from Plato, Aristotle, Aquinas, Rousseau, Kant, and Tocqueville, accompanied by contemporary selections.

**PHIL 23J. On the Notion of Respect: Politics, Deliberation and Disagreements. 2 Units.**

The notion of respect plays a crucial role in a variety of human contexts. We respect many different things and we respect them in many different ways: from parents and elders, to public institutions and the law, and other people's dignity, feelings and rights. Many, in fact, claim that all people deserve respect; some way or another. Public conversations lately have been plagued with calls to respect the environment, life in all of its forms, citizens, sexual orientation, etc. Additionally, it is also urged that public debates should take place under conditions of mutual respect: that above and beyond our differences and our interests, we should respect each other as persons. In particular, philosophers working in moral and political theory focus on what respect for persons might mean, including oneself and possibly other entities. Such a notion is frequently issued inter alia in discussions about justice and legitimacy, equality and exploitation, multiculturalism and pluralism, toleration and recognition. The main concern here centers on the ways in which citizens should respect one another in plural democracies. Explore whether or not the assumption that in order to properly respect each other as free and equal citizens we are obligated to satisfy certain requirements of justification (viz., public reason) by seeking appropriate political justifications and sometimes exercising restraint in appealing to individual points of views (viz., comprehensive doctrines) in political discourse.

**PHIL 23K. Race and Gender. 2 Units.**

Are race and gender interesting biological categories, or are they in some way socially constructed? How are race and gender similar and different? Are legal restrictions on racist or sexist speech morally acceptable? What about racial profiling? This tutorial will explore theoretical questions about race and gender drawn from metaphysics and the philosophy of science, as well as the pressing moral and political questions these topics raise. Readings will consist of recent articles by prominent philosophers, including Elizabeth Anderson, Sally Haslanger, Tommie Shelby, Rae Langton, and Laurence Thomas.

**PHIL 23L. Love and Friendship. 2 Units.**

People as different as Jesus Christ and Justin Timberlake think that love is crucial to living the good life. But what is love? What part should it play in our lives? Is it just one value among many? This course will consider questions about the nature of love, the role it plays in moral philosophy, and its effect on individual autonomy. Readings will be from both contemporary and historical sources.

**PHIL 23N. Neuroscience and the Self. 2 Units.**

The Self: Fiction or reality? Bundle of perceptions? Pragmatic role-concept? Fleeting moment of consciousness? Social invention? Narrative construct? Various philosophical conceptions of the self will be explored with a particular focus on the notion of the 'narrative self.' Literature from neuroscience, psychology and philosophy will be considered.

**PHIL 23P. Personal Responsibility: Moral and Civic. 2 Units.**

What do we as individuals owe to other people? Should we be spending our free time toiling in local politics and volunteering in soup kitchens? Should we be sending every extra penny (goodbye new shoes) to people who barely eek out a living on less than a dollar a day? Maybe we ought to spend tons of our time fighting to protect future generations from the predicted devastating effects of climate change. In this course we will explore how local, distant, and future circumstances affect our responsibilities as individuals. We'll discuss questions about what and how much we owe to others, and whether our responsibilities are part and parcel of being a morally good person, or whether they are things we owe others as good citizens of the community (and for that matter, which community do we owe them to--local, national, or global?).

**PHIL 23T. Intellectual trust in oneself and others. 2 Units.**

Most people have many false beliefs. Yet, one routinely relies on one's own beliefs and on the views of others. Does that mean that one takes oneself to be exceptionally good at forming true beliefs, and exceptionally good at detecting false beliefs in others? When is it justified to place intellectual trust in oneself and in others?.

**PHIL 25SI. The Animal-Human Relationship: Interdisciplinary Perspectives. 1 Unitss.**

The ethical, scientific, and spiritual problems that arise from the interaction between humans and other animals. Can animals have empathy? What does it mean for an animal to feel pain? How did humans come to dominate other animals? What moral obligations do humans have towards animals? Where do animals fit in religious thought? Is animal research ethical, and is it effective? What role does meat consumption play in modern society? How can the environmental impacts of livestock production be mitigated? Guest lecturers from philosophy, literature, biology, neurology, religious studies, psychology, anthropology, and environmental science.

**PHIL 30S. Justifying justice at home and abroad. 3 Units.**

It is difficult to read the news today without getting enmeshed in discussions about justice both at home and abroad. Whether it be the authorized Awlaki killing, humanitarian intervention in Somalia, Wall Street regulations or health care reform that grabs your attention, there is no doubt that we are living in tumultuous times. What do you think when you read about the austerity measures in Greece and in Ireland, or about the high unemployment in Spain and in Italy, or about the relaxation of environmental regulations in the USA, or about the abolition of capital punishment? To figure out how to frame answers to these questions, we shall look at some of the main topics in social and political philosophy: rights, property, justice, criminal punishment, humanitarian intervention and just war theory.

**PHIL 41Q. Truth. 3 Units.**

Preference to sophomores. Central issues animating current work in the philosophy of truth. What is truth? What is it about a statement or judgment that makes it true rather than false? Are there any propositions that are neither true nor false? Could truth be relative to individuals or communities? Do people have different notions of truth for different enterprises such as mathematics and ethics? Might truth be a matter of degree? Sources include the instructor's book manuscript and other contemporary writers.

**PHIL 42. Philosophy through Theater: Choice and Chance. 4 Units.**

Dramatic literature as a window into philosophical work on freedom of the will and indeterminism. Students participate in the production of original one-act plays.

**PHIL 43S. Happiness: Positive Psychology and Philosophy. 3 Units.**

The connection between research in positive psychology to determine what happiness is and the conditions under which human beings are happy with issues in moral philosophy regarding whether we should aim at happiness or think of it as a good. The assumptions about happiness made by positive psychologists. The philosophical insight into the question of how people should live that is gained by looking at the empirical results provide by psychologists.

**PHIL 45S. Is it always good to 'be yourself'? Issues in Ethics and Moral Psychology. 3 Units.**

It may seem obvious that it is good to 'be yourself,' to be 'who you really are,' or to do what you 'really' want to do 'but is it? Some believe that we are our true, or real, selves when we act on our values, what we love, or what we care most about. But if that is true, then is it still good to be yourself when what you value and care most about involves a commitment to acts of terrorism, torturing others, or a life of pain and boredom? We will look at contemporary philosophical attempts to make sense of the idea of 'being yourself,' and what the nature of the value of this authenticity is." Authors include Bratman, Frankfurt, Korsgaard, Millgram and Williams.

**PHIL 50. Introductory Logic. 4 Units.**

Propositional and predicate logic; emphasis is on translating English sentences into logical symbols and constructing derivations of valid arguments.

**PHIL 50S. Introductory Logic. 3 Units.**

Propositional and predicate logic. Themes include: translations of English sentences into logical symbols; semantics of and proof rules for propositional and predicate logic. Emphasis is on evaluating arguments with the syntax and semantics of contemporary logic. Special attention to the properties of the languages studied.

**PHIL 60. Introduction to Philosophy of Science. 5 Units.**

20th-century views on the nature of scientific knowledge. Logical positivism and Popper; the problem of induction; Kuhn, Feyerabend, and radical philosophies of science; subsequent attempts to rebuild moderate empiricist and realist positions.

Same as: HPS 60.

**PHIL 61. Science, Religion, and the Birth of Modern Philosophy. 5 Units.**

Galileo's defense of the Copernican world-system that initiated the scientific revolution of the 17th century, led to conflict between science and religion, and influenced the development of modern philosophy. Readings focus on Galileo and Descartes.

Same as: HPS 61.

**PHIL 61S. A Meaningful Life in a Physical World. 3 Units.**

Questions about the meaning of life have occupied a central place in philosophical thought throughout its history. However, the scientific view of human beings as essentially complex, evolutionarily-designed biological systems in a purely material world (one governed by fundamental physical laws) seemingly puts pressure on the idea that humans can live a life of genuine meaningfulness. The guiding questions of this course will be: Is there the prospect of our living truly meaningful lives even if we are just complex biological systems? If so, what kind(s) of meaning can we hope to achieve? If not, how should we live our lives? In exploring these questions, we will read works by philosophers (and psychologists) approaching these questions from many different traditions and perspectives. Possible authors will include Plato, Hobbes, Rousseau, Nietzsche, Sartre, Camus, Sigmund Freud, Viktor Frankl, Bertrand Russell, John Searle, Owen Flanagan, Daniel Dennett, and Ruth Millikan.

**PHIL 63S. Introduction to Bioethics. 3 Units.**

If I am at least partly at fault for my own illness, should I lose priority for treatment? Is there a moral difference between killing and letting die? Focus is on understanding recent issues in applied ethics that arise from the biological and medical sciences. Readings are centralized around human life. Topics may include pre-birth, cloning, killing and letting die, and organ markets.

**PHIL 64S. Introduction to Environmental Ethics. 3 Units.**

There is perhaps no more relevant field of applied philosophy than environmental ethics. The importance and urgency of an issue like climate change is but one example of the subject matter of this rich and burgeoning field. Introduction to basic concepts in environmental ethics, the theories that employ and inform them, and how they are applied to the fundamental problems that it is concerned with. Potential topics and questions include: animal rights (do animals have rights, and if so, what grounds them?), climate change (what is the best way for us to respond to climate change, and why?), the value of the natural world (does the natural world have value in-itself, or only as an instrument to human ends?), our relationship to future generations (what do we owe future generations, if anything, and why?); Can we have obligations to people who do not, and may not, exist?.

**PHIL 65S. Technology and the Good Life. 3 Units.**

Can we engineer our way to happiness? Should we try to? An introduction to select issues in engineering ethics, the course examines various threats to human welfare, environmental catastrophe, social injustice, the limitations of "human nature" that could be amenable to engineering solutions. We consider whether it is ethically permissible to address these threats via engineering (referring to various conceptions of the good life for human beings: hedonism, liberalism, virtue ethics) and what the costs of such solutions are.

**PHIL 71. Population Ethics. 4 Units.**

This course examines the ethical issues that surround the decision to have a child. These issues are both private and public. For example, should we even have children knowing the environmental impacts of doing so? What kinds of population policies can the state legitimately enforce? Can it legitimately forbid parents from having more than one child? Can it adopt policies to promote a larger population? Other questions the course will consider include: Is the genetic engineering of children acceptable? Can it be permissible to use abortion as a means of sex selection? If one does have children, who ought pay the costs of supporting them?  
Same as: ETHICSOC 184M.

**PHIL 71H. Philosophy and the Real World. 2 Units.**

Introduction to the humanities as an applied discipline; how literary and philosophical ideas illuminate and change how people live their lives as individuals and members of society. Focus is on short texts that illustrate how literary and philosophical ideas arise from social problems and attempt to confront those problems. Methods and approaches: how to read such texts; how to make arguments about them; how such texts shed light on contemporary situations.

**PHIL 72. Contemporary Moral Problems. 5 Units.**

As individuals and as members of societies, we make choices that can be assessed from the moral point of view. What choices should we make, and how should we make them? Is it ok to buy iThings when others lack basic nutrition? Does a preference for the taste of meat justify killing animals? When is deceptive seduction seriously wrong and when is it just sketchy? Topics include exploitation, poverty, sexual and reproductive autonomy, commercialization, homelessness, citizenship, education, stereotypes, affirmative action, and social responsibility.  
Same as: ETHICSOC 185M, POLISCI 134P.

**PHIL 73. Collective Action: Ethics and Policy. 4 Units.**

Individually rational actions can give rise to results that are collectively irrational. For example, the collective result of our consumption decisions is to warm the planet, destroy the world's fisheries, and increase reliance on factory farming; at the same time, the decisions of a single individual seem to have no tangible effect on such things. In light of this, what (if anything) are you as an individual required to do in these and other collective action situations, especially when others are not doing their part to prevent things from getting out of control? For example, are you required to reduce your carbon footprint and avoid products that are produced in ethically objectionable ways? Do you have a duty to vote? Is free-riding always ethically objectionable? Can you be required to 'cooperate' in a situation where you know that most others will 'defect'? Finally, from a real-world policy perspective, how can we bring about the best solutions to these and other collective action problems? Is the best policy response always a straightforward function of the variable features of each case? Interdisciplinary readings from authors in philosophy, politics, economics, and law such as Elinor Ostrom, Peter Singer, and Cass Sunstein.  
Same as: ETHICSOC 180M, PUBLPOL 304A.

**PHIL 74. Business Ethics. 4 Units.**

What do people mean when they say, "it's just business"? Do they mean that there are no moral norms in business or do they mean that there are special moral norms in business that differ from those of personal relationships and other spheres of social activity? In this class we will examine ethical questions that arise in the domain of business. We will ask, for example: What does the market reward and what should it reward? What are the moral responsibilities of a business owner in a competitive environment? Is it acceptable to employ 'sweatshop labor'? How do the moral responsibilities of a business owner differ from that of a policy maker? What information does a seller (or buyer) have a moral duty to disclose? In real estate, is a strategic default morally wrong? How much government regulation of Wall Street is morally justified? We will use the writings of Plato, Aristotle, Cicero, J. S. Mill, Marx, Jevons and Menger, Hayek, Walzer, and Sandel, among others, to help us answer these questions. We will see, for example, what Aristotle thought about day trading.

Same as: ETHICSOC 182M.

**PHIL 76. Introduction to Global Justice. 5 Units.**

Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

Same as: ETHICSOC 136R, INTNLREL 136R, POLISCI 136R, POLISCI 336.

**PHIL 77S. Philosophy of Religion. 3 Units.**

Key philosophical questions concerning the nature of the divine and the religious through a close reading of some classic philosophical texts, while aiming to develop critical thinking about these issues. Topics include: the existence and nature of God, the problem of evil, the justification of religious belief, the nature of and relationship between faith and reason, and the function(s) of religion. Key texts will include Plato, St. Anselm, Hume, and Nietzsche.

Same as: RELIGST 62S.

**PHIL 80. Mind, Matter, and Meaning. 5 Units.**

Central topics in philosophy emphasizing development of analytical writing skills. What are human beings? Are human beings free? How do human minds and bodies interact? What does it all mean? Prerequisite: introductory philosophy course.

**PHIL 81. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English. Same as: CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENCH 181, GERMAN 181, ITALIAN 181, SLAVIC 181.

**PHIL 90A. The Philosophy of John Perry. 4 Units.**

John Perry is among the most influential philosophers of the last several decades, making important contributions to the philosophy of language, metaphysics, and the philosophy of mind. Focus on Perry's work on indexicality, belief reports, reference, pragmatics, identity, personal identity, modality, and consciousness. Perry's work in these areas will be studied in conjunction with that of some key figures in the surrounding literatures, including Kaplan, Lewis, Stalnaker, Kripke, and Chalmers.

**PHIL 90B. The Ethics of War. 4 Units.**

Issues both in contemporary just war theory and political philosophy. Relevant questions include: Can conscription ever be justified? If not, is there anything wrong with targeting poor people as part of efforts to recruit a 'volunteer' military? If, during war itself, combatants act in ways prohibited by the moral requirements governing war's conduct, then does it make any moral difference whether they were acting as ordered? And how do we identify these moral requirements in the first place? For example, what distinguishes a legitimate target from an illegitimate one? What determines whether military action is disproportionate? What, if anything, is morally distinctive about terrorism? Explores the complexities behind these questions and others, with a view to evaluating the potential answers to them.

Same as: ETHICSOC 175M.

**PHIL 90C. Predicting the Future: Puzzles of Induction. 4 Units.**

Can we know that the future is likely to resemble the past? Do we have reason to believe that the Sun is even remotely likely to rise again tomorrow? Are we rationally justified in accepting the confident predictions of science and commonsense, based on well-observed regularities? Consider several paradoxes of induction (that is, extrapolation from observed to unobserved), including those raised by Hume, Hempel, and Goodman, the Doomsday and Sleeping Beauty paradoxes, as well as some attempts to solve or cope with them.

**PHIL 90D. What do Philosophers do?. 4 Units.****PHIL 90G. Native American Philosophy. 4 Units.**

Examine traditional philosophical questions like "How do we know?" "What exists?" "What is a person?" and "What is the good life?" from the perspectives of classical and contemporary Native American thinkers. We will look at Native American beliefs about respect for persons and places; reactions to colonial doctrines of conversion, treaties, and removal; and the importance of the themes of circularity and performance in classical and contemporary Native philosophical thought. Also of importance will be to contrast some Native American approaches to philosophical questions against Western attempts to answer these same questions. How are the approaches the same? How are they different? What assumptions about the natures of reality or humanity account for the similarities or differences?.

**PHIL 90H. The Relations Between Philosophical Enquiry and Historical Enquiry. 4 Units.**

This course will examine different ways in which historical knowledge about the past might contribute to our philosophical understanding of the present. While philosophy is often seen as a characteristically reflective form of enquiry which addresses distinctly timeless questions and problems, some philosophers have insisted that our philosophical enquiries, especially those into questions of morality and politics, are bound to go astray unless we pay serious attention to history. In particular, the history of how our most fundamental concepts, beliefs and values have changed over time. Nietzsche was amongst the first philosophers to emphasise such a need for a historical philosophising, and developed an entire methodology which he called genealogy that would allow for the integration of philosophy and history. This method of genealogy has since proved influential, especially given its appropriation by Foucault, but it remains difficult to say exactly what genealogy as a unique method of enquiry is supposed to be, or how genealogical insights into the past could be of any relevance to our philosophical understanding of our present. This course, by trying to gain a clearer understanding of what genealogical enquiry is supposed to be and how it is supposed to function, will allow us to address broader questions concerning the relationship between philosophy and history. Some of the questions to be explored in the course: In what ways can our fundamental moral and political concepts, such as the concept of good, or of justice, change over history? How can knowledge of the history of these concepts help us understand what these concepts mean today? Can our beliefs and values be criticised or condemned based upon historical knowledge about how they originated? Is the past something that remains buried behind us, or is it instead something that continues to influence us today, in ways we don't often recognise? What role could hypothetical histories, as opposed to actual histories, possibly play in philosophy? Reading from major historical figures such as Kant, Hegel and Nietzsche, as well as recent philosophers such as Bernard Williams and Raymond Geuss.

**PHIL 90L. Probability and the Law. 4 Units.**

What does it mean to prove guilt beyond a reasonable doubt? Can we interpret legal standards of proof probabilistically? What is the role of probability and statistics in the courtroom? How are quantitative methods changing legal proceedings? Courtroom movies, criminal and civil cases, and academic scholarship will help us address these and related questions. No statistical or legal background is expected.

**PHIL 90S. Philosophical Dimensions of Cognitive Science. 4 Units.**

What is consciousness? What is the relation between the mind and the body? How does the mind represent the world around it? Are our minds just sophisticated computers? If they are, what functions as the 1s and 0s in our brains? Or are our minds something else altogether? This course will look at the philosophical foundations of cognitive science with a particular focus on cognitive architecture. In addition we will consider the nature of mental representation and the challenges presented by subjective experience.

**PHIL 100. Greek Philosophy. 4 Units.**

Greek philosophical thought, covering Socrates, Plato, Aristotle, and the Hellenistic schools (the Epicureans, the Stoics, and the Skeptics). Topics: the nature of the soul, virtue and happiness, knowledge, and reality. (Bobonich).

**PHIL 101. Introduction to Medieval Philosophy. 4 Units.**

Classics of Western philosophy by Augustine, Boethius, Anselm, Abelard, Aquinas, and Ockham. Explore the puzzles facing someone seeking to lead a good life and to understand herself and her world. A theory of will and human motivation, a theory of ethics based on the agent's intention, and a theory of divine omniscience and omnipotence consistent with divine goodness and human freedom. Works include *On Free Choice*, *The Consolation of Philosophy*, *Ethics*, *Summa theologiae*, and *The Connection of the Virtues*. Same as: PHIL 201.

**PHIL 101A. Medieval Religious Philosophy. 4 Units.**

(Same as PHIL 101A.) Survey of medieval philosophy, focusing on God, world and words. A pervasive assumption about the structure of the world, that it reflected the categories of God's mind and emerged from an act of divine speech, gave impetus to the interest in the nature of language and its relation to the world. Scripture served as one kind of divine communication to human beings, and "The Book of the World" as another. The problem of universals, the question of how words relate to God, epistemology, theories of reference, semiotics, are some of the topics discussed. Readings from Augustine, Anselm, Aquinas, Scotus, and Ockham, etc. Same as: RELIGST 167.

**PHIL 102. Modern Philosophy, Descartes to Kant. 4 Units.**

Major figures in early modern philosophy in epistemology, metaphysics, and philosophy of mind. Writings by Descartes, Locke, Leibniz, Berkeley, Hume, and Kant.

**PHIL 103. 19th-Century Philosophy. 4 Units.**

Focus is on ethics and the philosophy of history. Works include Mill's *Utilitarianism*, Hegel's *The Philosophy of World History*, Marx's *Economic and Philosophic Manuscripts*, Kierkegaard's *The Sickness Unto Death*, and Nietzsche's *On the Genealogy of Morals*.

**PHIL 104. Philosophy of Religion. 4 Units.**

Key issues in the philosophy of religion. Topics include the relationship between faith and reason, the concept of God, proofs of God's existence, the meaning of religious language, arguments for and against divine command theory in ethics and the role of religious belief in a liberal society.

**PHIL 106. Ancient Skepticism. 4 Units.**

The ancient Pyrrhonian skeptics who think that for any claim there is no more reason to assert it than deny it and that a life without any beliefs is the best route to happiness. Some ancient opponents of the Pyrrhonian skeptics and some relations between ancient and modern skepticism. Same as: PHIL 206.

**PHIL 107. Plato's Metaphysics and Epistemology. 4 Units.**

Examine Plato's views on the nature of reality and knowledge by reading the relevant parts of dialogues such as the *Parmenides*, the *Phaedo*, the *Philebus*, and the *Republic*. Same as: PHIL 207.

**PHIL 107A. The Greeks on Irrationality. 2-4 Units.**

In this course, we shall examine the views of some central Greek philosophers (Plato, Aristotle, the Epicureans, and the Stoics) on the irrational and non-rational aspects of human life. What makes something irrational and what roles (negative and perhaps positive as well) does the irrational play in our lives? We shall examine their views on anger, fear, madness, love, pleasure and pain, sexual desire and so on. We shall also consider more briefly some depictions of these psychic items in ancient Greek literature. Same as: PHIL 207A.

**PHIL 108. Topics in Aristotle: Aristotle on Potentiality. 4 Units.**

Examine Aristotle's introduction of a distinction between potential being and actual being, and his arguments for the priority and superiority of actual being. This distinction is employed by Aristotle in a wide variety of contexts, including his definitions of soul and psychological properties, the definition of change in his physics, the relation of matter and form in natural objects, and the causes and principles of being in his ontology. Topics to be covered include powers, change, possibility, modes of being, activity and actuality, and priority (in being, in time, in definition). The primary text for this course will be *Metaphysics Theta*, 1-9. Same as: PHIL 208.

**PHIL 109. Topics in Ancient Philosophy: Plato and Aristotle on Art and Rhetoric. 4 Units.**

Plato's and Aristotle's views on the nature of art and rhetoric and their connections with the emotions, reason and the good life. Readings include Plato's *Gorgias*, *Ion* and parts of the *Republic* and the *Laws* and Aristotle's *Poetics* and *Rhetoric*.  
Same as: PHIL 209.

**PHIL 109A. Special Topics in Ancient Philosophy. 4 Units.**

An examination of Aristotle's views about substance, ontological priority, categories and the hylomorphic (matter/form) analysis of physical objects. This course will introduce students to the basic concepts of Aristotle's metaphysics through a close reading of *\*Categories\** 1-5 and *\*Metaphysics\** Zeta. The notion of a basic subject of predication (a bearer of properties that is not itself predicable of anything further) is used to characterize the primary substances. Such items are ontologically basic, and all other items in the ontology depend upon them for being what they are. No knowledge of Greek is required.  
Same as: PHIL 209A.

**PHIL 109B. Greek philosophers read their ancestors: Intro to the ancient reception of Presocratic philosophy. 4 Units.**

The first Greek philosophers are known to us only through fragments of their original works, generally few in number and transmitted by later authors, as well as through a set of testimonies covering a thousand years and more. Thus it is crucial, in order to understand archaic thought, to get a sense of how they were read by those to whom we owe their transmission. What was their aim, their method, their presuppositions or prejudices? The course will employ this perspective to examine authors such as Plato, Aristotle, Theophrastus, Diogenes Laertius, Simplicius, among others. We shall also reflect, on the basis of the paradigmatic case of the Presocratics, on some of the more general problems raised by literary and philosophical approaches to the notion of reception.  
Same as: PHIL 209B.

**PHIL 110. Plato. 4 Units.**

Plato's *Republic*.  
Same as: PHIL 210.

**PHIL 111. Aristotle and Contemporary Ethics. 4 Units.**

Aristotle's *Nicomachean Ethics*, focusing on virtue, happiness, pleasure, practical reasoning, and particularism. Sources include the *Eudemian Ethics*, contemporary philosophers who have taken many of these topics up again, and contemporary material such as that by Anscombe, Foot, Hursthouse, Korsgaard, and McDowell.  
Same as: PHIL 211.

**PHIL 113. Hellenistic Philosophy. 4 Units.**

Epicureans, skeptics, and stoics on epistemology, ethics, metaphysics, and psychology.  
Same as: PHIL 213.

**PHIL 115. Problems in Medieval Philosophy: Islamic Aristotelianism and Western Scholasticism. 3-5 Units.**

The western world adopted Aristotle's metaphysics and natural philosophy as the foundation of its educational system and scholarly life between 1210 and 1255. Christian Europe was thereby following the example set by Islam in Spain and the Near East. Today some people believe that this development was independent, and others think that the scholastics copied even their methods from Arabic philosophers. Historical evaluation of those claims.  
Same as: PHIL 215.

**PHIL 117. Descartes. 4 Units.**

(Formerly 121/221.) Descartes's philosophical writings on rules for the direction of the mind, method, innate ideas and ideas of the senses, mind, God, eternal truths, and the material world.  
Same as: PHIL 217.

**PHIL 118. British Empiricism, 1660s-1730s. 4 Units.**

Focus is on the big three British Empiricists and their developments of thought based on the foundational role that they give to sensory perception or experience as the source of knowledge. Topics may include the theory of ideas, idealism, personal identity, human agency, moral motivation, causation, and induction. Readings predominantly from Locke, Berkeley, and Hume.

**PHIL 118A. Origins of Empiricism: Gassendi, Locke, and Berkeley. 4 Units.**

Particular light is shed on both the strengths and weaknesses of empiricism by studying it as it first arose during the 17th century revolution in philosophy and the sciences initiated by Descartes. Three philosophers of that period helped to advance empiricism: Pierre Gassendi (1592-1655), John Locke (1632-1704), and George Berkeley (1685-1753). Focus on Locke's theory of ideas, mind, language, reality, and natural philosophy expounded in his *An Essay concerning Human Understanding* (Fourth Edition, 1689). Study Gassendi's early influence on, and Berkeley's later reaction to Locke.  
Same as: PHIL 218A.

**PHIL 119. Rationalists. 4 Units.**

Developments in 17th-century continental philosophy. Descartes's views on mind, necessity, and knowledge. Spinoza and Leibniz emphasizing their own doctrines and their criticism of their predecessors. Prerequisite: 102.  
Same as: PHIL 219.

**PHIL 120A. The Leibniz-Clarke Correspondence. 4 Units.**

Correspondence on metaphysics, theology, and science.  
Same as: PHIL 220A.

**PHIL 122. Hume. 4 Units.**

(Formerly 120/220; graduate students enroll in 222.) Hume's theoretical philosophy, in particular, skepticism and naturalism, the theory of ideas and belief, space and time, causation and necessity, induction and laws of nature, miracles, a priori reasoning, the external world, and the identity of the self.  
Same as: PHIL 222.

**PHIL 124. Topics in Early Modern Philosophy. 4 Units.**

Philosophical views of the highly influential rationalist philosophers Benedict (or Baruch) Spinoza (1632-1677) and G. W. Leibniz (1646-1716). Topics to be treated include: the nature of God and the question of his providential care for human beings, the concept of substance and its extension, the ontological relation of finite beings to God, the mental and its relation to the corporeal, and the nature of human freedom.

**PHIL 125. Kant's First Critique. 4 Units.**

(Graduate students register for 225.) The founding work of Kant's critical philosophy emphasizing his contributions to metaphysics and epistemology. His attempts to limit metaphysics to the objects of experience. Prerequisite: course dealing with systematic issues in metaphysics or epistemology, or with the history of modern philosophy.  
Same as: PHIL 225.

**PHIL 126B. Kant's Ethical Theory. 2-4 Units.**

(Graduate students register for 226B.) Kant's moral philosophy based primarily on the *Groundwork of Metaphysics of Morals*, *Critique of Practical Reason*, and *The Metaphysics of Morals*.  
Same as: PHIL 226B.

**PHIL 127A. Kant's Value Theory. 4 Units.**

(Graduate students register for 227A.) The role of autonomy, principled rational self-governance, in Kant's account of the norms to which human beings are answerable as moral agents, citizens, empirical inquirers, and religious believers. Relations between moral values (goodness, rightness) and aesthetic values (beauty, sublimity).  
Same as: PHIL 227A.



**PHIL 127B. Kant's Anthropology and Philosophy of History. 4 Units.**

Kant's conception of anthropology or human nature, based on his philosophy of history, which influenced and anticipated 18th- and 19th-century philosophers of history such as Herder, Fichte, Hegel, and Marx. Texts include *Idea for a Universal History*, *Conjectural Beginning of Human History*, and *Anthropology from a Pragmatic Point of View*. Topics include: Kant's pragmatic approach to the study of human nature; the difficulty of human self knowledge; the role of regulative and teleological principles in studying human history; and Kant's theory of race. Same as: PHIL 227B.

**PHIL 128. Fichte's Ethics. 4 Units.**

(Graduate students register for 228.) The founder of the German Idealist movement who adopted but revised Kant's project of transcendental philosophy basing it on the principle of awareness of free self-activity. The awareness of other selves and of ethical relations to them as a necessary condition for self-awareness. His writings from 1793-98 emphasizing the place of intersubjectivity in his theory of experience. Same as: PHIL 228.

**PHIL 130. Hegel. 4 Units.**

(Formerly 122/222; graduate students register for 230.) Introduction to Hegel's philosophy, emphasizing his moral and political philosophy, through study of his last major work (1821). May be repeated for credit. Prerequisite: course in the history of modern philosophy. Same as: PHIL 230.

**PHIL 134. Phenomenology and Intersubjectivity. 4 Units.**

(Graduate students register for 234.) Readings from Husserl, Stein, Heidegger, Sartre, and Merleau-Ponty on subjects related to awareness of others. Topics include solipsism, collective experience, empathy, and objectification of the other. Same as: PHIL 234.

**PHIL 135. Existentialism. 4 Units.**

(Formerly 132/232.) Focus is on the existentialist preoccupation with human freedom. What constitutes authentic individuality? What is one's relation to the divine? How can one live a meaningful life? What is the significance of death? A rethinking of the traditional problem of freedom and determinism in readings from Rousseau, Kierkegaard, and Nietzsche, and the extension of these ideas by Sartre, Beauvoir, and Camus, including their social and political consequences in light of 20th-century fascism and feminism. Same as: PHIL 235.

**PHIL 136. History of Analytic Philosophy. 4 Units.**

(Formerly 147/247; graduate students register for 236.) Theories of knowledge in Frege, Carnap, and Quine. Emphasis is on conceptions of analyticity and treatment of logic and mathematics. Prerequisite: 50 and one course numbered 150-165 or 181-90. Same as: PHIL 236.

**PHIL 137. Wittgenstein. 4 Units.**

(Graduate students register for 237.) The main themes and claims in Wittgenstein's later work concentrating on his views about meaning, mind, knowledge, the nature of philosophical perplexity, and the nature of philosophical progress in his *Philosophical Investigations*. Emphasis is on the relationship between the novel arguments of the *Investigations* and its ways of writing up the results of philosophical questioning. Same as: PHIL 237.

**PHIL 138. Recent European Philosophy: Between Nature and History. 4 Units.**

A critical introduction to the novel understandings of time, language, and cultural power developed by 20th-century continental thinkers, with close attention to work by Heidegger, Saussure, Benjamin, and Foucault. Same as: PHIL 238.

**PHIL 143. Quine. 4 Units.**

(Formerly 183/283; graduate students register for 243.) The philosophy of Quine: meaning and communication; analyticity, modality, reference, and ontology; theory and evidence; naturalism; mind and the mental. Same as: PHIL 243.

**PHIL 150. Basic Concepts in Mathematical Logic. 4 Units.**

(Formerly 159.) The concepts and techniques used in mathematical logic, primarily through the study of the language of first order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability. Same as: PHIL 250.

**PHIL 150E. Logic in Action: A New Introduction to Logic. 4 Units.**

A new introduction to logic, covering propositional, modal, and first-order logic. Highlights connections with philosophy, mathematics, computer science, linguistics, and neighboring fields. Based on the open source logic course 'Logic in Action,' available online at <http://www.logicinaction.org/>. Fulfills the undergraduate philosophy logic requirement.

**PHIL 150X. Basic Concepts in Mathematical Logic. 2 Units.**

Equivalent to the second half of 150. Students attend the first meeting of 150 and rejoin the class on October 30. Prerequisite: CS 103A or X, or PHIL 50.

**PHIL 151. First-Order Logic. 4 Units.**

(Formerly 160A.) The syntax and semantics of sentential and first-order logic. Concepts of model theory. Gödel's completeness theorem and its consequences: the Löwenheim-Skolem theorem and the compactness theorem. Prerequisite: 150 or consent of instructor. Same as: PHIL 251.

**PHIL 151A. Recursion Theory. 4 Units.**

Computable functions, Turing degrees, generalized computability and definability. "What does it mean for a function from the natural numbers to themselves to be computable?" and "How can noncomputable functions be classified into a hierarchy based on their level of noncomputability?". Theory of relative computability, reducibility notions and degree structures. Prerequisite is PHIL 150, or PHIL 151 or CS 103. Same as: PHIL 251A.

**PHIL 152. Computability and Logic. 4 Units.**

Approaches to effective computation: recursive functions, register machines, and programming styles. Proof of their equivalence, discussion of Church's thesis. Elementary recursion theory. These techniques used to prove Gödel's incompleteness theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 151. Same as: PHIL 252.

**PHIL 153. Feminist Theories and Methods Across the Disciplines. 2-5 Units.**

The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research. Same as: FEMST 103, FEMST 203, PHIL 253.

**PHIL 154. Modal Logic. 4 Units.**

(Graduate students register for 254.) Syntax and semantics of modal logic, and technical results like completeness and correspondence theory. Applications to philosophy and computer science. Prerequisite: 150 or preferably 151. Same as: PHIL 254.

**PHIL 155. General Interest Topics in Mathematical Logic. 4 Units.**

Introduction to formalization using language of logic and to problems of philosophical logic and computer science that can be handled this way. Propositional calculus, Sudoku puzzles, resolution rule, problem  $P=NP$ . Possible worlds, modal logic with emphasis on individuation problems. May be repeated for credit.  
Same as: PHIL 255.

**PHIL 157. Topics in Philosophy of Logic. 3 Units.**

(Graduate students register for 257.) Disputed foundational issues in logic; the question of what the subject matter and boundaries of logic are, such as whether what is called second-order logic should be counted as logic. What is the proper notion of logical consequence? May be repeated for credit.  
Pre- or corequisite: 151, or consent of instructor.  
Same as: PHIL 257.

**PHIL 160A. Newtonian Revolution. 4 Units.**

(Graduate students register for 260A.) 17th-century efforts in science including by Kepler, Galileo, Descartes, and Huygens, that formed the background for and posed the problems addressed in Newton's *Principia*.  
Same as: PHIL 260A.

**PHIL 160B. Newtonian Revolution. 4 Units.**

(Graduate students register for 260B.) Newton's *Principia* in its historical context, emphasizing how it produced a revolution in the conduct of empirical research and in standards of evidence in science.  
Same as: PHIL 260B.

**PHIL 162. Philosophy of Mathematics. 4 Units.**

(Graduate students register for PHIL 262.) 20th-century approaches to the foundations and philosophy of mathematics. The background in mathematics, set theory, and logic. Schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisite: PHIL151 or consent of instructor.  
Same as: MATH 162, PHIL 262.

**PHIL 163. Significant Figures in Philosophy of Science. 4 Units.**

(Graduate students register for 263.) Directed study of two or more thinkers, past or present, who have made a lasting impact on contemporary philosophy of science. Subjects last year were Henri Poincaré, Pierre Duhem, and Gaston Bachelard.  
Same as: PHIL 263.

**PHIL 164. Central Topics in the Philosophy of Science: Theory and Evidence. 4 Units.**

(Graduate students register for 264.) The relation of theory to evidence and prediction, problems of induction, empirical under-determination of theory by evidence, and theory choice. Hypothetico-deductive, Bayesian, pragmatic, and inference to the best explanation models of explanation. The semantic approach to theories.  
Same as: PHIL 264.

**PHIL 164A. Central Topics in Philosophy of Science: Causation. 4 Units.**

(Graduate Students register for 264A.) Establishing causes in science, engineering, and medicine versus establishing them in Anglo-American law, considered in the context of Hume and Mill on causation. May be repeated for credit.  
Same as: PHIL 264A.

**PHIL 165. Philosophy of Physics. 4 Units.**

(Graduate students register for 265.) Central topic alternates annually between space-time theories and philosophical issues in quantum mechanics. Topics last year: absolute and relational theories of space, time, and motion. Newton's critique of Descartes and debate with Leibniz. The principle of relativity and space-time formulations of Aristotelian, Galilean, and relativity physics. Mach's principle and the theory of general relativity. Einstein's struggles with the principle of general covariance. Space-time substantivalism, and the meaning of background independence. May be repeated for credit if content is different.  
Same as: PHIL 265.

**PHIL 166. Probability: Ten Great Ideas About Chance. 4 Units.**

Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116.  
Same as: PHIL 266, STATS 167, STATS 267.

**PHIL 167A. Philosophy of Biology. 2-4 Units.**

(Graduate students register for 267A.) Evolutionary theory and in particular, on characterizing natural selection and how it operates. We examine debates about fitness, whether selection is a cause or force, the levels at which selection operates, and whether cultural evolution is a Darwinian process.  
Same as: PHIL 267A.

**PHIL 167B. Philosophy, Biology, and Behavior. 4 Units.**

(Graduate students register for 267B.) Continuation of 167A/267A. Further philosophical study of key theoretical ideas in biology, focusing on problems involving explanation of behavior. Topics: evolutionary versus proximate causal explanations of behavior; genetic and other determinisms; and classification and measurement of behavior. Prerequisites: 167A; or one PHIL course and either one BIO course or Human Biology core; or equivalent with consent of instructor.  
Same as: PHIL 267B.

**PHIL 167C. Associative Theories of Mind and Brain. 4 Units.**

After a historical survey of associative theories from Hume to William James, current versions will be analyzed including the important early ideas of Karl Lashley. Emphasis will be on the computational power of associative networks and their realization in the brain.  
Same as: PHIL 267C.

**PHIL 167D. philosophy of neuroscience. 4 Units.**

Can problems of mind be solved by understanding the brain, or models of the brain? We will examine the views of philosophers and neuroscientists who believe so, and others who are skeptical of neurophilosophical approaches to the mind. The course will examine historical and recent literature in philosophy and neuroscience. Topics may include perception, memory, neural accounts of consciousness, neurophenomenology, neuroscience and physics, computational models, and eliminativism, among others.  
Same as: PHIL 267D, SYMSYS 206.

**PHIL 170. Ethical Theory. 4 Units.**

A more demanding version of Phil. 2. Designed for juniors, seniors, and first-year graduate students who are new to moral philosophy. May be appropriate for some freshmen and sophomores (contact professor). Fulfills the Ethical Reasoning requirement.  
Same as: ETHICSOC 170, PHIL 270.

**PHIL 170B. Metaphor. 4 Units.**

Think and talk about two things at once: two different subject matters are mingled to rich and unpredictable effect. Close critical study of the main modern accounts of metaphors nature and interest, drawing on the work of writers, linguists, philosophers, and literary critics. Attention to how understanding, appreciation, and pleasure connect with one another in the experience of metaphor. Consideration of the possibility that metaphor or something very like it can occur in nonverbal media: gesture, dance, painting, music.

Same as: PHIL 270B.

**PHIL 170D. Trust and Trustworthiness. 4 Units.**

An exploration of the place of interpersonal trust in ethical thought. What is it to trust another person? How is trusting related to, though different from, other attitudes we sometimes bear towards others (e.g. justified beliefs we form about others and their conduct; ethically significant expectations we have of others, etc.)? What is involved in acquiring/possessing the virtue of trustworthiness? How should trust (and trustworthiness) figure in our thinking about important ethical activities, for example promising, friendship, or the practice of politics?

Same as: PHIL 270D.

**PHIL 171. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors.

Same as: ETHICSOC 171, IPS 208, PHIL 271, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307.

**PHIL 172. History of Modern Moral Philosophy. 4 Units.**

This course traces the development of moral philosophy in Britain just prior to the nearly simultaneous emergence of Kant's moral philosophy and Bentham's utilitarianism in the 1780's. Emphasis is on the dialogue between empiricists and rationalists on the subject of the relationship between the natural and the normative. Authors include Hobbes, Clarke, Hutcheson, Hume, Smith, Price, and Bentham. Prerequisite: some familiarity with Kant's moral theory and utilitarianism, and demonstrated interest in philosophy.

Same as: PHIL 272.

**PHIL 172B. Recent Ethical Theory. 4 Units.**

Study the works of several prominent contemporary moral philosophers. Possible authors include: Scanlon, Darwall, Nagel, Williams, Blackburn, Gibbard, Korsgaard. Prerequisite: students should have taken an introduction to moral philosophy (Phil. 20, Phil. 170 or equivalent).

Same as: PHIL 272B.

**PHIL 172D. Bernard Williams. 4 Units.**

An exploration of some central themes from the work of Bernard Williams. Particular attention will be paid to his discussion of the character and identity of the self, his sustained critique of morality and moral philosophy. We will also read several of Williams's interlocutors, including Nagel, Parfit, Korsgaard, and Herman.

Same as: PHIL 272D.

**PHIL 173A. Aesthetics: Metaphor across the Arts. 4 Units.**

What if a metaphor is an instructively compact work of art, or if finding a metaphor apt is an instructively simple case of finding something aesthetically valuable? What does this reveal about the nature of art and language? Introduction to the philosophical study of art and aesthetic value, organized around metaphor. Contemporary accounts of metaphor as a verbal device. Arguments for the existence of nonverbal metaphor in nonliterary arts. The power and appeal of metaphors drawn from art, art criticism, theoretical inquiry, and everyday life.

**PHIL 173B. Metaethics. 4 Units.**

This is an undergraduate only class. Can moral and ethical values be justified or is it just a matter of opinion? Is there a difference between facts and values? Are there any moral truths? Does it matter if there are not? Is anything in life really valuable or meaningful? Focus is not on which things or actions are valuable or morally right, but what is value or rightness itself. Contemporary metaethics. Prerequisites: 1 and 80.

**PHIL 174. Freedom and the Practical Standpoint. 4 Units.**

(Graduate students register for 274.) Confronted with the question of how to act, people think of themselves as freely determining their own conduct. Natural science poses a challenge to this by explaining all events, including human actions, in terms of causal processes. Are people justified in thinking of themselves as free? Major philosophical approaches to this question: incompatibilism, compatibilism, and the two-standpoint view.

Same as: PHIL 274.

**PHIL 174A. Moral Limits of the Market. 4 Units.**

Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute? Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases.

Same as: ETHICSOC 174A, PHIL 274A.

**PHIL 175. Philosophy of Law. 4 Units.**

Philosophical foundations of law and the legal system. The justifiability of patterns of assigning legal responsibility within criminal law. Prerequisite: PHIL 80 and one additional PHIL course.

**PHIL 175M. Two Ethical Theories and Being a Person. 4 Units.**

The distinction between the ethics of being a person and the ethics of rules as opposed to the distinction between Kantian ethics and utilitarianism or consequentialism. Comparison of these two types of ethics with respect to their relationship to agency and being a good person. Relations between Western ethics and those of other continents.

Same as: PHIL 275M.

**PHIL 176. Political Philosophy: The Social Contract Tradition. 4 Units.**

(Graduate students register for 276.) Why and under what conditions do human beings need political institutions? What makes them legitimate or illegitimate? What is the nature, source, and extent of the obligation to obey the legitimate ones, and how should people alter or overthrow the others? Answers by political theorists of the early modern period: Hobbes, Locke, Rousseau, and Kant.

Same as: PHIL 276.

**PHIL 176A. Classical Seminar: Origins of Political Thought. 4-5 Units.**

Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change.

Same as: CLASSHIS 133, CLASSHIS 333, PHIL 276A, POLISCI 230A, POLISCI 330A.

**PHIL 176B. The Economic Individual in the Behavioral Sciences. 4 Units.**

(Graduate students register for 276B.)

Same as: PHIL 276B.

**PHIL 178. Ethics in Society Honors Seminar. 3 Units.**

For students planning honors in Ethics in Society. Methods of research. Students present issues of public and personal morality; topics chosen with advice of instructor.

Same as: ETHICSOC 190.

**PHIL 178A. The Ethics of Environmental Choices. 4 Units.**

(Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

Same as: EARTHSYS 178, EARTHSYS 278, PHIL 278A.

**PHIL 178M. Introduction to Environmental Ethics. 5 Units.**

This course examines the following ethical questions about the environment: (1) how we ought morally to relate to animals; (2) attempts to expand the circle of moral concern beyond animals to other parts of nature; (3) economic approaches to environmental problems (e.g. cost-benefit analysis) and the justification of the precautionary principle; and (4) our moral obligations to future people. The class will conclude by considering whether the theoretical tools that we have examined help to address the problems of climate change, one of the most pressing environmental challenges of our time.

Same as: ETHICSOC 178M, ETHICSOC 278M, PHIL 278M, POLISCI 134L.

**PHIL 179S. Moral Psychology, Reasons for Action, and Moral Theory. 4 Units.**

What sorts of considerations does an ethical agent take to be good reasons for action? Work in moral psychology to illuminate the theory of practical reasons, and the theory of practical reasons to test the prospects for systematic moral theory. Can any systematic moral theory be reconciled with the moral psychology of ordinary, morally respectable agents?

Reading include Bernard Williams, Rosalind Hursthouse, Peter Railton, T.M. Scanlon, and Barbara Herman.

Same as: PHIL 279S.

**PHIL 180. Metaphysics. 4 Units.**

Selection of core topics in metaphysics, including personal identity, naturalism, modality, and/or existence of God. Prerequisite: 80 or consent of instructor.

Same as: PHIL 280.

**PHIL 180A. Realism, Anti-Realism, Irrealism, Quasi-Realism. 4 Units.**

Realism and its opponents as options across a variety of different domains: natural science, mathematics, ethics, and aesthetics. Clarify the various conceptions that fall under these terms and outline the reasons for and against adopting realism for the various domains. Highlight the general issues involved. Prerequisites: 80, 181

Same as: PHIL 280A.

**PHIL 181. Philosophy of Language. 4 Units.**

The study of conceptual questions about language as a focus of contemporary philosophy for its inherent interest and because philosophers see questions about language as behind perennial questions in other areas of philosophy including epistemology, philosophy of science, metaphysics, and ethics. Key concepts and debates about the notions of meaning, truth, reference, and language use, with relations to psycholinguistics and formal semantics. Readings from philosophers such as Frege, Russell, Wittgenstein, Grice, and Kripke. Prerequisites: 80 and background in logic. Same as: PHIL 281.

**PHIL 181B. Philosophy of Language: Contemporary Debates. 4 Units.**

This course builds on the material of 181/281, focusing on debates and developments in the pragmatics of conversation, the semantics/pragmatics distinction, the contextuality of meaning, the nature of truth and its connection to meaning, and the workings of particular linguistic constructions of special philosophical relevance. Students who have not taken 181/281 should seek the instructor's advice as to whether they have sufficient background.

Same as: PHIL 281B.

**PHIL 182. Truth. 2-4 Units.**

Focus on the nature of truth; specifically, ongoing debates between so-called correspondence theorists and deflationists. The former generally think truth amounts to some kind of structural isomorphism between the world and our representations of it (like the relationship between a subway map and the subway route itself). Deflationists think the nature of truth is exhausted by something as trifling as the equivalence between affirming something and affirming that it's true: e.g., it's true that Modest Mouse is God's gift to indie rock if and only if Modest Mouse IS God's gift to indie rock. Related issues include the possibility of truth-value "gaps" (claims that are neither true nor false), degrees of truth, relativism and realism about arbitrary subject matters, the semantic paradoxes (like the Liar), the role of truth in the theory of meaning, and the value of true belief. Most readings were written after 1980. Previous courses in philosophy of language and/or metaphysics very strongly encouraged. Phil 80 a must.

Same as: PHIL 282.

**PHIL 184. Theory of Knowledge. 4 Units.**

Focus on nature of epistemic justification, good reasoning, and transmission of warrant, both intrapersonal (inference) and interpersonal (testimony).

Prerequisite: 80 or consent of instructor.

Same as: PHIL 284.

**PHIL 184B. Philosophy of the Body. 4 Units.**

Despite the fact that to be human is to be embodied, the body is rarely given the attention it deserves in analytic philosophy. We will bring the body into sharper focus thinking about cognition, agency, and personhood. What role does embodiment play in shaping cognitive capacities? What kind of somatic awareness is required for agency? How essential is the body to our conception of ourselves, both as individuals and as humans? Readings from history of philosophy, contemporary philosophy of mind and cognitive science, with special attention paid to embodiment theories of cognition.

**PHIL 184C. Epistemology of Testimony. 4 Units.**

Many of our beliefs come from others, and not from direct experience.

Is testimony a source of fundamental reasons, reasons that do not have to be supported or validated by other sources like perception or inference? What sort of responsibility does one have to one's hearers, when one gives testimony?

Same as: PHIL 284C.

**PHIL 184F. Feminist Theories of Knowledge. 4 Units.**

Feminist critique of traditional approaches in epistemology and alternative feminist approaches to such topics as reason and rationality, objectivity, experience, truth, the knowing subject, knowledge and values, knowledge and power.

Same as: FEMST 166, PHIL 284F.

**PHIL 184P. Probability and Epistemology. 4 Units.**

Confirmation theory and various ways of trying to understand the concept of evidence. Discuss a series of issues in epistemology including probabilism (the view that you should assign degrees of belief to various propositions), conditionalization, confirmational holism, reliabilism and justification, and disagreement.

**PHIL 185. Memory. 4 Units.**

Structure, content, functional role, and epistemic authority of human memories. Sources include philosophical and psychological literature from different schools and historical periods.

**PHIL 185B. Philosophy of Perception. 4 Units.**

The nature of perceptual experience and the role it plays in securing empirical knowledge. Focus will be on what is sometimes called "the problem of perception": the question of how perception could provide us with direct awareness of the surrounding environment given the possibility of illusions or hallucinations. Topics, include the relationship between perception and belief, the nature of perceptual phenomenology, whether or not perceptual experiences are representational states, and the philosophical relevance of empirical research on perception.

Same as: PHIL 285B.

**PHIL 186. Philosophy of Mind. 4 Units.**

(Graduate students register for 286.) Debates concerning the nature of mental states, their relation to physical states of the human body, how they acquire their content, how people come to know about them in themselves and others, and the roles they play in the explanation of human conduct.

Same as: PHIL 286.

**PHIL 186B. Inner Sense. 4 Units.**

Often the label "inner" is used to describe aspects of ourselves we believe are not immediately observable to another. Thoughts, feelings, sensations; these all happen on the "inside," whereas speech, mannerisms, and actions are "outward" expressions. But how useful is this way of thinking?

And what does it assume about what is "inner" versus what is "outer"? How reliable are the various internal mechanisms that allow us to know ourselves? Do we have a special kind of direct access to our own inner lives? And what can we know about the inner lives of others? Readings from philosophy of mind and cognitive science.

**PHIL 187. Philosophy of Action. 4 Units.**

(Graduate students register for 287.) Contemporary research in the philosophy of action. Topics include: What is it to be an agent? Is there a philosophically defensible contrast between being an agent and being a locus of causal forces to which one is subject? What is it to act purposively? What is intention? What is the relation between intention and belief? What is it to act intentionally? What is it to act for a reason? What is the relation between explaining why someone acted by citing the reasons for which she acted and causal explanation of her action? What is the relation between theoretical and practical rationality? What is the nature of our knowledge of our own intentional activity? What is it to act autonomously? What is shared cooperative activity? Prerequisite: 80.

Same as: PHIL 287.

**PHIL 188. Personal Identity. 4 Units.**

Do you persist through time the way that a skyscraper persists through space, by having different parts at different locations? Or are you wholly present, at every moment of your life, in something more like the way that an elevator is present in each place as it travels up to the top floor? What criteria determine whether you now are the very same person as some unique person located at some time in the past? Is the continuity of your memories or other mental states sufficient for your survival? Can you survive the loss or destruction of your body? Do you really exist for more than just the present moment? How do different answers to these questions bear on your moral, personal, and professional obligations? What kinds of considerations could possibly help us to answer these questions? This course explores these and related issues. Readings include a mix of introductory survey, historical, and contemporary material.

Same as: PHIL 288.

**PHIL 189. Examples of Free Will. 4 Units.**

Examples drawn from three domains: choice, computation, and conflict of norms. Conceptually, a distinction is made between examples that are predictable and those that are not, but skepticism about making a sharp distinction between determinism and indeterminism is defended.

Same as: PHIL 289.

**PHIL 190. Introduction to Cognitive and Information Sciences. 4 Units.**

The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major.

Same as: LINGUIST 144, PSYCH 35, SYMSYS 100.

**PHIL 193C. Film & Philosophy. 4 Units.**

Issues of freedom, morality, faith, knowledge, personal identity, and the value of truth explored through film; philosophical investigation of the filmic medium itself. Screenings to include *Twelve Monkeys* (Gilliam), *Ordet* (Dreyer), *The Dark Knight* (Nolan), *Vicky Cristina Barcelona* (Allen), and *Eternal Sunshine of the Spotless Mind* (Kaufman). Taught in English.

Same as: COMPLIT 154A, FRENCH 154, ITALIAN 154, PHIL 293C.

**PHIL 193H. The Art of the Movies: Story, Drama, and Image. 4 Units.**

A philosophical study of how movies coordinate and transform elements they borrow from older arts of literary narrative, live theater, and graphic illustration. Examples from the career of Alfred Hitchcock.

**PHIL 193W. Nietzsche, Dostoevsky, and Sartre. 4 Units.**

Literary works in which philosophical ideas and issues are put forward, such as prose poems, novels, and plays. Ideas and issues and the dramatic or narrative structures through which they are presented. Texts include: Nietzsche, *Thus Spoke Zarathustra*; Dostoevsky, *The Brothers Karamazov*; and Sartre, *Nausea* and *No Exit*.

**PHIL 194A. Empiricism and the Philosophy of Mind. 4 Units.**

Priority to majors. 20th-century analytic and early modern philosophy of mind and epistemology. Main text is Wilfrid Sellars's *Empiricism and the Philosophy of Mind*; source materials and commentary. Enrollment limited to 12.

**PHIL 194B. The Ethics of Belief. 4 Units.**

Priority to majors. Are beliefs subject to moral evaluation? Can it be right or wrong to believe or disbelieve something? Are people morally required to believe only that for which there is sufficient evidence; or can the good consequences of believing something justify the belief, irrespective of the evidence? Contemporary and historical sources. Enrollment limited to 12.

**PHIL 194C. Time and Free Will. 4 Units.**

Classic and contemporary reading on free will, with special attention to the consequence argument for incompatibilism, and issues involving causation and time.

**PHIL 194E. Beauty and Other Forms of Value. 4 Units.**

The nature and importance of beauty and of our capacity to discern it and respond to it, as discussed by philosophers and artists from various traditions and historical periods. Attempts to think out the relations between beauty and ethical values (such as goodness) on the one hand and cognitive values (such as truth) on the other. Fulfills capstone seminar requirement for the Philosophy and Literature tracks.

**PHIL 194G. Philosophical Issues in Language. 4 Units.****PHIL 194H. Explanation and Justification. 4 Units.****PHIL 194L. Montaigne. 4 Units.**

Preference to Philosophy seniors. Philosophical and literary aspects of Montaigne's *Essays* including the nature of the self and self-fashioning, skepticism, fideism, and the nature of Montaigne's philosophical project. Montaigne's development of the essay as a literary genre.

**PHIL 194N. Philosophical Issues in Cognitive Science. 4 Units.**

Philosophers generally do not perform systematic empirical observations or construct computational models. But philosophy remains important to cognitive science because it deals with fundamental issues that underlie the experimental and computational approach to mind. Abstract questions such as the nature of representation and computation. Relation of mind and body and methodological questions such as the nature of explanations found in cognitive science. Normative questions about how people should think as well as with descriptive ones about how they do. In addition to the theoretical goal of understanding human thinking, cognitive science can have the practical goal of improving it, which requires normative reflection on what we want thinking to be. Philosophy of mind does not have a distinct method, but should share with the best theoretical work in other fields a concern with empirical results.

**PHIL 194P. Naming and Necessity. 4 Units.**

Saul Kripke's lectures on reference, modal metaphysics, and the mind/body problem.

**PHIL 194R. Epistemic Paradoxes. 4 Units.**

Paradoxes that arise from concepts of knowledge and rational belief, such as the skeptical paradox, the preface paradox, and Moore's paradox. Can one lose knowledge without forgetting anything? Can one change one's mind in a reasonable way without gaining new evidence?.

**PHIL 194S. Skepticism. 4 Units.**

Modern arguments for skepticism are hard to combat, but also curiously inert in ordinary life. We will look at a variety of contemporary attempts to come to terms with skepticism about the external world, each of which seeks to exploit the curious inertness of skeptical hypotheses.

**PHIL 194T. Practical Reason. 4 Units.**

Contemporary research on practical reason, practical rationality, and reasons for action. Enrollment limited to 12. Priority given to undergraduate Philosophy majors.

**PHIL 195A. Unity of Science. 4-5 Units.**

Primarily for seniors.

**PHIL 195B. Donor Seminar: Practical Reasoning. 4 Units.**

Primarily for seniors. Relationships among action, deliberation, reasons, and rationality. On what basis do people decide what to do? What norms or rules structure reasoning? What constitutes rationality?.

**PHIL 196. Tutorial, Senior Year. 5 Units.**

(Staff).

**PHIL 197. Individual Work, Undergraduate. 1-15 Units.**

May be repeated for credit.

**PHIL 198. The Dualist. 1 Unitss.**

Weekly meeting of the editorial board of *The Dualist*, a national journal of undergraduate work in philosophy. Open to all undergraduates. May be taken 1-3 quarters. (AU) (Potochnik, Yap).

**PHIL 199. Seminar for Prospective Honors Students. 2 Units.**

Open to juniors intending to do honors in philosophy. Methods of research in philosophy. Topics and strategies for completing honors project. May be repeated for credit.

**PHIL 201. Introduction to Medieval Philosophy. 4 Units.**

Classics of Western philosophy by Augustine, Boethius, Anselm, Abelard, Aquinas, and Ockham. Explore the puzzles facing someone seeking to lead a good life and to understand herself and her world. A theory of will and human motivation, a theory of ethics based on the agent's intention, and a theory of divine omniscience and omnipotence consistent with divine goodness and human freedom. Works include *On Free Choice*, *The Consolation of Philosophy*, *Ethics*, *Summa theologiae*, and *the Connection of the Virtues*.

Same as: PHIL 101.

**PHIL 206. Ancient Skepticism. 4 Units.**

The ancient Pyrrhonian skeptics who think that for any claim there is no more reason to assert it than deny it and that a life without any beliefs is the best route to happiness. Some ancient opponents of the Pyrrhonian skeptics and some relations between ancient and modern skepticism.

Same as: PHIL 106.

**PHIL 207. Plato's Metaphysics and Epistemology. 4 Units.**

Examine Plato's views on the nature of reality and knowledge by reading the relevant parts of dialogues such as the *Parmenides*, the *Phaedo*, the *Philebus*, and the *Republic*.

Same as: PHIL 107.

**PHIL 207A. The Greeks on Irrationality. 2-4 Units.**

In this course, we shall examine the views of some central Greek philosophers (Plato, Aristotle, the Epicureans, and the Stoics) on the irrational and non-rational aspects of human life. What makes something irrational and what roles (negative and perhaps positive as well) does the irrational play in our lives? We shall examine their views on anger, fear, madness, love, pleasure and pain, sexual desire and so on. We shall also consider more briefly some depictions of these psychic items in ancient Greek literature.

Same as: PHIL 107A.

**PHIL 208. Topics in Aristotle: Aristotle on Potentiality. 4 Units.**

Examine Aristotle's introduction of a distinction between potential being and actual being, and his arguments for the priority and superiority of actual being. This distinction is employed by Aristotle in a wide variety of contexts, including his definitions of soul and psychological properties, the definition of change in his physics, the relation of matter and form in natural objects, and the causes and principles of being in his ontology. Topics to be covered include powers, change, possibility, modes of being, activity and actuality, and priority (in being, in time, in definition). The primary text for this course will be *Metaphysics Theta*, 1-9.

Same as: PHIL 108.

**PHIL 209. Topics in Ancient Philosophy: Plato and Aristotle on Art and Rhetoric. 4 Units.**

Plato's and Aristotle's views on the nature of art and rhetoric and their connections with the emotions, reason and the good life. Readings include Plato's *Gorgias*, *Ion* and parts of the *Republic* and the *Laws* and Aristotle's *Poetics* and *Rhetoric*.

Same as: PHIL 109.

**PHIL 209A. Special Topics in Ancient Philosophy. 4 Units.**

An examination of Aristotle's views about substance, ontological priority, categories and the hylomorphic (matter/form) analysis of physical objects. This course will introduce students to the basic concepts of Aristotle's metaphysics through a close reading of *\*Categories\** 1-5 and *\*Metaphysics\** Zeta. The notion of a basic subject of predication (a bearer of properties that is not itself predicable of anything further) is used to characterize the primary substances. Such items are ontologically basic, and all other items in the ontology depend upon them for being what they are. No knowledge of Greek is required.

Same as: PHIL 109A.

**PHIL 209B. Greek philosophers read their ancestors: Intro to the ancient reception of Presocratic philosophy. 4 Units.**

The first Greek philosophers are known to us only through fragments of their original works, generally few in number and transmitted by later authors, as well as through a set of testimonies covering a thousand years and more. Thus it is crucial, in order to understand archaic thought, to get a sense of how they were read by those to whom we owe their transmission. What was their aim, their method, their presuppositions or prejudices?

The course will employ this perspective to examine authors such as Plato, Aristotle, Theophrastus, Diogenes Laertius, Simplicius, among others. We shall also reflect, on the basis of the paradigmatic case of the Presocratics, on some of the more general problems raised by literary and philosophical approaches to the notion of reception.

Same as: PHIL 109B.

**PHIL 210. Plato. 4 Units.**

Plato's *Republic*.

Same as: PHIL 110.

**PHIL 211. Aristotle and Contemporary Ethics. 4 Units.**

Aristotle's Nicomachean Ethics, focusing on virtue, happiness, pleasure, practical reasoning, and particularism. Sources include the Eudemean Ethics, contemporary philosophers who have taken many of these topics up again, and contemporary material such as that by Anscombe, Foot, Hursthouse, Korsgaard, and McDowell.

Same as: PHIL 111.

**PHIL 213. Hellenistic Philosophy. 4 Units.**

Epicureans, skeptics, and stoics on epistemology, ethics, metaphysics, and psychology.

Same as: PHIL 113.

**PHIL 215. Problems in Medieval Philosophy: Islamic Aristotelianism and Western Scholasticism. 3-5 Units.**

The western world adopted Aristotle's metaphysics and natural philosophy as the foundation of its educational system and scholarly life between 1210 and 1255. Christian Europe was thereby following the example set by Islam in Spain and the Near East. Today some people believe that this development was independent, and others think that the scholastics copied even their methods from Arabic philosophers. Historical evaluation of those claims.

Same as: PHIL 115.

**PHIL 217. Descartes. 4 Units.**

(Formerly 121/221.) Descartes's philosophical writings on rules for the direction of the mind, method, innate ideas and ideas of the senses, mind, God, eternal truths, and the material world.

Same as: PHIL 117.

**PHIL 218A. Origins of Empiricism: Gassendi, Locke, and Berkeley. 4 Units.**

Particular light is shed on both the strengths and weaknesses of empiricism by studying it as it first arose during the 17th century revolution in philosophy and the sciences initiated by Descartes. Three philosophers of that period helped to advance empiricism: Pierre Gassendi (1592-1655), John Locke (1632-1704), and George Berkeley (1685-1753). Focus on Locke's theory of ideas, mind, language, reality, and natural philosophy expounded in his *An Essay concerning Human Understanding* (Fourth Edition, 1689). Study Gassendi's early influence on, and Berkeley's later reaction to Locke.

Same as: PHIL 118A.

**PHIL 219. Rationalists. 4 Units.**

Developments in 17th-century continental philosophy. Descartes's views on mind, necessity, and knowledge. Spinoza and Leibniz emphasizing their own doctrines and their criticism of their predecessors. Prerequisite: 102.

Same as: PHIL 119.

**PHIL 220A. The Leibniz-Clarke Correspondence. 4 Units.**

Correspondence on metaphysics, theology, and science.

Same as: PHIL 120A.

**PHIL 222. Hume. 4 Units.**

(Formerly 120/220; graduate students enroll in 222.) Hume's theoretical philosophy, in particular, skepticism and naturalism, the theory of ideas and belief, space and time, causation and necessity, induction and laws of nature, miracles, a priori reasoning, the external world, and the identity of the self.

Same as: PHIL 122.

**PHIL 224. Kant's Philosophy of Physical Science. 2-4 Units.**

Kant's *Metaphysical Foundations of Natural Science* (1786), published between the first (1781) and second (1787) editions of the *Critique of Pure Reason*, in the scientific and philosophical context provided by Newtonian natural philosophy and the Leibnizian tradition. The place of this work in the development of Kant's thought. Prerequisite: acquaintance with either Kant's theoretical philosophy or the contemporaneous scientific context, principally Newton, Leibniz, and Euler.

**PHIL 224A. Mathematics in Kant's Philosophy. 4 Units.**

Recent work in Kant's philosophy of mathematics, examined with a view to the role of mathematics, both pure and applied, within Kant's philosophy more generally. Particular attention to the Schematism chapter of the *Critique of Pure Reason*. Prerequisite: prior acquaintance with Kant's theoretical philosophy and the *Critique of Pure Reason*.

**PHIL 225. Kant's First Critique. 4 Units.**

(Graduate students register for 225.) The founding work of Kant's critical philosophy emphasizing his contributions to metaphysics and epistemology. His attempts to limit metaphysics to the objects of experience. Prerequisite: course dealing with systematic issues in metaphysics or epistemology, or with the history of modern philosophy.

Same as: PHIL 125.

**PHIL 226B. Kant's Ethical Theory. 2-4 Units.**

(Graduate students register for 226B.) Kant's moral philosophy based primarily on the *Groundwork of Metaphysics of Morals*, *Critique of Practical Reason*, and *The Metaphysics of Morals*.

Same as: PHIL 126B.

**PHIL 227A. Kant's Value Theory. 4 Units.**

(Graduate students register for 227A.) The role of autonomy, principled rational self-governance, in Kant's account of the norms to which human beings are answerable as moral agents, citizens, empirical inquirers, and religious believers. Relations between moral values (goodness, rightness) and aesthetic values (beauty, sublimity).

Same as: PHIL 127A.

**PHIL 227B. Kant's Anthropology and Philosophy of History. 4 Units.**

Kant's conception of anthropology or human nature, based on his philosophy of history, which influenced and anticipated 18th- and 19th-century philosophers of history such as Herder, Fichte, Hegel, and Marx. Texts include *Idea for a Universal History*, *Conjectural Beginning of Human History*, and *Anthropology from a Pragmatic Point of View*. Topics include: Kant's pragmatic approach to the study of human nature; the difficulty of human self knowledge; the role of regulative and teleological principles in studying human history; and Kant's theory of race.

Same as: PHIL 127B.

**PHIL 228. Fichte's Ethics. 4 Units.**

(Graduate students register for 228.) The founder of the German Idealist movement who adopted but revised Kant's project of transcendental philosophy basing it on the principle of awareness of free self-activity. The awareness of other selves and of ethical relations to them as a necessary condition for self-awareness. His writings from 1793-98 emphasizing the place of intersubjectivity in his theory of experience.

Same as: PHIL 128.

**PHIL 230. Hegel. 4 Units.**

(Formerly 122/222; graduate students register for 230.) Introduction to Hegel's philosophy, emphasizing his moral and political philosophy, through study of his last major work (1821). May be repeated for credit. Prerequisite: course in the history of modern philosophy. Same as: PHIL 130.

**PHIL 231. Introduction to Philosophy of Education. 3 Units.**

How to think philosophically about educational problems. Recent influential scholarship in philosophy of education. No previous study in philosophy required. Same as: EDUC 204.

**PHIL 233. Husserl. 4 Units.**

Husserl's phenomenology. Main themes in his philosophy and their interconnections, including consciousness, perception, intersubjectivity, lifeworld, ethics, mathematics and the sciences, and time and space. Works in English translation.

**PHIL 234. Phenomenology and Intersubjectivity. 4 Units.**

(Graduate students register for 234.) Readings from Husserl, Stein, Heidegger, Sartre, and Merleau-Ponty on subjects related to awareness of others. Topics include solipsism, collective experience, empathy, and objectification of the other. Same as: PHIL 134.

**PHIL 234B. The Later Heidegger: Art, Poetry, Language. 3 Units.**

Lectures and seminar discussions of the problematic of the later Heidegger (1930 - 1976) in the light of his entire project. Readings from "On the Origin of the Work of Art" and Elucidations of Holderlin's Poetry. Same as: RELIGST 277, RELIGST 377.

**PHIL 235. Existentialism. 4 Units.**

(Formerly 132/232.) Focus is on the existentialist preoccupation with human freedom. What constitutes authentic individuality? What is one's relation to the divine? How can one live a meaningful life? What is the significance of death? A rethinking of the traditional problem of freedom and determinism in readings from Rousseau, Kierkegaard, and Nietzsche, and the extension of these ideas by Sartre, Beauvoir, and Camus, including their social and political consequences in light of 20th-century fascism and feminism. Same as: PHIL 135.

**PHIL 236. History of Analytic Philosophy. 4 Units.**

(Formerly 147/247; graduate students register for 236.) Theories of knowledge in Frege, Carnap, and Quine. Emphasis is on conceptions of analyticity and treatment of logic and mathematics. Prerequisite: 50 and one course numbered 150-165 or 181-90. Same as: PHIL 136.

**PHIL 237. Wittgenstein. 4 Units.**

(Graduate students register for 237.) The main themes and claims in Wittgenstein's later work concentrating on his views about meaning, mind, knowledge, the nature of philosophical perplexity, and the nature of philosophical progress in his *Philosophical Investigations*. Emphasis is on the relationship between the novel arguments of the *Investigations* and its ways of writing up the results of philosophical questioning. Same as: PHIL 137.

**PHIL 238. Recent European Philosophy: Between Nature and History. 4 Units.**

A critical introduction to the novel understandings of time, language, and cultural power developed by 20th-century continental thinkers, with close attention to work by Heidegger, Saussure, Benjamin, and Foucault. Same as: PHIL 138.

**PHIL 239. Teaching Methods in Philosophy. 1-4 Units.**

For Ph.D. students in their first or second year who are or are about to be teaching assistants for the department. May be repeated for credit.

**PHIL 240. Individual Work for Graduate Students. 1-15 Units.**

May be repeated for credit.

**PHIL 241. Dissertation Development Seminar. 1-4 Units.**

Required of second-year Philosophy Ph.D. students; restricted to Stanford Philosophy Ph.D. students. Prerequisite: consent of instructor.

**PHIL 243. Quine. 4 Units.**

(Formerly 183/283; graduate students register for 243.) The philosophy of Quine: meaning and communication; analyticity, modality, reference, and ontology; theory and evidence; naturalism; mind and the mental. Same as: PHIL 143.

**PHIL 248. Medieval Latin Paleography. 3-5 Units.**

The history of medieval scripts and medieval abbreviation. Dating and placing Latin European medieval manuscripts. Editing medieval texts in philosophy, psychology, physics, and theology. Class project: an early 13th century encyclopedia (with entries citing both Plato and Aristotle). Intellectually exciting, easy to read (textualis script).

**PHIL 249. Evidence and Evolution. 3-5 Units.**

The logic behind the science. The concept of evidence and how it is used in science with regards to testing claims in evolutionary biology and using tools from probability theory, Bayesian, likelihoodist, and frequentist ideas. Questions about evidence that arise in connection with evolutionary theory. Creationism and intelligent design. Questions that arise in connection with testing hypotheses about adaptation and natural selection and hypotheses about phylogenetic relationships. Same as: PHIL 349.

**PHIL 250. Basic Concepts in Mathematical Logic. 4 Units.**

(Formerly 159.) The concepts and techniques used in mathematical logic, primarily through the study of the language of first order logic. Topics: formalization, proof, propositional logic, quantifiers, sets, mathematical induction, and enumerability. Same as: PHIL 150.

**PHIL 251. First-Order Logic. 4 Units.**

(Formerly 160A.) The syntax and semantics of sentential and first-order logic. Concepts of model theory. Gödel's completeness theorem and its consequences: the Löwenheim-Skolem theorem and the compactness theorem. Prerequisite: 150 or consent of instructor. Same as: PHIL 151.

**PHIL 251A. Recursion Theory. 4 Units.**

Computable functions, Turing degrees, generalized computability and definability. "What does it mean for a function from the natural numbers to themselves to be computable?" and "How can noncomputable functions be classified into a hierarchy based on their level of noncomputability?". Theory of relative computability, reducibility notions and degree structures. Prerequisite is PHIL 150, or PHIL 151 or CS 103. Same as: PHIL 151A.

**PHIL 252. Computability and Logic. 4 Units.**

Approaches to effective computation: recursive functions, register machines, and programming styles. Proof of their equivalence, discussion of Church's thesis. Elementary recursion theory. These techniques used to prove Gödel's incompleteness theorem for arithmetic, whose technical and philosophical repercussions are surveyed. Prerequisite: 151. Same as: PHIL 152.

**PHIL 253. Feminist Theories and Methods Across the Disciplines. 2-5 Units.**

The interdisciplinary foundations of feminist thought. The nature of disciplines and of interdisciplinary work. Challenges of feminism for scholarship and research. Same as: FEMST 103, FEMST 203, PHIL 153.



**PHIL 254. Modal Logic. 4 Units.**

(Graduate students register for 254.) Syntax and semantics of modal logic, and technical results like completeness and correspondence theory. Applications to philosophy and computer science. Prerequisite: 150 or preferably 151.  
Same as: PHIL 154.

**PHIL 255. General Interest Topics in Mathematical Logic. 4 Units.**

Introduction to formalization using language of logic and to problems of philosophical logic and computer science that can be handled this way. Propositional calculus, Sudoku puzzles, resolution rule, problem P=NP. Possible worlds, modal logic with emphasis on individuation problems. May be repeated for credit.  
Same as: PHIL 155.

**PHIL 257. Topics in Philosophy of Logic. 3 Units.**

(Graduate students register for 257.) Disputed foundational issues in logic; the question of what the subject matter and boundaries of logic are, such as whether what is called second-order logic should be counted as logic. What is the proper notion of logical consequence? May be repeated for credit. Pre- or corequisite: 151, or consent of instructor.  
Same as: PHIL 157.

**PHIL 258. Minds and Machines. 4 Units.**

Readings on arguments concerning mechanical models of the mind including Turing machine models to which Gödel's incompleteness theorems are relevant, and connectionist (neural net) models. Prerequisites: 151 (formerly 160A), 152, or equivalents. Recommended: 389. (Feferman).

**PHIL 260A. Newtonian Revolution. 4 Units.**

(Graduate students register for 260A.) 17th-century efforts in science including by Kepler, Galileo, Descartes, and Huygens, that formed the background for and posed the problems addressed in Newton's *Principia*.  
Same as: PHIL 160A.

**PHIL 260B. Newtonian Revolution. 4 Units.**

(Graduate students register for 260B.) Newton's *Principia* in its historical context, emphasizing how it produced a revolution in the conduct of empirical research and in standards of evidence in science.  
Same as: PHIL 160B.

**PHIL 262. Philosophy of Mathematics. 4 Units.**

(Graduate students register for PHIL 262.) 20th-century approaches to the foundations and philosophy of mathematics. The background in mathematics, set theory, and logic. Schools and programs of logicism, predicativism, platonism, formalism, and constructivism. Readings from leading thinkers. Prerequisite: PHIL151 or consent of instructor.  
Same as: MATH 162, PHIL 162.

**PHIL 263. Significant Figures in Philosophy of Science. 4 Units.**

(Graduate students register for 263.) Directed study of two or more thinkers, past or present, who have made a lasting impact on contemporary philosophy of science. Subjects last year were Henri Poincaré, Pierre Duhem, and Gaston Bachelard.  
Same as: PHIL 163.

**PHIL 264. Central Topics in the Philosophy of Science: Theory and Evidence. 4 Units.**

(Graduate students register for 264.) The relation of theory to evidence and prediction, problems of induction, empirical under-determination of theory by evidence, and theory choice. Hypothetico-deductive, Bayesian, pragmatic, and inference to the best explanation models of explanation. The semantic approach to theories.  
Same as: PHIL 164.

**PHIL 264A. Central Topics in Philosophy of Science: Causation. 4 Units.**

(Graduate Students register for 264A.) Establishing causes in science, engineering, and medicine versus establishing them in Anglo-American law, considered in the context of Hume and Mill on causation. May be repeated for credit.  
Same as: PHIL 164A.

**PHIL 265. Philosophy of Physics. 4 Units.**

(Graduate students register for 265.) Central topic alternates annually between space-time theories and philosophical issues in quantum mechanics. Topics last year: absolute and relational theories of space, time, and motion. Newton's critique of Descartes and debate with Leibniz. The principle of relativity and space-time formulations of Aristotelian, Galilean, and relativity physics. Mach's principle and the theory of general relativity. Einstein's struggles with the principle of general covariance. Space-time substantivalism, and the meaning of background independence. May be repeated for credit if content is different.  
Same as: PHIL 165.

**PHIL 265C. Philosophy of Physics: Probability and Relativity. 4 Units.**

Conceptual puzzles in formulating probability concepts to be invariant in the sense of the Lorentz transformation of special relativity. Problems arise in both classical and quantum physics.

**PHIL 266. Probability: Ten Great Ideas About Chance. 4 Units.**

Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116.  
Same as: PHIL 166, STATS 167, STATS 267.

**PHIL 267A. Philosophy of Biology. 2-4 Units.**

(Graduate students register for 267A.) Evolutionary theory and in particular, on characterizing natural selection and how it operates. We examine debates about fitness, whether selection is a cause or force, the levels at which selection operates, and whether cultural evolution is a Darwinian process.  
Same as: PHIL 167A.

**PHIL 267B. Philosophy, Biology, and Behavior. 4 Units.**

(Graduate students register for 267B.) Continuation of 167A/267A. Further philosophical study of key theoretical ideas in biology, focusing on problems involving explanation of behavior. Topics: evolutionary versus proximate causal explanations of behavior; genetic and other determinisms; and classification and measurement of behavior. Prerequisites: 167A; or one PHIL course and either one BIO course or Human Biology core; or equivalent with consent of instructor.  
Same as: PHIL 167B.

**PHIL 267C. Associative Theories of Mind and Brain. 4 Units.**

After a historical survey of associative theories from Hume to William James, current versions will be analyzed including the important early ideas of Karl Lashley. Emphasis will be on the computational power of associative networks and their realization in the brain.  
Same as: PHIL 167C.

**PHIL 267D. philosophy of neuroscience. 4 Units.**

Can problems of mind be solved by understanding the brain, or models of the brain? We will examine the views of philosophers and neuroscientists who believe so, and others who are skeptical of neurophilosophical approaches to the mind. The course will examine historical and recent literature in philosophy and neuroscience. Topics may include perception, memory, neural accounts of consciousness, neurophenomenology, neuroscience and physics, computational models, and eliminativism, among others.

Same as: PHIL 167D, SYMSYS 206.

**PHIL 270. Ethical Theory. 4 Units.**

A more demanding version of Phil. 2. Designed for juniors, seniors, and first-year graduate students who are new to moral philosophy. May be appropriate for some freshmen and sophomores (contact professor). Fulfills the Ethical Reasoning requirement.

Same as: ETHICSOC 170, PHIL 170.

**PHIL 270B. Metaphor. 4 Units.**

Think and talk about two things at once: two different subject matters are mingled to rich and unpredictable effect. Close critical study of the main modern accounts of metaphors nature and interest, drawing on the work of writers, linguists, philosophers, and literary critics. Attention to how understanding, appreciation, and pleasure connect with one another in the experience of metaphor. Consideration of the possibility that metaphor or something very like it can occur in nonverbal media: gesture, dance, painting, music.

Same as: PHIL 170B.

**PHIL 270D. Trust and Trustworthiness. 4 Units.**

An exploration of the place of interpersonal trust in ethical thought. What is it to trust another person? How is trusting related to, though different from, other attitudes we sometimes bear towards others (e.g. justified beliefs we form about others and their conduct; ethically significant expectations we have of others, etc.)? What is involved in acquiring/possessing the virtue of trustworthiness? How should trust (and trustworthiness) figure in our thinking about important ethical activities, for example promising, friendship, or the practice of politics?

Same as: PHIL 170D.

**PHIL 270E. Sexual Ethics. 4 Units.**

What is sex? What are the implications of different conceptions of sex for sexual ethics? Are there any distinctively sexual ethical principles or virtues or are principles and virtues that govern the sexual domain specific instances of principles and virtues that govern human activity more generally? Readings will range from historical to contemporary sources.

Same as: ETHICSOC 175, PHIL 170E.

**PHIL 271. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors.

Same as: ETHICSOC 171, IPS 208, PHIL 171, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307.

**PHIL 272. History of Modern Moral Philosophy. 4 Units.**

This course traces the development of moral philosophy in Britain just prior to the nearly simultaneous emergence of Kant's moral philosophy and Bentham's utilitarianism in the 1780's. Emphasis is on the dialogue between empiricists and rationalists on the subject of the relationship between the natural and the normative. Authors include Hobbes, Clarke, Hutcheson, Hume, Smith, Price, and Bentham. Prerequisite: some familiarity with Kant's moral theory and utilitarianism, and demonstrated interest in philosophy.

Same as: PHIL 172.

**PHIL 272B. Recent Ethical Theory. 4 Units.**

Study the works of several prominent contemporary moral philosophers. Possible authors include: Scanlon, Darwall, Nagel, Williams, Blackburn, Gibbard, Korsgaard. Prerequisite: students should have taken an introduction to moral philosophy (Phil. 20, Phil. 170 or equivalent).

Same as: PHIL 172B.

**PHIL 272D. Bernard Williams. 4 Units.**

An exploration of some central themes from the work of Bernard Williams. Particular attention will be paid to his discussion of the character and identity of the self, his sustained critique of morality and moral philosophy. We will also read several of Williams's interlocutors, including Nagel, Parfit, Korsgaard, and Herman.

Same as: PHIL 172D.

**PHIL 274. Freedom and the Practical Standpoint. 4 Units.**

(Graduate students register for 274.) Confronted with the question of how to act, people think of themselves as freely determining their own conduct. Natural science poses a challenge to this by explaining all events, including human actions, in terms of causal processes. Are people justified in thinking of themselves as free? Major philosophical approaches to this question: incompatibilism, compatibilism, and the two-standpoint view.

Same as: PHIL 174.

**PHIL 274A. Moral Limits of the Market. 4 Units.**

Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute?

Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases.

Same as: ETHICSOC 174A, PHIL 174A.

**PHIL 275M. Two Ethical Theories and Being a Person. 4 Units.**

The distinction between the ethics of being a person and the ethics of rules as opposed to the distinction between Kantian ethics and utilitarianism or consequentialism. Comparison of these two types of ethics with respect to their relationship to agency and being a good person. Relations between Western ethics and those of other continents.

Same as: PHIL 175M.

**PHIL 276. Political Philosophy: The Social Contract Tradition. 4 Units.**

(Graduate students register for 276.) Why and under what conditions do human beings need political institutions? What makes them legitimate or illegitimate? What is the nature, source, and extent of the obligation to obey the legitimate ones, and how should people alter or overthrow the others? Answers by political theorists of the early modern period: Hobbes, Locke, Rousseau, and Kant.

Same as: PHIL 176.

**PHIL 276A. Classical Seminar: Origins of Political Thought. 4-5 Units.**

Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change.

Same as: CLASSHIS 133, CLASSHIS 333, PHIL 176A, POLISCI 230A, POLISCI 330A.

**PHIL 276B. The Economic Individual in the Behavioral Sciences. 4 Units.**

(Graduate students register for 276B.)

Same as: PHIL 176B.

**PHIL 278A. The Ethics of Environmental Choices. 4 Units.**

(Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

Same as: EARTHSYS 178, EARTHSYS 278, PHIL 178A.

**PHIL 278M. Introduction to Environmental Ethics. 5 Units.**

This course examines the following ethical questions about the environment: (1) how we ought morally to relate to animals; (2) attempts to expand the circle of moral concern beyond animals to other parts of nature; (3) economic approaches to environmental problems (e.g. cost-benefit analysis) and the justification of the precautionary principle; and (4) our moral obligations to future people. The class will conclude by considering whether the theoretical tools that we have examined help to address the problems of climate change, one of the most pressing environmental challenges of our time.

Same as: ETHICSOC 178M, ETHICSOC 278M, PHIL 178M, POLISCI 134L.

**PHIL 279S. Moral Psychology, Reasons for Action, and Moral Theory. 4 Units.**

What sorts of considerations does an ethical agent take to be good reasons for action? Work in moral psychology to illuminate the theory of practical reasons, and the theory of practical reasons to test the prospects for systematic moral theory. Can any systematic moral theory be reconciled with the moral psychology of ordinary, morally respectable agents?

Reading include Bernard Williams, Rosalind Hursthouse, Peter Railton, T.M. Scanlon, and Barbara Herman.

Same as: PHIL 179S.

**PHIL 280. Metaphysics. 4 Units.**

Selection of core topics in metaphysics, including personal identity, naturalism, modality, and/or existence of God. Prerequisite: 80 or consent of instructor.

Same as: PHIL 180.

**PHIL 280A. Realism, Anti-Realism, Irrealism, Quasi-Realism. 4 Units.**

Realism and its opponents as options across a variety of different domains: natural science, mathematics, ethics, and aesthetics. Clarify the various conceptions that fall under these terms and outline the reasons for and against adopting realism for the various domains. Highlight the general issues involved. Prerequisites: 80, 181

Same as: PHIL 180A.

**PHIL 281. Philosophy of Language. 4 Units.**

The study of conceptual questions about language as a focus of contemporary philosophy for its inherent interest and because philosophers see questions about language as behind perennial questions in other areas of philosophy including epistemology, philosophy of science, metaphysics, and ethics. Key concepts and debates about the notions of meaning, truth, reference, and language use, with relations to psycholinguistics and formal semantics. Readings from philosophers such as Frege, Russell, Wittgenstein, Grice, and Kripke. Prerequisites: 80 and background in logic. Same as: PHIL 181.

**PHIL 281B. Philosophy of Language: Contemporary Debates. 4 Units.**

This course builds on the material of 181/281, focusing on debates and developments in the pragmatics of conversation, the semantics/pragmatics distinction, the contextuality of meaning, the nature of truth and its connection to meaning, and the workings of particular linguistic constructions of special philosophical relevance. Students who have not taken 181/281 should seek the instructor's advice as to whether they have sufficient background.

Same as: PHIL 181B.

**PHIL 282. Truth. 2-4 Units.**

Focus on the nature of truth; specifically, ongoing debates between so-called correspondence theorists and deflationists. The former generally think truth amounts to some kind of structural isomorphism between the world and our representations of it (like the relationship between a subway map and the subway route itself). Deflationists think the nature of truth is exhausted by something as trifling as the equivalence between affirming something and affirming that it's true: e.g., it's true that Modest Mouse is God's gift to indie rock if and only if Modest Mouse IS God's gift to indie rock. Related issues include the possibility of truth-value "gaps" (claims that are neither true nor false), degrees of truth, relativism and realism about arbitrary subject matters, the semantic paradoxes (like the Liar), the role of truth in the theory of meaning, and the value of true belief. Most readings were written after 1980. Previous courses in philosophy of language and/or metaphysics very strongly encouraged. Phil 80 a must.

Same as: PHIL 182.

**PHIL 284. Theory of Knowledge. 4 Units.**

Focus on nature of epistemic justification, good reasoning, and transmission of warrant, both intrapersonal (inference) and interpersonal (testimony).

Prerequisite: 80 or consent of instructor.

Same as: PHIL 184.

**PHIL 284C. Epistemology of Testimony. 4 Units.**

Many of our beliefs come from others, and not from direct experience.

Is testimony a source of fundamental reasons; reasons that do not have to be supported or validated by other sources like perception or inference? What sort of responsibility does one have to one's hearers, when one gives testimony?

Same as: PHIL 184C.

**PHIL 284F. Feminist Theories of Knowledge. 4 Units.**

Feminist critique of traditional approaches in epistemology and alternative feminist approaches to such topics as reason and rationality, objectivity, experience, truth, the knowing subject, knowledge and values, knowledge and power.

Same as: FEMST 166, PHIL 184F.

**PHIL 285B. Philosophy of Perception. 4 Units.**

The nature of perceptual experience and the role it plays in securing empirical knowledge. Focus will be on what is sometimes called "the problem of perception": the question of how perception could provide us with direct awareness of the surrounding environment given the possibility of illusions or hallucinations. Topics, include the relationship between perception and belief, the nature of perceptual phenomenology, whether or not perceptual experiences are representational states, and the philosophical relevance of empirical research on perception.

Same as: PHIL 185B.

**PHIL 286. Philosophy of Mind. 4 Units.**

(Graduate students register for 286.) Debates concerning the nature of mental states, their relation to physical states of the human body, how they acquire their content, how people come to know about them in themselves and others, and the roles they play in the explanation of human conduct.

Same as: PHIL 186.

**PHIL 287. Philosophy of Action. 4 Units.**

(Graduate students register for 287.) Contemporary research in the philosophy of action. Topics include: What is it to be an agent? Is there a philosophically defensible contrast between being an agent and being a locus of causal forces to which one is subject? What is it to act purposively? What is intention? What is the relation between intention and belief? What is it to act intentionally? What is it to act for a reason? What is the relation between explaining why someone acted by citing the reasons for which she acted and causal explanation of her action? What is the relation between theoretical and practical rationality? What is the nature of our knowledge of our own intentional activity? What is it to act autonomously? What is shared cooperative activity? Prerequisite: 80.. Same as: PHIL 187.

**PHIL 288. Personal Identity. 4 Units.**

Do you persist through time the way that a skyscraper persists through space, by having different parts at different locations? Or are you wholly present at every moment of your life, in something more like the way that an elevator is present in each place as it travels up to the top floor? What criteria determine whether you now are the very same person as some unique person located at some time in the past? Is the continuity of your memories or other mental states sufficient for your survival? Can you survive the loss or destruction of your body? Do you really exist for more than just the present moment? How do different answers to these questions bear on your moral, personal, and professional obligations? What kinds of considerations could possibly help us to answer these questions? This course explores these and related issues. Readings include a mix of introductory survey, historical, and contemporary material. Same as: PHIL 188.

**PHIL 289. Examples of Free Will. 4 Units.**

Examples drawn from three domains: choice, computation, and conflict of norms. Conceptually, a distinction is made between examples that are predictable and those that are not, but skepticism about making a sharp distinction between determinism and indeterminism is defended. Same as: PHIL 189.

**PHIL 293C. Film & Philosophy. 4 Units.**

Issues of freedom, morality, faith, knowledge, personal identity, and the value of truth explored through film; philosophical investigation of the filmic medium itself. Screenings to include *Twelve Monkeys* (Gilliam), *Ordet* (Dreyer), *The Dark Knight* (Nolan), *Vicky Cristina Barcelona* (Allen), and *Eternal Sunshine of the Spotless Mind* (Kaufman). Taught in English. Same as: COMPLIT 154A, FRENCH 154, ITALIAN 154, PHIL 193C.

**PHIL 300. Proseminar. 4 Units.**

Topically focused seminar. Required of all first year Philosophy PhD students.

**PHIL 301. Dissertation Development Proseminar. 2-4 Units.**

Topically focused seminar. Optional of all third year Philosophy PhD students.

**PHIL 312. Aristotle's Psychology. 4 Units.**

*De Anima* and parts of *Parva Naturalia*.

**PHIL 314. Practical Reasoning in Plato and Aristotle. 2-4 Units.**

It is often said that the greatest difference between Plato's ethics and those of Aristotle is that the latter thinks that practical and theoretical reason are distinct, but the former does not. We shall read some of both Plato and Aristotle and ask whether the above claim is true and then consider what the implications the differences between their views of practical reason have for the rest of their ethics.

**PHIL 316. Ethics before ethics: moral conduct in archaic philosophy. 2-4 Units.**

Depicting Socrates as the founder of ethics is certainly legitimate in some sense, but it also tends to minimize or even obfuscate the importance of the references to human conduct in Presocratic thought. The aim of the seminar is to draw a map of the available material in this respect, and to assess the role that ethical and social thought and concepts plays in some of the most prominent archaic thinkers. Anaximander, Xenophanes, Parmenides, Empedocles and Democritus receive special attention.

**PHIL 317. Topics in Plato: Middle and Late Ethics & Politics. 2-4 Units.**

Examine the fundamentals of Plato's political philosophy by reading the *Politics* as well relevant parts of some of his other ethical and political works.

**PHIL 318. Aristotle and the Object of Mathematical Reasoning. 4 Units.**

The concept of definition plays a central role in Aristotle's treatment of both philosophical and scientific inquiry, as well as explanation. A definition is an account of what something is, and some definitions are used to guide causal inquiry whereas others function as explanatory starting points. In this course we will examine texts from his logic, natural science and metaphysics in order to see what the different kinds of definition are, how they obtained, and how they capture the nature or essence of a definable object. Particular attention will be given to the role of matter in the definition of the form of a natural substance, state, process or activity. For instance, what role does a specification of physiological processes play in the definitions of emotions such as anger? No knowledge of Greek is required.

Same as: CLASSGEN 338.

**PHIL 319. Topics in Greek Philosophy: Plato and Aristotle on Knowledge and Action. 2-4 Units.**

Aristotle's views about substance and the nature and possibility of metaphysics. Focus is on *Categories* and *Metaphysics* Book Zeta.

**PHIL 321. Leibniz's Metaphysics. 2-4 Units.**

Leibniz's metaphysical views during his so-called "mature period" (early 1680s to 1716). Topics will include Leibniz's conception of substance, his alleged idealism, his doctrine of possible worlds and his doctrine of pre-established harmony. Reading of the *Discourse on Metaphysics* (1686) and the correspondence with Arnauld (1686-1690).

**PHIL 322. Hume. 2-4 Units.**

Hume's theoretical philosophy emphasizing skepticism and naturalism, the theory of ideas and belief, space and time, causation and necessity, induction and laws of nature, miracles, a priori reasoning, the external world, and the identity of the self.

**PHIL 323. Kant's Criticism of Metaphysics. 4 Units.**

Motivations and strategies of Kant's criticisms of traditional metaphysics in the *Critique of Pure Reason*. Leibnizian and Wolffian versions of the concept containment theory of truth and the Wolffian ideal of a conceptual system of metaphysical knowledge. Kant's analytic/synthetic distinction, focusing on its place in the rejection of metaphysics and in arguments about the ideas of reason in the transcendental dialectic. Prerequisite: course on the first *Critique*, or consent of instructor.

**PHIL 324. Kant's System of Nature and Freedom. 4 Units.**

The aim is to acquire a sense of how the two main parts of Kant's philosophy, theoretical and practical, fit together. These two parts, according to the *Critique of the Power of Judgment*, concern the realm of nature and the realm of freedom respectively. We shall study parts of all three *Critiques*, along with appropriate supplementary materials. Prior acquaintance with both Kant's theoretical and his practical philosophy is presupposed.

**PHIL 332. Nietzsche. 2-4 Units.**

Preference to doctoral students. Nietzsche's later works emphasizing *The Gay Science*, *Beyond Good and Evil*, and *On the Genealogy of Morals*. The shape of Nietzsche's philosophical and literary projects, and his core doctrines such as eternal recurrence, will to power, and perspectivism. Problems such as the proper regulation of belief, and the roles of science, morality, art, and illusion in life.

**PHIL 334. Habermas. 3-5 Units.**

Does Habermas have a distinctive account of normativity and normative judgements?.

**PHIL 335. Topics in Aesthetics. 4 Units.**

May be repeated for credit.

**PHIL 340. Time and Free Will. 3-5 Units.**

Free will and the consequence argument of Peter van Inwagen and others. Focus is on the principle that one cannot change the past and the problem of backtracking conditionals, and less on the problem raised by determinism. Hypotheses less drastic than determinism support backtrackers; given the backtracker, would someone's not having done something require that he change the past? Issues related to time, change, the phenomenology of agency, and McTaggart's argument about the reality of time.

**PHIL 348. Evolution of Signals. 2-4 Units.**

Explores evolutionary (and learning) dynamics applied to simple models of signaling, emergence of information and inference. Classroom presentations and term papers. Text: Skyrms - SIGNALS: EVOLUTION, LEARNING and INFORMATION and selected articles.

**PHIL 349. Evidence and Evolution. 3-5 Units.**

The logic behind the science. The concept of evidence and how it is used in science with regards to testing claims in evolutionary biology and using tools from probability theory, Bayesian, likelihoodist, and frequentist ideas. Questions about evidence that arise in connection with evolutionary theory. Creationism and intelligent design. Questions that arise in connection with testing hypotheses about adaptation and natural selection and hypotheses about phylogenetic relationships. Same as: PHIL 249.

**PHIL 350A. Model Theory. 3 Units.**

Back-and-forth arguments with applications to completeness, quantifier-elimination and omega-categoricity. Elementary extensions and the monster model. Preservation theorems. Interpolation and definability theorems. Imaginaries. Prerequisite: Phil151A or consent of the instructor.

**PHIL 350B. Model Theory B. 1-3 Units.**

Decidable theories. Model-theoretic background. Arithmetic of addition, real closed and algebraically closed fields, weak second order arithmetic, theories of terms, theories of arrays, temporal logic. Combining decision procedures. May be repeated for credit. Prerequisite: 151, 152 or equivalents. Same as: MATH 290B.

**PHIL 351A. Recursion Theory. 3 Units.**

Theory of recursive functions and recursively enumerable sets. Register machines, Turing machines, and alternative approaches. Gödel's incompleteness theorems. Recursively unsolvable problems in mathematics and logic. Introduction to higher recursion theory. The theory of combinators and the lambda calculus. Prerequisites: 151, 152, and 161, or equivalents.

**PHIL 351B. Proof Mining. 1-3 Units.**

Uses of proof theory in analysis and number theory. Proof mining: extraction of bounds from non-effective proofs. May be repeated for credit. Prerequisite: 151, 152 or equivalents, and a calculus course.

**PHIL 352A. Set Theory. 3 Units.**

The basics of axiomatic set theory; the systems of Zermelo-Fraenkel and Bernays-Gödel. Topics: cardinal and ordinal numbers, the cumulative hierarchy and the role of the axiom of choice. Models of set theory, including the constructible sets and models constructed by the method of forcing. Consistency and independence results for the axiom of choice, the continuum hypothesis, and other unsettled mathematical and set-theoretical problems. Prerequisites: PHIL151 and MATH 161, or equivalents. Same as: MATH 292A.

**PHIL 353A. Proof Theory. 3 Units.**

Gentzen's natural deduction and sequential calculi for first-order propositional and predicate logics. Normalization and cut-elimination procedures. Relationships with computational lambda calculi and automated deduction. Prerequisites: 151, 152, and 161, or equivalents. Same as: MATH 293A.

**PHIL 353B. Proof Theory B. 2-3 Units.**

Consistency ordinal as a measure of the strength of a mathematical theory. The open problem of describing the ordinal of mathematical analysis (second order arithmetic). Present state of the problem and approaches to a solution. Prerequisites: Phil 151, 152 or equivalents.

**PHIL 353C. Functional Interpretations. 4 Units.**

Finite-type arithmetic. Gödel's functional interpretation and Kreisel's modified realizability. Systems based on classical logic. Spector's extension by bar-recursive functionals. Kohlenbach's monotone interpretation and the bounded functional interpretation. The elimination of weak König's lemma. Uniform boundedness. A look at Tao's hard/soft analysis distinction.

**PHIL 354. Topics in Logic. 1-3 Units.**

Epsilon-calculus. Syntax and semantics of first-order epsilon-calculus. Hilbert's epsilon substitution method. Recent progress and open problems. May be repeated for credit. Prerequisite: 151, 152 or equivalents.

**PHIL 355. Logic and Social Choice. 4 Units.**

Topics in the intersection of social choice theory and formal logic. Voting paradoxes, impossibility theorems and strategic manipulation, logical modeling of voting procedures, preference versus judgment aggregation, role of language in social choice, and metatheory of social choice. May be repeated for credit. Prerequisite: 151 or consent of instructor.

**PHIL 356. Applications of Modal Logic. 3 Units.**

Applications of modal logic to knowledge and belief, and actions and norms. Models of belief revision to develop a dynamic doxastic logic. A workable modeling of events and actions to build a dynamic deontic logic on that foundation. (Staff).

**PHIL 358. Rational Agency and Intelligent Interaction. 3 Units.**

For advanced undergraduates, and M.S. and beginning Ph.D. students. Logic-based methods for knowledge representation, information change, and games in artificial intelligence and philosophy. Topics: knowledge, certainty, and belief; time and action; belief dynamics; preference and social choice; games; and desire and intention. Prerequisite: propositional and first-order logic. Same as: CS 222.

**PHIL 359. Advanced Modal Logic. 2-4 Units.**

Mathematical analysis of modal systems, including bisimulation and expressive power, correspondence theory, algebraic duality, completeness and incompleteness, and extended modal logics, up to guarded fragments of first-order logic, fixed-point logics, and second-order logic. Prerequisite: 151, 154/254, or equivalent background.

**PHIL 360. Core Seminar in Philosophy of Science. 4 Units.**

Limited to first- and second-year Philosophy Ph.D. students.

**PHIL 365. Seminar in Philosophy of Science: Time. 4 Units.**

**PHIL 366. Evolution and Communication. 4 Units.**

Topics include information bottlenecks, signaling networks, information processing, invention of new signals, teamwork, evolution of complex signals, teamwork. Sources include signaling games invented by David Lewis and generalizations thereof, using evolutionary and learning dynamics.

**PHIL 370. Core Seminar in Ethics. 4 Units.**

Limited to first- and second-year students in the Philosophy Ph.D. program.

**PHIL 371D. Graduate Seminar on Equality. 5 Units.**

This seminar will focus on ideas of equality of opportunity, with readings from political theory, as well as American constitutional law, political science, economics, and sociology. The readings will address four main questions: What is equality of opportunity? Why is equality of opportunity an important requirement of justice? What are the principal sources of inequalities of opportunity? And how might those inequalities be remedied? Readings from: Hayek, Rawls, Dworkin, Okin, Roemer, Tawney, Bourdieu, Barry, Jencks, Mazumder, Alstott, McLanahan, and Heckman. Same as: POLISCI 431L.

**PHIL 372. Topics in Kantian Ethics. 4 Units.**

Selected topics in ethics, considering both Kant's texts and recent writings by Kant interpreters and moral philosophers in the Kantian tradition. Among the topics covered will be: Practical reason, personal relationships, duties to oneself, evil, right and politics, lying, constructivism in ethics.

**PHIL 372E. Graduate Seminar on Moral Psychology. 3-5 Units.**

Recent philosophical works on desire, intention, the motivation of action, valuing, and reasons for action. Readings: Williams, Korsgaard, Smith, Blackburn, Velleman, Stampe, Frankfurt.

**PHIL 372P. Korsgaard and her Critics. 2-4 Units.**

Christine Korsgaard has developed an unusually complex and comprehensive theory of morality, according to which moral authority has its source in our authority over ourselves simply as human agents. Her view purports to be humanist without falling into relativism, subjectivism, or voluntarism. Our aim is to understand and evaluate Korsgaard's theory, which Derek Parfit has characterized as combining "Kantian, Humean, and existentialist ideas in unexpected, platitude-denying ways." Readings include Korsgaard's own works as well as selected critiques. Graduate level seminar aimed primarily at philosophy students.

**PHIL 372R. Political Realism. 3-5 Units.**

This seminar will explore various articulations of political realism in their historical contexts. Realism is generally taken to be a pragmatic approach to a political world marked by the competition for material interests and the struggle for power. Yet beyond a shared critique of idealism and an insistence on the priority and autonomy of the political, realists tend to have very different normative visions and political projects. We will consider the works of several political realists from the history of political and international relations thought, including: Thucydides, Machiavelli, Hobbes, Carr, Niebuhr, and Morgenthau. Same as: POLISCI 435R.

**PHIL 373. Moral Psychology: The Concept of Inclination. 4 Units.**

The weight placed by Kantian and rationalist moral theories on the distinction between inclination and reason. The concept of inclination as that which inclines but does not determine how people act. How are inclinations related to the people who hold them? Are they expressions of values, or more like internal weather? What is their nature? What does it mean to act from inclination? Are actions on inclination unchosen or just badly chosen? Historical and contemporary sources.

**PHIL 374. Caring and Practical Reasoning. 4 Units.**

What is it to care about something; how is caring related to desiring, emotions, and having policies; what is the relationship between caring and the will; why do people care about things; can attention to caring help explain the phenomenon of silencing reasons? Readings from contemporary literature, including Frankfurt, Watson, Bratman, Scanlon, Williams, Helm, and Kolodny. May be repeated for credit.

**PHIL 374C. Democracy and the Constitution. 5 Units.**

Connections between democratic theory and constitutional theory. Sources include literature from political philosophy, constitutional law, and jurisprudence, and arguments about freedom of expression, campaign finance, legislative apportionment, federalism, and separation of powers. Readings from Scalia, Breyer, Ely, Ackerman, Dahl, Rawls, Habermas, Dworkin, Riker, and Schumpeter, as well as constitutional cases. Same as: POLISCI 438.

**PHIL 376. Agency and Personal Identity. 4 Units.**

How philosophical theories of agency interact with philosophical accounts of personal identity. Readings include David Velleman and Harry Frankfurt.

**PHIL 377. Rational and Social Agency. 2-5 Units.**

Contemporary discussions of practical reason, individual rational agency, planning agency, diachronic agency, intention, belief, intentional action, shared agency, identification and self-governance. Tentative list of authors whose work will be studied includes: Michael Bratman, Margaret Gilbert, Richard Holton, Christine Korsgaard, Alfred Mele, Kieran Setiya, Scott Shapiro, Michael Smith, David Velleman, Jay Wallace, and Gary Watson. Same as: POLISCI 333.

**PHIL 378. Amartya Sen's capability theory. 2-4 Units.**

Amartya Sen's pioneering work attempts to open up economics to missing informational and evaluative dimensions. This seminar will explore Sen's "capability approach" and its implications for the study of economics, gender, and justice. It will look at different ways that the capability approach has been developed, in particular, by Martha Nussbaum, but also by other political philosophers. Same as: POLISCI 436R.

**PHIL 379. Graduate Seminar in Metaethics. 2-4 Units.**

Theories about the meaning of ethical terms and the content of ethical judgements. Do these theories fit with best accounts of human agency and practical deliberation? Readings from recent literature. Prerequisites: 173B/273B, 181, 187/287 or equivalent.

**PHIL 380. Core Seminar in Metaphysics and Epistemology. 4 Units.**

Limited to first- and second-year students in the Philosophy Ph.D. program.

**PHIL 381. Core Seminar in Philosophy of Language. 4 Units.**

Limited to first- and second-year students in the Philosophy Ph.D. program.

**PHIL 382. Seminar on Reference. 4 Units.**

Philosophical issues concerning the relationship between linguistic expressions and the objects to which they refer. Is it possible to get one unified theory of reference for different kinds of referring expressions such as proper names, pronouns, demonstratives, and other kinds of indexicals? Unsolved problems and desiderata for a theory of reference?.

**PHIL 382A. Pragmatics and Reference. 4 Units.**

Grice's theory of conversational implicatures, Relevance Theory and other contemporary pragmatic theories, focusing on issues involving singular reference, "pragmatic intrusion," and the semantics - pragmatics "interface." Throughout the seminar will be developing the approach Kera Korta and Perry call "critical pragmatics."

**PHIL 383. Philosophy of Mind Seminar. 2-4 Units.**

May be repeated for credit.

**PHIL 383B. What's an Inference?. 2-4 Units.**

Fundamental issues in epistemology, philosophy of mind and language: issues relating to the notion (or rather, notions) of an inference. What's inferential justification? What's an inferential reasoning process? What are inference rules, and what distinguishes a good rule of inference from a bad rule? Subtopics to be discussed include: the problem of mental causation, the distinction between personal and sub-personal levels of explanation, preservation of content and warrant, the epistemic support relation, and time permitting the nature of perceptual justification.

**PHIL 384. Seminar in Metaphysics and Epistemology. 4 Units.**

May be repeated for credit.

**PHIL 385. Pragmatics and Reference. 2-4 Units.**

Problems about reference have played a large role in the philosophy of language since the days of Frege and Russell. An approach to reference from the point of view of pragmatics, that Kepa Korta and John Perry have developed in their book CRITICAL PRAGMATICS. Rely on ideas from John Perry's book REFERENCE AND REFLEXIVITY. Also look at other approaches to reference, and to pragmatics.

**PHIL 385B. Topics in Metaphysics and Epistemology: Vagueness. 4 Units.**

Contemporary proposals for how and whether to explain and accommodate vagueness in reality and in representation. Theories of mental and linguistic representation that struggle to explain imprecise representation, and metaphysical theories of the ultimate structure of reality that are threatened with incoherence if worldly boundaries are vague. May be repeated for credit.

**PHIL 385C. Topics in Philosophy of Language: The Frege-Russell Problems. 2-4 Units.**

Explore various approaches to the difficulties for semantic theories raised by the behavior of propositional attitude sentences. How, if Superman and Clark are the same person, can Lois have different beliefs about them? "Classic" treatments of the issues including Frege, Russell, Quine, Davidson, and Kripke. Contemporary debates about the most promising approaches, including "naive Russellianism" and "unarticulated constituent" accounts.

**PHIL 385D. Topics in Philosophy of Language. 4 Units.****PHIL 385M. The Metaphysics of Meaning. 2-4 Units.**

One central project in the philosophy of language is to explain the relationships between paradigmatically semantic phenomena like meaning, truth, and reference (as well as entailment, satisfaction, application, and others). Often the pursuit of this project generates orders of explanation in which some notions are privileged as more "fundamental" than others, in what is arguably a metaphysical sense of the expression. The dominant order of explanation in both philosophical and linguistic semantics seems to be Referentialism, according to which word/world relationships like reference and application are taken to be more fundamental than sentential truth or meaning. (Think: correspondence theory + model-theoretic semantics.) Alternatives to the orthodoxy include certain versions of conceptual-role semantics, Brandom's inferentialism, and Horwich's use theory of meaning. The aims of this seminar will be to acquaint ourselves with these and other going concerns in the theory of meaning, to organize logical space so that gaps might more easily be spotted, and to help the instructor develop his own, as yet nascent form of opposition to Referentialism. Of special interest will be the alleged normativity of meaning and the Field/Wright dispute over reference to abstracta. Besides the authors already mentioned, readings will be drawn from Katz, King, Kripke, and perhaps (time permitting) Millikan, Peacocke, and/or Taylor as well. But we should probably begin by rehashing Davidson v. Dummett.

**PHIL 385R. Metaphysics of Reference. 2-4 Units.**

This seminar is an investigation of the nature of reference in both private thought and public talk. Just what is it for some bits of either our shared public language or our inner thoughts to refer to or stand for bits of the world? In virtue of what does the relation of reference obtain between some bit of the world and some bit of either outer language or inner thought? What about apparent reference to putatively non-existent objects, like Santa Claus or Sherlock Holmes? We appear to think and talk about objects that do not exist. But there are no such objects. So just how do we manage to think and talk about them? Or consider abstract objects, like numbers, that are thought by some to exist outside the spatial-temporal order. We appear to think and talk about such objects as well. But it is a mystery how, if at all, the reach of our thought could possibly extend beyond even the bounds of space and time. Though we will canvass a number of different answers to this questions, proposed by a variety of philosophers, my main goal will be to develop and defend a view that I call two-factor referentialism. Readings will be drawn from a number of sources, including several chapters of my book in progress Referring to the World.

**PHIL 386B. Husserl and Adam Smith. 4 Units.**

Readings from Husserl and others in the phenomenological tradition, and recent work on intentionality and consciousness by philosophers and cognitive scientists.

**PHIL 386C. Subjectivity. 4 Units.**

Continuation of 386B.

**PHIL 386D. Personal Identity. 4 Units.**

Focus on personal identity as a case study in metaphysical indeterminacy. The classic puzzles of PI can be construed as arguments that it can be indeterminate whether person A is identical to person B, and indeed, whether person A exists. Can such cases of indeterminacy be plausibly interpreted as semantic (or epistemic), or do they support the possibility of worldly or "ontic" indeterminacy? Is ontic indeterminacy even coherent? How might it be modeled? Parallel questions arise in the metaphysics of ordinary material objects, of course; but it's not obvious that their answers should also run parallel. And even if they do, focusing on PI lends the questions some real urgency. How should I feel about the interests of a past or future person who's only indeterminately me? Should I fear a future in which I merely indeterminately exist? Maybe outright death is preferable to being literally liminal. Seminar. Graduate work in core philosophy a prerequisite.

**PHIL 387. Practical Rationality. 2-4 Units.**

Contemporary research on practical reason, practical rationality and reasons for action. May be repeated for credit.

**PHIL 387C. Consistency and Coherence. 2-4 Units.**

Some philosophers think that attitudes like belief and intention are subject to consistency and coherence requirements. Are there such general purpose cogency requirements on attitudes? If so, what is their nature and strength? What grounds these requirements; for instance, does the point or purpose of a belief or an intention ground consistency and coherence requirements on that attitude? How are such requirements on belief related to requirements on intention? How does the answer to such questions bear on understanding of the interrelations between theoretical and practical rationality?.

**PHIL 387D. Rationality over Time. 2-4 Units.****PHIL 387S. Practical Reasons and Practical Reasoning. 4 Units.**

Attempts to develop alternatives to Humean, instrumentalist conceptions of practical reasoning, and alternatives to Humean, non-cognitivist views of practical reasons. Readings include Aurel Kolnai, Bernard Williams, David Wiggins, Joseph Raz, Michael Bratman, Elijah Millgram, and T.M. Scanlon.

**PHIL 388. Normativity. 2-4 Units.**

May be repeated for credit.

**PHIL 389. Advanced Topics in Epistemology. 3-5 Units.**

Skepticism and contextualism, epistemic closure, and problems generated by closure.

**PHIL 391. Research Seminar in Logic and the Foundations of Mathematics. 1-3 Units.**

Contemporary work. May be repeated a total of three times for credit. Math 391 students attend the logic colloquium in 380-381T. Same as: MATH 391.

**PHIL 450. Thesis. 1-15 Units.**

(Staff).

**PHIL 470. Proseminar in Moral Psychology. 4 Units.**

Restricted to Philosophy doctoral students. May be repeated for credit.

**PHIL 500. Advanced Dissertation Seminar. 1 Unitss.**

Presentation of dissertation work in progress by seminar participants. May be repeated for credit.

**PHIL 801. TGR Project. 0 Unit.****PHIL 802. TGR Dissertation. 0 Unit.**

(Staff).

## Physics Courses

**PHYSICS 15. The Nature of the Universe. 3 Units.**

The structure, origin, and evolution of the major components of the Universe: planets, stars, and galaxies. Emphasis is on the formation of the Sun and planets, the evolution of stars, and the structure and content of the Milky Way galaxy. Topics: cosmic enigmas (dark matter, black holes, pulsars, x-ray sources), star birth and death, and the origins of and search for life in the solar system and beyond.

**PHYSICS 16. Cosmic Horizons. 3 Units.**

The origin and evolution of the universe and its contents: stars, galaxies, quasars. The overall structure of the cosmos and the physical laws that govern matter, space, and time. Topics include the evolution of the cosmos from the origin of the elements and the formation of stars and galaxies, exotic astronomical objects (black holes, quasars, supernovae, and gamma ray bursts), dark matter, inflationary cosmology, and the fate of the cosmos.

**PHYSICS 17. Black Holes. 3 Units.**

Newton's and Einstein's theories of gravitation and their relationship to the predicted properties of black holes. Their formation and detection, and role in galaxies and high-energy jets. Hawking radiation and aspects of quantum gravity.

**PHYSICS 18N. Frontiers in Theoretical Physics and Cosmology. 3 Units.**

Preference to freshmen. The course will begin with a description of the current standard models of gravitation, cosmology, and elementary particle physics. We will then focus on frontiers of current understanding including investigations of very early universe cosmology, string theory, and the physics of black holes.

**PHYSICS 19. How Things Work: An Introduction to Physics. 3 Units.**

Introduction to the principles of physics through familiar objects and phenomena, including airplanes, cameras, computers, engines, refrigerators, lightning, radio, microwave ovens, and fluorescent lights. Estimates of real quantities from simple calculations. Prerequisite: high school algebra and trigonometry.

**PHYSICS 21. Mechanics and Heat. 3 Units.**

For biology, social science, and premedical students. Introduction to Newtonian mechanics, fluid mechanics, theory of heat. Prerequisite: high school algebra and trigonometry; calculus not required.

**PHYSICS 21S. Mechanics and Heat w/ laboratory. 4 Units.**

Equivalent to PHYSICS 21 and PHYSICS 22.

**PHYSICS 22. Mechanics and Heat Laboratory. 1 Unitss.**

Guided hands-on exploration of concepts in classical mechanics and thermodynamics with an emphasis on student predictions, observations and explanations. Pre- or corequisite: PHYS 21.

**PHYSICS 23. Electricity and Optics. 3 Units.**

Electric charges and currents, magnetism, induced currents; wave motion, interference, diffraction, geometrical optics. Prerequisite: PHYSICS 21.

**PHYSICS 24. Electricity and Optics Laboratory. 1 Unitss.**

Guided hands-on exploration of concepts in electricity and magnetism, circuits and optics with an emphasis on student predictions, observations and explanations. Introduction to multimeters and oscilloscopes. Pre- or corequisite: PHYS 23.

**PHYSICS 25. Modern Physics. 3 Units.**

Introduction to modern physics. Relativity, quantum mechanics, atomic theory, radioactivity, nuclear reactions, nuclear structure, high energy physics, elementary particles, astrophysics, stellar evolution, and the big bang. Prerequisite: PHYSICS 23 or consent of instructor.

**PHYSICS 25S. Modern Physics with Laboratory. 4 Units.**

Equivalent to PHYSICS 25 and PHYSICS 26.

**PHYSICS 26. Modern Physics Laboratory. 1 Unitss.**

Guided hands-on and simulation-based exploration of concepts in modern physics, including special relativity, quantum mechanics and nuclear physics with an emphasis on student predictions, observations and explanations. Pre- or corequisite: PHYSICS 25.

**PHYSICS 28. Mechanics, Heat, and Electricity. 6 Units.**

For biology, social science, and premedical students. The sequence PHYSICS 28 and PHYSICS 29 fulfills, in ten weeks, the one-year college physics requirement with lab of most medical schools. Topics: Newtonian mechanics, fluid mechanics, theory of heat, electric charges, and currents. Prerequisite: high school algebra and trigonometry.

**PHYSICS 29. Electricity and Magnetism, Optics, Modern Physics. 6 Units.**

Magnetism, induced currents; wave motion, optics; relativity, quantum mechanics, atomic theory, radioactivity, nuclear structure and reactions, elementary particles, astrophysics, and cosmology. Prerequisite: PHYSICS 28.

**PHYSICS 41. Mechanics. 4 Units.**

Vectors, particle kinematics and dynamics, work, energy, momentum, angular momentum; conservation laws; rigid bodies; mechanical oscillations and waves. Discussions based on use of calculus. Prerequisite: High school physics or PHYSICS 19. MATH 19 or MATH 41 or equivalent. Corequisite: MATH 20 or MATH 42 or MATH 51.

**PHYSICS 41A. Mechanics Concepts, Calculations, and Context. 1 Unitss.**

Additional assistance and applications for PHYSICS 41. In-class problems in physics and engineering. Exercises in the concepts and calculations of vectors, translational and rotational velocity and acceleration, equations of motion for particles and rigid bodies, and principles of energy and linear/angular momentum. In-class participation required. Limited enrollment.

**PHYSICS 42. Classical Mechanics Laboratory. 1 Unitss.**

Hand-on exploration of concepts in classical mechanics: Newton's laws, conservation laws, rotational motion. Introduction to laboratory techniques, experimental equipment and data analysis. Pre- or corequisite: PHYSICS 41.



**PHYSICS 43. Electricity and Magnetism. 4 Units.**

Electrostatics, Coulomb's law, electric fields and fluxes, electric potential, properties of conductors, Gauss's law, capacitors and resistors, DC circuits; magnetic forces and fields, Biot-Savart law, Faraday's law, Ampere's law, inductors, transformers, AC circuits, motors and generators, electric power, Galilean transformation of electric and magnetic fields, Maxwell's equations; limited coverage of electromagnetic fields and special relativity. Prerequisite: PHYSICS 41 or equivalent. MATH 20 or MATH 42 or MATH 51 or equivalent. Recommended corequisite: Math 52.

**PHYSICS 43N. Understanding Electromagnetic Phenomena. 1 Unitss.**

Preference to freshmen. Expands on the material presented in PHYSICS 43; applications of concepts in electricity and magnetism to everyday phenomena and to topics in current physics research. Corequisite: PHYSICS 43 or advanced placement.

**PHYSICS 44. Electricity and Magnetism Lab. 1 Unitss.**

Hands-on exploration of concepts in electricity and magnetism and circuits. Introduction to multimeters, function generators, oscilloscopes, and graphing techniques. Pre- or corequisite: PHYSICS 43.

**PHYSICS 45. Light and Heat. 4 Units.**

Reflection and refraction, lenses and lens systems; polarization, interference, and diffraction; temperature, properties of matter and thermodynamics, introduction to kinetic theory of matter. Prerequisites: PHYSICS 41 or equivalent. MATH 20 or MATH 42 or MATH 51 or equivalent.

**PHYSICS 45N. Advanced Topics in Light and Heat. 1 Unitss.**

Preference to freshmen. Expands on the subject matter presented in PHYSICS 45 to include optics and thermodynamics in everyday life, and applications from modern physics and astrophysics. Corequisite: PHYSICS 45 or advanced placement.

**PHYSICS 46. Light and Heat Laboratory. 1 Unitss.**

Hands-on exploration of concepts in geometrical optics, wave optics and thermodynamics. Pre- or corequisite: PHYSICS 45.

**PHYSICS 50. Astronomy Laboratory and Observational Astronomy. 3 Units.**

Introduction to observational astronomy emphasizing the use of optical telescopes. Observations of stars, nebulae, and galaxies in laboratory sessions with 16- and 24-inch telescopes at the Stanford Observatory. Meets one evening per week from dusk until well after dark at the Stanford Observatory. No previous physics required. Limited enrollment. Lab.

**PHYSICS 59. Current Research Topics. 1 Unitss.**

Recommended for prospective Physics majors. Presentations of current research topics by faculty with research interests related to physics, often including tours of experimental laboratories where the research is conducted.

**PHYSICS 61. Mechanics and Special Relativity. 4 Units.**

(First in a three-part series: PHYSICS 61, PHYSICS 63, PHYSICS 65.) Advanced freshman physics. For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. Special theory of relativity and Newtonian mechanics with multi-variable calculus. Postulates of special relativity, simultaneity, time dilation, length contraction, the Lorentz transformation, causality, and relativistic mechanics. Central forces, contact forces, linear restoring forces. Momentum transport, work, energy, collisions. Angular momentum, torque, moment of inertia in three dimensions. Damped and forced harmonic oscillators. Recommended prerequisites: Mastery of mechanics at the level of AP Physics C and AP Calculus B/C or equivalent. Corequisite: MATH 51.

**PHYSICS 62. Classical Mechanics Laboratory. 1 Unitss.**

Introduction to laboratory techniques, experiment design, data collection and analysis simulations, and correlating observations with theory. Labs emphasize discovery with open-ended questions and hands-on exploration of concepts developed in PHYSICS 61 including Newton's laws, conservation laws, rotational motion. Pre-or corequisite PHYSICS 61.

**PHYSICS 63. Electricity, Magnetism, and Waves. 4 Units.**

(Second in a three-part series: PHYSICS 61, PHYSICS 63, PHYSICS 65.) Advanced freshman physics. For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. Electricity, magnetism and waves with some description of optics. Electrostatics and Gauss' law. Electric potential, electric field, conductors, image charges. Other theorems of vector calculus. Electric currents, DC circuits. Moving charges, magnetic field, Ampere's law. Solenoids, transformers, induction, AC circuits, resonance. Relativistic point of view for moving charges. Displacement current, Maxwell's equations. Electromagnetic waves, dielectrics. Diffraction, interference, refraction, reflection, polarization. Prerequisite: PHYSICS 61 and MATH 51; Pre- or corequisite: MATH 52.

**PHYSICS 64. Electricity, Magnetism and Optics Laboratory. 1 Unitss.**

Introduction to multimeters, breadboards, function generators and oscilloscopes. Emphasis on student-developed design of experimental procedure and data analysis for topics covered in PHYSICS 63: electricity, magnetism, circuits, and optics. Pre- or corequisite: PHYSICS 63.

**PHYSICS 65. Quantum and Thermal Physics. 4 Units.**

(Third in a three-part series: PHYSICS 61, PHYSICS 63, PHYSICS 65.) Advanced freshman physics. For students with a strong high school mathematics and physics background contemplating a major in Physics or interested in a rigorous treatment of physics. Introduction to quantum mechanics: matter waves, atomic structure, Schrödinger's equation. Thermodynamics and statistical mechanics: entropy and heat, Boltzmann statistics, quantum statistics. Prerequisites: PHYSICS 61 & PHYSICS 63. Pre- or corequisite: MATH 53.

**PHYSICS 67. Introduction to Laboratory Physics. 2 Units.**

Methods of experimental design, data collection and analysis, statistics, and curve fitting in a laboratory setting. Experiments drawn from electronics, optics, heat, and modern physics. Lecture plus laboratory format. Required for PHYSICS 60 series Physics and Engineering Physics majors; recommended, in place of PHYSICS 44, for PHYSICS 40 series students who intend to major in Physics or Engineering Physics. Pre- or corequisite: PHYSICS 65 or PHYSICS 43.

**PHYSICS 70. Foundations of Modern Physics. 4 Units.**

Required for Physics majors who completed the PHYSICS 40 series, or the PHYSICS 60 series prior to 2005-06. Special relativity, the experimental basis of quantum theory, atomic structure, quantization of light, matter waves, Schrödinger equation. Prerequisites: PHYSICS 41, PHYSICS 43. Corequisite: PHYSICS 45. Recommended: prior or concurrent registration in MATH 53.

**PHYSICS 70N. Modern Physics in Your Life. 1 Unitss.**

How does modern physics intersect with your everyday life? Topics may include the quantum nature of light, atomic physics and an introduction to semiconductor physics, applications to light sources (incandescent, fluorescent, light-emitting diodes, lasers) and light sensors (photodiodes and solar cells), introduction to nuclear physics (e.g., fission, fusion, interaction of radiation with matter). Co- or pre-requisite: PHYSICS 70, PHYSICS 65, or similar high-school physics preparation.

**PHYSICS 80N. The Technical Aspects of Photography. 3 Units.**

Preference to freshmen and sophomores with some background in photography. How cameras record photographic images on film and electronically. Technical photographic processes to use cameras effectively. Camera types and their advantages, how lenses work and their limitations, camera shutters, light meters and the proper exposure of film, film types, depth of focus, control of the focal plane and perspective, and special strategies for macro and night photography. View cameras and range finder technical cameras. Students take photographs around campus. Prerequisite: high school physics.

**PHYSICS 81N. Science on the Back of the Envelope. 3 Units.**

Understanding the complex world around us quantitatively, using order of magnitude estimates and dimensional analysis. Starting from a handful of fundamental constants of Nature, one can estimate complex quantities such as cosmological length and time scales, size of the atom, height of Mount Everest, speed of tsunami, energy density of fuels and climate effects. Through these examples students learn the art of deductive thinking, fundamental principles of science and the beautiful unity of nature.

**PHYSICS 83N. Physics in the 21st Century. 3 Units.**

Preference to freshmen. Current topics at the frontier of modern physics. Topics include subatomic particles and the standard model, symmetries in nature, extra dimensions of space, string theory, supersymmetry, the big bang theory of the origin of the universe, black holes, dark matter, and dark energy of the universe. Why the sun shines. Cosmology and inflation.

**PHYSICS 100. Introduction to Observational and Laboratory Astronomy. 3-4 Units.**

Designed for undergraduate physics majors but open to all students with a calculus-based physics background and some laboratory experience. Students make and analyze observations using telescopes at the Stanford Student Observatory. Topics include navigating the night sky, the physics of stars and galaxies, telescope instrumentation and operation, quantitative error analysis, and effective scientific communication. Limited enrollment. Prerequisites: prior completion of Physics 40 or PHYSICS 60 series.

**PHYSICS 105. Intermediate Physics Laboratory I: Analog Electronics. 3 Units.**

Analog electronics including Ohm's law, passive circuits and transistor and op amp circuits, emphasizing practical circuit design skills to prepare undergraduates for laboratory research. Short design project. Minimal use of math and physics, no electronics experience assumed beyond introductory physics. Prerequisite: PHYSICS 43 or PHYSICS 63.

**PHYSICS 107. Intermediate Physics Laboratory II: Experimental Techniques and Data Analysis. 4 Units.**

Experiments on lasers, Gaussian optics, and atom-light interaction, with emphasis on data and error analysis techniques. Students describe a subset of experiments in scientific paper format. Prerequisites: completion of PHYSICS 40 or PHYSICS 60 series, and PHYSICS 70 and PHYSICS 105. Recommended: PHYSICS 130, prior or concurrent enrollment in PHYSICS 120. WIM.

**PHYSICS 108. Advanced Physics Laboratory: Project. 4 Units.**

Small student groups plan, design, build, and carry out a single experimental project in low-temperature physics. Prerequisites PHYSICS 105, PHYSICS 107.

**PHYSICS 110. Advanced Mechanics. 4 Units.**

Lagrangian and Hamiltonian mechanics. Principle of least action, Euler-Lagrange equations. Small oscillations and beyond. Symmetries, canonical transformations, Hamilton-Jacobi theory, action-angle variables. Introduction to classical field theory. Selected other topics, including nonlinear dynamical systems, attractors, chaotic motion. Prerequisites: MATH 131P, and PHYS 112 or MATH elective 104 or higher. Recommended prerequisite: PHYS 130.

**PHYSICS 112. Mathematical Methods of Physics. 4 Units.**

Theory of complex variables, complex functions, and complex analysis. Fourier series and Fourier transforms. Special functions such as Laguerre, Legendre, and Hermite polynomials, and Bessel functions. The uses of Green's functions. Covers material of MATH 106 and MATH 132 most pertinent to Physics majors. Prerequisites: MATH 50 or 50H series, and MATH 131P or MATH 173.

**PHYSICS 113. Computational Physics. 4 Units.**

Numerical methods for solving problems in mechanics, electromagnetism, quantum mechanics, and statistical mechanics. Methods include numerical integration; solutions of ordinary and partial differential equations; solutions of the diffusion equation, Laplace's equation and Poisson's equation with relaxation methods; statistical methods including Monte Carlo techniques; matrix methods and eigenvalue problems. Short introduction to MatLab, used for class examples; class projects may be programmed in any language such as C. Prerequisites: MATH 53 and PHYS 120. Previous programming experience not required.

**PHYSICS 120. Intermediate Electricity and Magnetism I. 4 Units.**

(First in a two-part series: PHYS 120, PHYS 121.) Vector analysis. Electrostatic fields, including boundary-value problems and multipole expansion. Dielectrics, static and variable magnetic fields, magnetic materials. Maxwell's equations. Prerequisites: PHYSICS 43 or PHYS 63; MATH 52 and MATH 53. Pre- or corequisite: MATH 131P or MATH 173. Recommended corequisite: PHYS 112.

**PHYSICS 121. Intermediate Electricity and Magnetism II. 4 Units.**

(Second in a two-part series: PHYS 120, PHYS 121.) Conservation laws and electromagnetic waves, Poynting's theorem, tensor formulation, potentials and fields. Plane wave problems (free space, conductors and dielectric materials, boundaries). Dipole and quadrupole radiation. Special relativity and transformation between electric and magnetic fields. Prerequisites: PHYS 120 and MATH 131P or MATH 173; Recommended: PHYS 112.

**PHYSICS 130. Quantum Mechanics. 4 Units.**

The origins of quantum mechanics and wave mechanics. Schrödinger equation and solutions for one-dimensional systems. Commutation relations. Generalized uncertainty principle. Time-energy uncertainty principle. Separation of variables and solutions for three-dimensional systems; application to hydrogen atom. Spherically symmetric potentials and angular momentum eigenstates. Spin angular momentum. Addition of angular momentum. Prerequisites: PHYSICS 65 or PHYSICS 70. Pre- or corequisites: PHYSICS 120 and MATH 131P or MATH 173.

**PHYSICS 131. Quantum Mechanics II. 4 Units.**

Identical particles; Fermi and Bose statistics. Time-independent perturbation theory. Fine structure, the Zeeman effect and hyperfine splitting in the hydrogen atom. Time-dependent perturbation theory. Variational principle and WKB approximation. Prerequisite: PHYSICS 120, PHYSICS 130, MATH 131P, or MATH 173. Pre- or PHYSICS 121.

**PHYSICS 134. Advanced Topics in Quantum Mechanics. 4 Units.**

Scattering theory, partial wave expansion, Born approximation. Additional topics may include nature of quantum measurement, EPR paradox, Bell's inequality, and topics in quantum information science; path integrals and applications; Berry's phase; structure of multi-electron atoms (Hartree-Fock); relativistic quantum mechanics (Dirac equation). Prerequisites: PHYSICS 130, PHYSICS 131.

**PHYSICS 152. Introduction to Particle Physics I. 3 Units.**

Elementary particles and the fundamental forces. Quarks and leptons. The mediators of the electromagnetic, weak and strong interactions. Interaction of particles with matter; particle acceleration, and detection techniques. Symmetries and conservation laws. Bound states. Decay rates. Cross sections. Feynman diagrams. Introduction to Feynman integrals. The Dirac equation. Feynman rules for quantum electrodynamics and for chromodynamics. Undergraduates register for PHYSICS 152. Graduate students register for PHYSICS 252. Prerequisite: PHYSICS PHYSICS 130. Pre- or corequisite: PHYSICS 131. Same as: PHYSICS 252.

**PHYSICS 160. Introduction to Stellar and Galactic Astrophysics. 3 Units.**

Observed characteristics of stars and the Milky Way galaxy. Physical processes in stars and matter under extreme conditions. Structure and evolution of stars from birth to death. White dwarfs, planetary nebulae, supernovae, neutron stars, pulsars, binary stars, x-ray stars, and black holes. Galactic structure, interstellar medium, molecular clouds, HI and HII regions, star formation, and element abundances. (Graduate student enrollees will be required to complete additional assignments in a format determined by the instructor). Pre or corequisites: PHYSICS 130.

**PHYSICS 161. Introduction to Extragalactic Astrophysics and Cosmology. 3 Units.**

Observations of the distances and compositions of objects on cosmic scales: galaxies, galaxy clusters, quasars, and diffuse matter at high red shift. Big bang cosmology, physical processes in the early universe, the origin of matter and the elements, inflation, and creation of structure in the Universe. Observational evidence for dark matter and dark energy. Future of the Universe. (Graduate student enrollees will be required to complete additional assignments in a format determined by the instructor). Pre or corequisites: PHYSICS 160. Same as: PHYSICS 261.

**PHYSICS 170. Thermodynamics, Kinetic Theory, and Statistical Mechanics I. 4 Units.**

(Same as PHYSICS 170) Foundations of statistical mechanics. Thermodynamic variables and basic thermodynamics. Ideal gases (including Maxwell-Boltzmann distribution). Bose and Fermi gases; examples including blackbody radiation, Debye theory of phonons, Sommerfeld theory of electrons in metals. Thermodynamic functions. Undergraduates register for Physics 170 (4 units). Graduates register for Physics 270 (3 units). Recommended prerequisite: PHYSICS 130. Same as: PHYSICS 270.

**PHYSICS 171. Thermodynamics, Kinetic Theory, and Statistical Mechanics II. 3-4 Units.**

(Same as PHYSICS 271) Mean-field theory of phase transitions; critical exponents. Ferromagnetism, the Ising model. The renormalization group. Dynamics near equilibrium: Brownian motion, diffusion, Boltzmann equations. Other topics at discretion of instructor. Prerequisite: PHYS 170/270. Undergraduates register for Physics 171 (4 units). Graduate students register for Physics 271 (3 units). Recommended pre- or corequisite: PHYS 130. Same as: PHYSICS 271.

**PHYSICS 172. Solid State Physics. 3 Units.**

Introduction to the properties of solids. Crystal structures and bonding in materials. Momentum-space analysis and diffraction probes. Lattice dynamics, phonon theory and measurements, thermal properties. Electronic structure theory, classical and quantum; free, nearly-free, and tight-binding limits. Electron dynamics and basic transport properties; quantum oscillations. Properties and applications of semiconductors. Reduced-dimensional systems. (Graduate student enrollees will be required to complete additional assignments in a format determined by the instructor). Undergraduates should register for PHYSICS 172 and graduate students for APPPHYS 272. Prerequisites: PHYSICS 170 and PHYSICS 171, or equivalents. Same as: APPPHYS 272.

**PHYSICS 190. Independent Research and Study. 1-9 Units.**

Undergraduate research in experimental or theoretical physics under the supervision of a faculty member. Prerequisites: superior work as an undergraduate Physics major and consent of instructor.

**PHYSICS 205. Senior Thesis Research. 1-12 Units.**

Long-term experimental or theoretical project and thesis in Physics under supervision of a faculty member. Planning of the thesis project is recommended to begin as early as middle of the junior year. Successful completion of a senior thesis requires a minimum of 3 units for a letter grade completed during the senior year, along with the other formal thesis and physics major requirements. Students doing research for credit prior to senior year should sign up for Physics 190. Prerequisites: superior work as an undergraduate Physics major and approval of the thesis application.

**PHYSICS 210. Advanced Mechanics. 3 Units.**

Lagrangian and Hamiltonian mechanics. Principle of least action, Euler-Lagrange equations. Small oscillations and beyond. Symmetries, canonical transformations, Hamilton-Jacobi theory, action-angle variables. Introduction to classical field theory. Selected other topics, including nonlinear dynamical systems, attractors, chaotic motion. Prerequisites: MATH 131P, and PHYSICS 112 or MATH elective 104 or higher. Recommended prerequisite: PHYSICS 130.

**PHYSICS 211. Continuum Mechanics. 3 Units.**

Elasticity, fluids, turbulence, waves, gas dynamics, shocks, and MHD plasmas. Examples from everyday phenomena, geophysics, and astrophysics.

**PHYSICS 216. Back of the Envelope Physics. 3 Units.**

Techniques such as scaling and dimensional analysis, useful to make order-of-magnitude estimates of physical effects in different settings. Goals are to promote a synthesis of physics through solving problems, including problems that are not usually thought of as physics. Applications include properties of materials, fluid mechanics, geophysics, astrophysics, and cosmology. Prerequisites: undergraduate mechanics, statistical mechanics, electricity and magnetism, and quantum mechanics.

**PHYSICS 220. Classical Electrodynamics. 3 Units.**

Special relativity: The principles of relativity, Lorentz transformations, four vectors and tensors, relativistic mechanics and the principle of least action. Lagrangian formulation, charges in electromagnetic fields, gauge invariance, the electromagnetic field tensor, covariant equations of electrodynamics and mechanics, four-current and continuity equation. Noether's theorem and conservation laws, Poynting's theorem, stress-energy tensor. Constant electromagnetic fields: conductors and dielectrics, magnetic media, electric and magnetic forces, and energy. Electromagnetic waves: Plane and monochromatic waves, spectral resolution, polarization, electromagnetic properties of matter, dispersion relations, wave guides and cavities. Prerequisites: PHYSICS 121 and PHYSICS 210, or equivalent; MATH 106 or MATH 116, and MATH 132 or equivalent.

**PHYSICS 230. Quantum Mechanics. 3 Units.**

Fundamental concepts. Introduction to Hilbert spaces and Dirac's notation. Postulates applied to simple systems, including those with periodic structure. Symmetry operations and gauge transformation. The path integral formulation of quantum statistical mechanics. Problems related to measurement theory. The quantum theory of angular momenta and central potential problems. Prerequisite: PHYSICS 131 or equivalent.

**PHYSICS 231. Quantum Mechanics. 3 Units.**

Basis for higher level courses on atomic solid state and particle physics. Problems related to measurement theory and introduction to quantum computing. Approximation methods for time-independent and time-dependent perturbations. Semiclassical and quantum theory of radiation, second quantization of radiation and matter fields. Systems of identical particles and many electron atoms and molecules. Prerequisite: PHYSICS 230.

**PHYSICS 234. Advanced Topics in Quantum Mechanics. 3 Units.**

Scattering theory, partial wave expansion, Born approximation. Additional topics may include nature of quantum measurement, EPR paradox, Bell's inequality, and topics in quantum information science; path integrals and applications; Berry's phase; structure of multi-electron atoms (Hartree-Fock); relativistic quantum mechanics (Dirac equation). Undergraduates register for PHYSICS 134 (4 units). Graduate students register for PHYSICS 234 (3 units). Prerequisites: PHYSICS 130, 131.

**PHYSICS 240. Introduction to the Physics of Energy. 3 Units.**

Energy as a consumable. Forms and interconvertability. World joule budget. Equivalents in rivers, oil pipelines and nuclear weapons. Quantum mechanics of fire, batteries and fuel cells. Hydrocarbon and hydrogen synthesis. Fundamental limits to mechanical, electrical and magnetic strengths of materials. Flywheels, capacitors and high pressure tanks. Principles of AC and DC power transmission. Impossibility of pure electricity storage. Surge and peaking. Solar constant. Photovoltaic and thermal solar conversion. Physical limits on agriculture.

**PHYSICS 241. Introduction to Nuclear Energy. 3 Units.**

Radioactivity. Elementary nuclear processes. Energetics of fission and fusion. Cross-sections and resonances. Fissionable and fertile isotopes. Neutron budgets. Light water, heavy water and graphite reactors. World nuclear energy production. World reserves of uranium and thorium. Plutonium, reprocessing and proliferation. Half lives of fission decay products and actinides made by neutron capture. Nuclear waste. Three Mile Island and Chernobyl. Molten sodium breeders. Generation-IV reactors. Inertial confinement and magnetic fusion. Laser compression. Fast neutron production and fission-fusion hybrids. PREREQUISITES: Strong undergraduate background in elementary chemistry and physics. PHYS 240 and PHYS 252 recommended but not required. Interested undergraduates encouraged to enroll, with permission of instructor.

**PHYSICS 252. Introduction to Particle Physics I. 3 Units.**

Elementary particles and the fundamental forces. Quarks and leptons. The mediators of the electromagnetic, weak and strong interactions. Interaction of particles with matter; particle acceleration, and detection techniques. Symmetries and conservation laws. Bound states. Decay rates. Cross sections. Feynman diagrams. Introduction to Feynman integrals. The Dirac equation. Feynman rules for quantum electrodynamics and for chromodynamics. Undergraduates register for PHYSICS 152. Graduate students register for PHYSICS 252. Prerequisite: PHYSICS PHYSICS 130. Pre- or corequisite: PHYSICS 131. Same as: PHYSICS 152.

**PHYSICS 260. Introduction to Astrophysics and Cosmology. 3 Units.**

Observed characteristics of stars and the Milky Way galaxy. Physical processes in stars and matter under extreme conditions. Structure and evolution of stars from birth to death. White dwarfs, planetary nebulae, supernovae, neutron stars, pulsars, binary stars, x-ray stars, and black holes. Galactic structure, interstellar medium, molecular clouds, HI and HII regions, star formation, and element abundances. (Graduate student enrollees will be required to complete additional assignments in a format determined by the instructor). Pre or corequisites: PHYSICS 130.

**PHYSICS 261. Introduction to Extragalactic Astrophysics and Cosmology. 3 Units.**

Observations of the distances and compositions of objects on cosmic scales: galaxies, galaxy clusters, quasars, and diffuse matter at high red shift. Big bang cosmology, physical processes in the early universe, the origin of matter and the elements, inflation, and creation of structure in the Universe. Observational evidence for dark matter and dark energy. Future of the Universe. (Graduate student enrollees will be required to complete additional assignments in a format determined by the instructor). Pre or corequisites: PHYSICS 160 Same as: PHYSICS 161.

**PHYSICS 262. Introduction to Gravitation. 3 Units.**

Introduction to general relativity. Curvature, energy-momentum tensor, Einstein field equations. Weak field limit of general relativity. Black holes, relativistic stars, gravitational waves, cosmology. Prerequisite: PHYSICS 121 or equivalent including special relativity.

**PHYSICS 270. Thermodynamics, Kinetic Theory, and Statistical Mechanics I. 4 Units.**

(Same as PHYSICS 170) Foundations of statistical mechanics. Thermodynamic variables and basic thermodynamics. Ideal gases (including Maxwell-Boltzmann distribution). Bose and Fermi gases; examples including blackbody radiation, Debye theory of phonons, Sommerfeld theory of electrons in metals. Thermodynamic functions. Undergraduates register for Physics 170 (4 units). Graduates register for Physics 270 (3 units). Recommended prerequisite: PHYSICS 130. Same as: PHYSICS 170.

**PHYSICS 271. Thermodynamics, Kinetic Theory, and Statistical Mechanics II. 3-4 Units.**

(Same as PHYSICS 271) Mean-field theory of phase transitions; critical exponents. Ferromagnetism, the Ising model. The renormalization group. Dynamics near equilibrium: Brownian motion, diffusion, Boltzmann equations. Other topics at discretion of instructor. Prerequisite: PHYS 170/270. Undergraduates register for Physics 171 (4 units). Graduate students register for Physics 271 (3 units). Recommended pre- or corequisite: PHYS 130. Same as: PHYSICS 171.

**PHYSICS 290. Research Activities at Stanford. 1-3 Units.**

Required of first-year Physics graduate students; suggested for junior or senior Physics majors for 1 unit. Review of research activities in the department and elsewhere at Stanford at a level suitable for entering graduate students.

**PHYSICS 291. Practical Training. 1-3 Units.**

Opportunity for practical training in industrial labs. Arranged by student with the research adviser's approval. A brief summary of activities is required, approved by the research adviser.

**PHYSICS 293. Literature of Physics. 1-15 Units.**

Study of the literature of any special topic. Preparation, presentation of reports. If taken under the supervision of a faculty member outside the department, approval of the Physics chair required. Prerequisites: 25 units of college physics, consent of instructor.

**PHYSICS 294. Teaching of Physics Seminar. 1 Units.**

Required of all Teaching Assistants prior to the first teaching assignment. Weekly seminar/discussions on interactive techniques for teaching physics. Practicum which includes class observations, grading and student teaching in current courses.

**PHYSICS 301. Astrophysics Laboratory. 3 Units.**

Open to all graduate students with a calculus-based physics background and some laboratory experience. Students make and analyze observations using telescopes at the Stanford Student Observatory. Topics include navigating the night sky, the physics of stars and galaxies, telescope instrumentation and operation, quantitative error analysis, and effective scientific communication. The course also introduces a number of hot topics in astrophysics and cosmology. Limited enrollment.

**PHYSICS 312. Basic Plasma Physics. 3 Units.**

For the nonspecialist who needs a working knowledge of plasma physics for space science, astrophysics, fusion, or laser applications. Topics: orbit theory, the Boltzmann equation, fluid equations, magneto hydrodynamics (MHD) waves and instabilities, electromagnetic (EM) waves, the Vlasov theory of electrostatic (ES) waves and instabilities including Landau damping and quasilinear theory, the Fokker-Planck equation, and relaxation processes. Advanced topics in resistive instabilities and particle acceleration. Prerequisite: PHYSICS 220, or consent of instructor.

**PHYSICS 330. Quantum Field Theory I. 3 Units.**

Quantization of scalar and Dirac fields. Feynman diagrams. Quantum electrodynamics. Elementary electrodynamic processes: Compton scattering; e+e- annihilation. Loop diagrams and electron (g-2). Introduction to supersymmetry. Prerequisites: PHYSICS 130, PHYSICS 131, or equivalents.

**PHYSICS 331. Quantum Field Theory II. 3 Units.**

Functional integral methods. Local gauge invariance and Yang-Mills fields. Asymptotic freedom. Spontaneous symmetry breaking and the Higgs mechanism. Unified models of weak and electromagnetic interactions. Prerequisite: PHYSICS 330.

**PHYSICS 332. Quantum Field Theory III. 3 Units.**

Theory of renormalization. The renormalization group and applications to the theory of phase transitions. Renormalization of Yang-Mills theories. Applications of the renormalization group of quantum chromodynamics. Perturbation theory anomalies. Applications to particle phenomenology. Prerequisite: PHYSICS 330.

**PHYSICS 351. Standard Model of Particle Physics. 3 Units.**

Symmetries, group theory, gauge invariance, Lagrangian of the Standard Model, flavor group, flavor-changing neutral currents, CKM quark mixing matrix, GIM mechanism, rare processes, neutrino masses, seesaw mechanism, QCD confinement and chiral symmetry breaking, instantons, strong CP problem, QCD axion. Prerequisite: PHYSICS 330; PHYSICS 331 and PHYSICS 332 recommended.

**PHYSICS 361. Advanced Topics in Radiative Processes and Stellar Astrophysics. 3 Units.**

Astronomical data on stars, star clusters, interstellar medium, and the Milky Way galaxy. Theory of stellar structure; hydrostatic equilibrium, radiation balance, and energy production. Stellar formation, Jean's mass, and protostars. Evolution of stars to the main sequence and beyond to red giants, white dwarfs, neutron stars, and black holes. Supernovae and compact sources. Structure of the Milky Way: disk and spiral arms; dark matter and the halo mass; central bulge or bar; and black hole. Prerequisite: PHYSICS 221 or equivalent. Recommended: PHYSICS 260, PHYSICS 360.

**PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology. 3 Units.**

Observational data on the content and activities of galaxies, the content of the Universe, cosmic microwave background radiation, gravitational lensing, and dark matter. Models of the origin, structure, and evolution of the Universe based on the theory of general relativity. Test of the models and the nature of dark matter and dark energy. Physics of the early Universe, inflation, baryosynthesis, nucleosynthesis, and galaxy formation. Prerequisites: PHYSICS 210, PHYSICS 211, and PHYSICS 260 or PHYSICS 360.

**PHYSICS 364. Advanced Gravitation. 3 Units.**

Classical and quantum gravity in Anti-de Sitter spacetime (AdS). History and uses of AdS. Basic classical physics of AdS: metric, conformal structure, common coordinate systems. Black holes in AdS: thermodynamics, Hawking-Page transition. Classical fields in AdS: action of conformal group, singletons. Stability of AdS and positive energy theorems. Towards the holographic correspondence: geodesics and the UV-IR relation. AdS from supergravity. Recommended: PHYSICS 330, some familiarity with general relativity.

**PHYSICS 372. Condensed Matter Theory I. 3 Units.**

Fermi liquid theory, many-body perturbation theory, response function, functional integrals, interaction of electrons with impurities. Prerequisite: APPPHYS 273 or equivalent.

**PHYSICS 373. Condensed Matter Theory II. 3 Units.**

Superfluidity and superconductivity. Quantum magnetism. Prerequisite: PHYSICS 372.

**PHYSICS 490. Research. 1-15 Units.**

Open only to Physics graduate students, with consent of instructor. Work is in experimental or theoretical problems in research, as distinguished from independent study of a non-research character in 190 and 293.

**PHYSICS 801. TGR Project. 0 Unit.****PHYSICS 802. TGR Dissertation. 0 Unit.**

## Political Economics Courses

**POLECON 230. Strategy Beyond Markets. 2 Units.**

This course develops techniques and tools to use in firms' strategic interactions beyond the market environment. We'll examine firms' interactions with stakeholders, constituents, and institutions, including interest groups, legislatures, regulatory agencies, courts, international organizations, and the public. Topics covered in the class include: environmental regulation, intellectual property, antitrust, bank bailouts, health care reform, carried interest in private equity, protectionist trade policies, strategic corporate social responsibility, and beyond market strategy for start-ups. The goal is to develop integrated strategies for optimal firm performance that combine strategies within and beyond markets.

**POLECON 231. Strategy Beyond Markets: Challenges and Opportunities in Developing Economies. 3 Units.**

This course shares significant material with POLECON 230 and the goal of developing integrated strategies for optimal firm performance that combine elements within and beyond markets. POLECON 231 diverges from the base course to delve deeper into issues that are particularly salient for entrepreneurs in emerging and frontier markets. Using a combination of cases from developed and developing countries, we will expand the list of topics considered to include managing political risk and protecting the firm in the face of uncertain and discretionary regulatory environments. The objective is to provide a solid grounding in the techniques explored in 230, while refining skill sets and whetting appetites for investment in higher risk environments.

**POLECON 232. Law and Economics for Corporate Strategy. 3 Units.**

This course introduces students to the core issues of law and economics and their applications to managerial strategy. Markets and the legal environment are increasingly interrelated: issues such as antitrust, intellectual property, privacy rights, product regulation, and torts affect firms' profitability both directly through legal action and indirectly by determining the "rules of the game." Nor are companies simply reactive to legal and political forces; actions taken by managers in firms often propel issues before the public eye. For instance, electronic collection and collation of personal data has stimulated new concerns about privacy, while court decisions, new legislation, and public opinion have all played roles in determining what is acceptable. Such legal and political forces invariably necessitate changes in corporate strategy, and the effectiveness of corporate strategy often rests on managers' ability to anticipate, rather than simply react to, developments in the nonmarket environment. Cases and readings consider specific legal principles and how executives can anticipate, and take effective action with regards to, the threats and opportunities they present. The course will focus on legal doctrine within the United States, but will also consider the legal ramifications of corporate actions with regards to other nations and international law. The course also considers other important nonmarket issues, such as responding to pressure from independent interest groups and understanding how firms may influence the legislative process, though in less depth than Nonmarket Strategy. Students are expected to come to class with a thorough understanding of the both the legal issues involved and the economic considerations of the case under discussion. By the end of the course, students will have acquired a thorough understanding of the legal principles covered, as well as a strategic acuity regarding the appropriate market and nonmarket responses. Grades will be based on student's demonstration of this understanding through class participation and a final exam.

**POLECON 239. Sloan: Strategy Beyond Markets. 4 Units.**

This course addresses managerial issues in the social, political, legal, and ethical environments of business. Cases and readings emphasize strategies to improve the performance of companies in light of their multiple constituencies, in both international and US environments. Most core courses focus on firms' interactions with customers, suppliers, and alliance partners in the form of mutually beneficial voluntary exchange transacted in markets. In contrast, this course considers the strategic interactions of firms with comparably important constituents, organizations, and institutions beyond markets. Issues considered include those involving activist and interest groups, the media, legislatures, regulatory and antitrust agencies, and international organizations such as the WTO. In many of the class sessions, we will draw on theoretical and empirical research in political economy, a field that is particularly relevant for understanding relationships between firms and governments, because (unlike most of economics) political economy focuses on interactions that are neither voluntary nor transacted via money.

**POLECON 330. Law and Economics for Corporate Strategy. 3 Units.**

This is an advanced version of the GSB's class on Strategy Beyond Markets. It is intended for students who have substantive experience working with/for governments, activist groups, the media, or heavily-regulated industries, and particularly those students with previous legal experience. The class may also be appropriate for students who have academic backgrounds in political science or public policy. Cases and readings consider specific legal principles (e.g., antitrust, fiduciary duty, intellectual property) and how executives can anticipate and take effective action with regards to the threats and opportunities they present. The course will focus on legal doctrine within the United States, but will also consider the legal ramifications of corporate actions with regards to other nations' legal doctrine and international law. By the end of the course, students are expected to acquire not only a thorough understanding of the legal principles covered, but also insight into the appropriate market-based and non-market-based responses.

**POLECON 332. Managers and the Legal Environment. 4 Units.**

To excel, managers and entrepreneurs must know how to operate successfully in the legal environment in which they must conduct business. This course addresses the legal aspects of business agreements and relationships. The course begins with an overview of the different forms of business organizations available, mergers and acquisitions, public and private offerings of securities, and the fiduciary duties of officers, directors and controlling shareholders. The course covers the US court system and the laws of contracts, torts, antitrust and intellectual property. The legal aspects of the employment relationship as they relate to the liability of corporations and managers for the acts of their employees, wrongful termination, discrimination, and sexual harassment will also be covered. Students who have a JD degree, or will receive a JD degree, from a U.S. university should not take this class. If you cannot attend a class, you must notify instructors before class.

**POLECON 349. The Business World: Moral and Spiritual Inquiry through Literature. 3 Units.**

This course uses novels and plays as a basis for examining the moral and spiritual aspects of business leadership and of the environment in which business is done. On the one hand literature is used as the basis for examining the character of business people, while on the other hand literature provides illumination of the cultural contexts of values and beliefs within which commercial activities take place in a global economy. The course is organized around the interplay of religious traditions and national identities. Classes are taught in a Socratic, discussion-based style, creating as much of a seminar atmosphere as possible. A two-text method is used, encouraging students to examine their own personal stories with as much care as the stories presented in the literature. This four unit course will be graded on the basis of class participation and a final paper. There will be no exam.

**POLECON 530. Law and Economics for Corporate Strategy. 3 Units.**

This is an advanced version of the GSB's class on Strategy Beyond Markets. It is intended for students who have substantive experience working with/for governments, activist groups, the media, or heavily-regulated industries, and particularly those students with previous legal experience. The class may also be appropriate for students who have academic backgrounds in political science or public policy. Cases and readings consider specific legal principles (e.g., antitrust, fiduciary duty, intellectual property) and how executives can anticipate and take effective action with regards to the threats and opportunities they present. The course will focus on legal doctrine within the United States, but will also consider the legal ramifications of corporate actions with regards to other nations' legal doctrine and international law. By the end of the course, students are expected to acquire not only a thorough understanding of the legal principles covered, but also insight into the appropriate market-based and non-market-based responses.

**POLECON 547. Intellectual Property and Its Effect on Business. 2 Units.**

This course explores the impact intellectual property rights have on business decisions. We begin with a general background of intellectual property law including copyright, trademark, patent and trade secret. We will also cover quasi property rights such as database and privacy. Each of these distinct rights will be examined through a case methodology affording students an opportunity to gauge the relative strengths and weaknesses of a particular form of protection. As the value of intellectual property rises, the avenues of economic return increase. We will analyze various methods of maximizing such economic returns. Focus for this course is on the impact both technological innovation and intellectual property law have on business strategies. This is not a class designed to teach students the law of intellectual property. Rather, this course educates business decision makers on the impact intellectual property can have on the bottom line. This course employs a mixed lecture/case discussion format. We will have several sessions with lectures by visiting industry experts.

**POLECON 571. The Future of Growth: Developed and Developing World. 2 Units.**

The course deals with the recent (post war) sustained high growth in the developing world and its likely evolution and impact in the future. How are these kinds of growth rates possible? What accounts for the absence of growth in a part of the developing world? What are the key political ingredients? Attention will be given to the evolving global landscape surrounding this growth. What is the impact of this widening pattern of growth and are there natural brakes that may slow the process down or make it difficult for the non-G20 developing countries and their 1/3 of the world's population to start or sustain the high growth process. The class will attempt to identify and assess the impact of important global trends and challenges. Included in the latter will be governance issues. We will spend a little time on the impact of the 2008-2009 crisis, the transmission channels and lessons learned from the vantage point of developing countries.

**POLECON 571. The Future of Growth: Developed and Developing World. 2 Units.**

The course deals with the recent (post war) sustained high growth in the developing world and its likely evolution and impact in the future. How are these kinds of growth rates possible? What accounts for the absence of growth in a part of the developing world? What are the key political ingredients? Attention will be given to the evolving global landscape surrounding this growth. What is the impact of this widening pattern of growth and are there natural brakes that may slow the process down or make it difficult for the non-G20 developing countries and their 1/3 of the world's population to start or sustain the high growth process. The class will attempt to identify and assess the impact of important global trends and challenges. Included in the latter will be governance issues. We will spend a little time on the impact of the 2008-2009 crisis, the transmission channels and lessons learned from the vantage point of developing countries.

**POLECON 584. Managing Global Political Risk. 1 Unit.**

In a globalized world, managers and investors are increasingly realizing that politics matter as much as economic fundamentals. Micro-level decisions made by local politicians in Brazil or India, national-level strategies of countries like China and Russia, and multi-national regimes, policies, and norms are all affecting global businesses in significant and often surprising ways. This course examines the full array of political risks confronting businesses today, from creeping expropriations to sudden shocks like national debt defaults and coups to emerging threats like cyber exploitation. Students will learn about impediments to assessing political risk and how to tackle them; develop strategies for managing political risk in a systematic way; and craft tools for mitigating the downside effects of political risk to business. Each session will include customized case studies and mini-simulations for students to walk in the shoes of senior managers confronting these challenges.

**POLECON 670. Advanced Topics in Political Economy. 4 Units.**

This is a topics class aimed at advanced students in political economy and related disciplines. It will consist of a combination of lectures and student presentations. Grading will be based on class participation and a research proposal/paper.

**POLECON 676. Behavioral Political Economy. 4 Units.**

This course examines organizational decision making in ways that depart from the "thin theory" of rationality in one of two respects. (1) The thin theory presumes that decision makers are fully rational, i.e., they are cognitively unconstrained. We will examine a variety of cognitive constraints and their effects on institutional behavior and policy outcomes. (2) The thin theory presumes individualistic preferences: people care only about their own payoffs. There is now substantial evidence that this assumption is sometimes inaccurate. We will study some of this literature. Much of the important work in this area has come not from political economy but from cognitive psychology and behavioral economics. Hence, we will spend between a third and a half of the quarter on micro-foundations. Throughout the course, contrasts will be drawn between models based on the thin theory of rationality and less orthodox ones. Consequently, some familiarity with theories of rational choice is desirable. Any course on game theory or normative decision theory suffices. Although the motivation for relaxing the thin theory has been largely empirical, the orientation of this course is heavily theoretical. Many of the theories that we will study are expressed as mathematical or computational models. Students are expected either to have a taste for formal reasoning or at least to tolerate it.

**POLECON 680. Foundations of Political Economy. 3 Units.**

This course provides an introduction to political economy with an emphasis on formal models of collective choice, public institutions, and political competition. Topics considered include voting theory, social choice, institutional equilibria, agenda setting, interest group politics, bureaucratic behavior, and electoral competition. Also listed as Political Science 351A.

**POLECON 681. Economic Analysis of Political Institutions. 4 Units.**

This course extends the foundations developed in P680 by applying techniques of microeconomic analysis and game theory to the study of political behavior and institutions. The techniques include information economics, games of incomplete information, sequential bargaining theory, repeated games, and rational expectations. The applications considered include agenda formation in legislatures, government formation in parliamentary systems, the implications of legislative structure, elections and information aggregation, lobbying, electoral competition and interest groups, the control of bureaucracies, interest group competition, and collective choice rules. Also listed as Political Science 351B.

**POLECON 682. Testing Models of Governmental Decision-Making. 4 Units.**

This course surveys applications of formal models to several stages of decision making, primarily in the U.S. national government and with an emphasis on the legislative branch. The course begins with explicit consideration of issues in philosophy of science and introduces an analytic framework to be applied to specific research throughout remaining sessions. Substantive topics and applications covered include strategies of committees, roll call voting, policy formation, effects of special rules, congressional-presidential relations, and congressional-agency relations. Students should have taken POLECON 680 and POLECON 681. Also listed as Political Science 351C. Same as: POLISCI 351C.

**POLECON 683. Political Development Economics. 4 Units.**

This course surveys emerging research in political economics as it applies to developing societies, emphasizing both theoretical and empirical approaches. Topics will include: corruption and "forensic" political economics, institutional reform and democratization, ethnicity, conflict and public goods provision, and the role of trade and financial innovations in political development. The aim of the course is to bring students to the frontier of the field and develop their own research. Graduate level proficiency in microeconomics and empirical methods will be required.

**POLECON 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, HRMGT 691, MGTECON 691, MKTG 691, OB 691, OIT 691, STRAMGT 691.

**POLECON 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, HRMGT 692, MGTECON 692, MKTG 692, OB 692, OIT 692, STRAMGT 692.

**POLECON 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, HRMGT 802, MGTECON 802, MKTG 802, OB 802, OIT 802, STRAMGT 802.

## Political Science Courses

**POLISCI 1. Introduction to International Relations. 5 Units.**

Approaches to the study of conflict and cooperation in world affairs. Applications to war, terrorism, trade policy, the environment, and world poverty. Debates about the ethics of war and the global distribution of wealth.

Same as: INTNLREL 1.

**POLISCI 1Z. Introduction to International Relations. 5 Units.**

Approaches to the study of conflict and cooperation in world affairs. Applications to war, terrorism, trade policy, the environment, and world poverty. Debates about the ethics of war and the global distribution of wealth.

**POLISCI 2. Introduction to American National Government and Politics. 5 Units.**

The role and importance of the ideal of democracy in the evolution of the American political system. American political institutions (the Presidency, Congress, and the Court) and political processes (the formation of political attitudes and voting) are examined against the backdrop of American culture and political history. The major areas of public policy in the current practice of the ideal of democracy.

Same as: AMSTUD 2.

**POLISCI 3P. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors.

Same as: ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 136S, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307.

**POLISCI 4. Introduction to Comparative Politics. 5 Units.**

Why are some countries prone to civil war and violence, while others remain peaceful? Why do some countries maintain democratic systems, while others do not? Why are some countries more prosperous than others?

This course will provide an overview of the most basic questions in the comparative study of political systems, and will introduce the analytical tools that can help us answer them.

**POLISCI 10SC. American Foreign Policy in the 21st Century. 2 Units.**

Nearly 20 years after the end of the Cold War and the collapse of the Soviet Union, the United States confronts a dizzying array of foreign policy challenges. The world in which we find ourselves is complex, contradictory, and highly uncertain. What role can and should the United States play in such a world? What are the major international challenges with which U.S. policymakers and the American people will have to contend in the immediate future and over the longer term? Given that the power of the United States is limited, how should we determine our priorities? Under what conditions should the United States be prepared to use force, and when is force inappropriate? What lessons have we learned from the wars in Iraq and Afghanistan? Can - and should - the United States provide the kind of global leadership that our political leaders tell us that we must? In this course we will explore the substance of U.S. foreign policy as well as the political considerations that influence both the making and the actual conduct of American diplomacy. Topics will include the challenges to policy associated with the proliferation of weapons of mass destruction, international terrorism, failing and failed states, and regional, interstate, and intrastate conflict. We will also examine how the changing distribution of power in the international system is likely to impact the United States and its allies. Finally, we will consider how domestic political considerations influence both the framing and the implementation of this country's foreign policy. In addition to the readings, students, operating in teams of three, will research and write a short policy memorandum on a topic the instructor designates. Students, each of whom will be assigned a particular role, will also take part in a 48-hour crisis simulation at the end of the course.

**POLISCI 18SC. The Federal Government and the West. 2 Units.**

Historical development and current status of the relationship between the U.S. federal government and the American West. Land ownership, natural resource management, agriculture, water, energy, and environmental quality.

Same as: HISTORY 18SC.

**POLISCI 19N. Politics of Energy Efficiency. 5 Units.**

We will examine the political context of energy efficiency and climate change. Why are some countries, such as Japan and France, able to achieve high levels of energy efficiency, while others, such as the United States and Australia, struggle to do so? What political factors facilitate or impede energy efficiency policies? Why is international cooperation on climate change so difficult?



**POLISCI 22SC. The Face of Battle. 2 Units.**

Our understanding of warfare often derives from the lofty perspective of political leaders and generals: what were their objectives and what strategies were developed to meet them? This top-down perspective slights the experience of the actual combatants and non-combatants caught in the crossfire. This course focuses on the complexity of the process by which strategy is translated into tactical decisions by the officers and foot soldiers on the field of battle. We will focus on three battles in American history: Gettysburg (July 1863), the Battle of Little Bighorn (June 1876), and the Korengal Valley campaign in Afghanistan (2006-2010). In addition to reading major works on these battles and the conflicts in which they occurred, we will travel to Gettysburg, Pennsylvania, and the Little Bighorn battlefield in Montana. The course's battlefield tours are based on the "staff rides" developed by the Prussian Army in the mid-1800s and employed by the U.S. Army since the early 1900s. While at Stanford, students will conduct extensive research on individual participants at Gettysburg and Little Bighorn. Then, as we walk through the battlefield sites, students will brief the group on their subjects' experience of battle and on why they made the decisions they did during the conflict. Why did Lt. General Longstreet oppose the Confederate attack on the Union Army at Gettysburg? What was the experience of a military surgeon on a Civil War battlefield? Why did Custer divide his 7th Cavalry troops as they approached the Little Bighorn River? What was the role of Lakota Sioux women after a battle? Travel will be provided and paid by Sophomore College (except incidentals) and is made possible by the support of the Center for International Security and Cooperation (CISAC). The course is open to students from a range of disciplines; an interest in the topic is the only prerequisite.

**POLISCI 24Q. Law and Order. 3 Units.**

Preference to sophomores. The role of law in promoting social order. What is the rule of law? How does it differ from the rule of men? What institutions best support the rule of law? Is a state needed to ensure that laws are enforced? Should victims be allowed to avenge wrongs? What is the relationship between justice and mercy?

**POLISCI 24SC. Conservatism and Liberalism in American Politics and Policy. 2 Units.**

What influence do political ideologies have in American politics and government? In this course, students will study liberal and conservative ideology in American politics and public policy from the mid-20th century onward. The course begins with an examination of ideology in the American public and then considers ideology among political activists and elected officials, focusing on members of Congress and the president. The course will also cover the ideological polarization of political elites and its impact on the policy-making process. In the final part of the course, through a series of policy case studies, students will also evaluate how well certain public policies have met the ideological goals of their liberal and conservative sponsors. The course will include several lunches and dinners with guest speakers.

**POLISCI 28N. The Changing Nature of Racial Identity in American Politics. 5 Units.**

Almost one-third of Americans now identify with a racial/ethnic minority group. This seminar examines the relationship between racial identity, group consciousness, and public opinion. Topics include the role of government institutions in shaping identification, challenges in defining and measuring race, attitudes towards race-based policies, and the development of political solidarity within racial groups. Particular attention will be paid to the construction of political identities among the growing mixed-race population.

**POLISCI 51K. Election 2012. 1 Unitss.**

Focuses on the November 2012 election. Serial examinations of major topics at stake: foreign policy, the economy, the Supreme Court, and campaign strategy. One session will be devoted to California. Distinguished guests will participate in sessions moderated by the instructors with participation by students. Students enrolling for credit must attend regularly and contribute to a course blog. Sign up for the waitlist through PoliSci 51K. In order for a student to be enrolled in the course via the waitlist process, the student must not exceed the maximum unit enrollment for the quarter OR have a time schedule conflict with another course on his/her study list. If the student will either exceed the maximum units or has a class time conflict, the waitlist will bypass this student for enrollment, and will enroll the next eligible student into this course.  
Same as: CSRE 51K, HISTORY 51K.

**POLISCI 110C. America and the World Economy. 5 Units.**

Examination of contemporary US foreign economic policy. Areas studied: the changing role of the dollar; mechanism of international monetary management; recent crises in world markets including those in Europe and Asia; role of IMF, World Bank and WTO in stabilizing world economy; trade politics and policies; the effects of the globalization of business on future US prosperity. Enroll in PoliSci 110C for WIM credit.  
Same as: INTNLREL 110C, POLISCI 110X.

**POLISCI 110D. War and Peace in American Foreign Policy. 5 Units.**

(Students not taking this course for WIM, register for 110Y.) The causes of war in American foreign policy. Issues: international and domestic sources of war and peace; war and the American political system; war, intervention, and peace making in the post-Cold War period.  
Same as: INTNLREL 110D, POLISCI 110Y.

**POLISCI 110X. America and the World Economy. 5 Units.**

Examination of contemporary US foreign economic policy. Areas studied: the changing role of the dollar; mechanism of international monetary management; recent crises in world markets including those in Europe and Asia; role of IMF, World Bank and WTO in stabilizing world economy; trade politics and policies; the effects of the globalization of business on future US prosperity. Enroll in PoliSci 110C for WIM credit.  
Same as: INTNLREL 110C, POLISCI 110C.

**POLISCI 110Y. War and Peace in American Foreign Policy. 5 Units.**

(Students not taking this course for WIM, register for 110Y.) The causes of war in American foreign policy. Issues: international and domestic sources of war and peace; war and the American political system; war, intervention, and peace making in the post-Cold War period.  
Same as: INTNLREL 110D, POLISCI 110D.

**POLISCI 114D. Democracy, Development, and the Rule of Law. 5 Units.**

Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts.  
Same as: INTNLREL 114D, IPS 230, POLISCI 314D.

**POLISCI 114S. International Security in a Changing World. 5 Units.**

This class surveys the most pressing international security issues facing the world today and includes an award-winning two-day international crisis simulation led by Stanford faculty and former policymakers. Guest lecturers have included former Secretary of Defense William Perry, former U.S. Ambassador to Afghanistan Gen. Karl Eikenberry, and former Secretary of State Condoleezza Rice. Major topics covered: cyber security, nuclear proliferation, insurgency and intervention, terrorism, the Arab Spring, and the future of U.S. leadership in the world. No prior background in international relations is necessary.  
Same as: IPS 241.

**POLISCI 116. History of Nuclear Weapons. 5 Units.**

The development of nuclear weapons and policies. How existing nuclear powers have managed their relations with each other. How nuclear war has been avoided so far and whether it can be avoided in the future.  
Same as: HISTORY 103E.

**POLISCI 118P. U.S. Relations in Iran. 5 Units.**

The evolution of relations between the U.S. and Iran. The years after WW II when the U.S. became more involved in Iran. Relations after the victory of the Islamic republic. The current state of affairs and the prospects for the future. Emphasis is on original documents of U.S. diplomacy (White House, State Department, and the U.S. Embassy in Iran). Research paper.

**POLISCI 120B. Campaigns, Voting, Media, and Elections. 4-5 Units.**

This course examines the theory and practice of American campaigns and elections. First, we will attempt to explain the behavior of the key players -- candidates, parties, journalists, and voters -- in terms of the institutional arrangements and political incentives that confront them. Second, we will use current and recent election campaigns as "laboratories" for testing generalizations about campaign strategy and voter behavior. Third, we examine selections from the academic literature dealing with the origins of partisan identity, electoral design, and the immediate effects of campaigns on public opinion, voter turnout, and voter choice. As well, we'll explore issues of electoral reform and their more long-term consequences for governance and the political process.  
Same as: COMM 162, COMM 262.

**POLISCI 120C. American Political Institutions: Congress, the Executive Branch, and the Courts. 5 Units.**

How politicians, once elected, work together to govern America. The roles of the President, Congress, and Courts in making and enforcing laws. Focus is on the impact of constitutional rules on the incentives of each branch, and on how they influence law. Fulfills the Writing in the Major Requirement for Political Science majors.  
Same as: PUBLPOL 124.

**POLISCI 121L. Racial-Ethnic Politics in US. 5 Units.**

This course examines various issues surrounding the role of race and ethnicity in the American political system. Specifically, this course will evaluate the development of racial group solidarity and the influence of race on public opinion, political behavior, the media, and in the criminal justice system. We will also examine the politics surrounding the Multiracial Movement and the development of racial identity and political attitudes in the 21st century.

**POLISCI 122. Introduction to American Law. 3-5 Units.**

For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general.  
Same as: AMSTUD 179, PUBLPOL 302A.

**POLISCI 123. Politics and Public Policy. 4-5 Units.**

How policies come to be formed. How interests compete within public institutions to turn ideas into policies. Examples of this process from contemporary policy areas, including tax, social welfare, and environmental policy; results evaluated using equity and efficiency criteria.  
Same as: PUBLPOL 101, PUBLPOL 201.

**POLISCI 124R. The Federal System: Judicial Politics and Constitutional Law. 5 Units.**

The impact of constitutional rules on policy making in the U.S. with a focus on structural issues such as separation of powers and federalism. Topics such as: the role of unelected judges in a democracy; the rule of law; and the constitutionality of the war in Iraq. Prerequisites: 2 or equivalent, and sophomore standing. Fulfills Writing in the Major requirement for PoliSci majors.

**POLISCI 124S. Civil Liberties: Judicial Politics and Constitutional Law. 5 Units.**

The role and participation of courts, primarily the U.S. Supreme Court, in public policy making and the political system. Judicial activity in civil liberty areas (religious liberty, free expression, race and sex discrimination, political participation, and rights of persons accused of crime). Prerequisites: 2 or equivalent, and sophomore standing.

**POLISCI 125S. Chicano/Latino Politics. 5 Units.**

The political position of Latinos and Latinas in the U.S.. Focus is on Mexican Americans, with attention to Cuban Americans, Puerto Ricans, and other groups. The history of each group in the American polity; their political circumstances with respect to the electoral process, the policy process, and government; the extent to which the demographic category Latino is meaningful; and group identity and solidarity among Americans of Latin American ancestry. Topics include immigration, education, affirmative action, language policy, and environmental justice.  
Same as: CHILATST 125S.

**POLISCI 127P. Economic Inequality and Political Dysfunction. 5 Units.**

This course will examine how two of the defining features of contemporary U.S. politics, economic inequality and political polarization, relate to each other and to Congressional gridlock. The reading list will focus on several books recently authored by preeminent political scientists on this important topic. The course will cover a range of topics, including the disparity in political representation of the preferences of the affluent over those of the poor, the origins of Congressional polarization, the influence of money in politics, budgetary politics, immigration policy, and electoral and institutional barriers to reform.

**POLISCI 131L. Modern Political Thought. 5 Units.**

This course offers an introduction to the history of Western political thought from the late fifteenth through the nineteenth centuries. We will consider the development of ideas like individual rights, government by consent, and the protection of private property. We will also explore the ways in which these ideas continue to animate contemporary political debates. Thinkers covered will include: Niccolò Machiavelli, Thomas Hobbes, John Locke, Jean-Jacques Rousseau, Edmund Burke, John Stuart Mill, and Karl Marx.  
Same as: ETHICSOC 131S.

**POLISCI 132C. Family, Friends, and Groups: The Ethics of Association. 4 Units.**

The practice of associating with others is a fundamental part of human existence. We cultivate friendships, we grow up in families, we work for nonprofit associations or businesses, we join social movements and sport clubs, and we participate in political associations with our fellow citizens. This seminar explores the ethical dimensions of association. What grounds a right to freedom of association? Do we have, beyond a right, also a duty to participate in associational life? Do we have special obligations towards our friends, family members, or fellow-citizens that we do not have toward strangers? To what extent should the internal life of private associations, such as families or churches, be regulated by the state? Should the state support, through tax-exemptions and subsidies, the nonprofit associations of civil society? Can a state exclude non-citizens, such as immigrants, in the same way in which a private club excludes non-members? These questions have wide-ranging implications for contemporary political and legal debates.

Same as: ETHICSOC 183M.

**POLISCI 134L. Introduction to Environmental Ethics. 5 Units.**

This course examines the following ethical questions about the environment: (1) how we ought morally to relate to animals; (2) attempts to expand the circle of moral concern beyond animals to other parts of nature; (3) economic approaches to environmental problems (e.g. cost-benefit analysis) and the justification of the precautionary principle; and (4) our moral obligations to future people. The class will conclude by considering whether the theoretical tools that we have examined help to address the problems of climate change, one of the most pressing environmental challenges of our time.

Same as: ETHICSOC 178M, ETHICSOC 278M, PHIL 178M, PHIL 278M.

**POLISCI 134P. Contemporary Moral Problems. 5 Units.**

As individuals and as members of societies, we make choices that can be assessed from the moral point of view. What choices should we make, and how should we make them? Is it ok to buy iThings when others lack basic nutrition? Does a preference for the taste of meat justify killing animals? When is deceptive seduction seriously wrong and when is it just sketchy? Topics include exploitation, poverty, sexual and reproductive autonomy, commercialization, homelessness, citizenship, education, stereotypes, affirmative action, and social responsibility.

Same as: ETHICSOC 185M, PHIL 72.

**POLISCI 136S. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors.

Same as: ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307.

**POLISCI 140L. China in World Politics. 5 Units.**

The implications of the rise of China in contemporary world politics and for American foreign policy, including issues such as arms and nuclear proliferation, regional security arrangements, international trade and investment, human rights, environmental problems, and the Taiwan and Tibet questions.

Same as: POLISCI 340L.

**POLISCI 142B. British Politics. 5 Units.**

The impact on the world's oldest democracy of major changes in policies, politics, and the institution of government made over the last two decades by Margaret Thatcher and Tony Blair.

**POLISCI 143S. Comparative Corruption. 5 Units.**

Causes, effects, and solutions to various forms of corruption in business and politics in both developing regions (e.g. Asia, E. Europe) and developed ones (the US and the EU).

Same as: SOC 113.

**POLISCI 147. Comparative Democratic Development. 5 Units.**

Social, cultural, political, economic, and international factors affecting the development and consolidation of democracy in historical and comparative perspective. Individual country experiences with democracy, democratization, and regime performance. Emphasis is on the third wave of democratization over the past three decades and contemporary possibilities for democratic change. (Diamond).

**POLISCI 148. Chinese Politics: The Transformation and the Era of Reform. 5 Units.**

Overview of the reforms in China since 1978 that have made its economy one of the fastest growing in the world yet it still has the Chinese Communist Party at the helm wielding one party rule. Key questions addressed include the following: What has been the process and challenges of reform that have reshaped China's economic landscape? What are the political consequences of these dramatic economic changes? Why has the CCP remained strong while other communist regimes have failed? Markets have spread but what is the role of the state? What are the opportunities for political participation and prospects for political change? Materials will include readings, lectures, and selected films. This course has no prerequisites. (Graduate students register for 348.) This fulfills the Writing in the Major requirement for PoliSci majors.

Same as: POLISCI 348.

**POLISCI 149S. Islam, Iran, and the West. 5 Units.**

Changes in relative power and vitality of each side. The relationship in the Middle Ages revolved around power and domination, and since the Renaissance around modernity. Focus is on Muslims of the Middle East.

**POLISCI 152. Introduction to Game Theoretic Methods in Political Science. 3-5 Units.**

Concepts and tools of non-cooperative game theory developed using political science questions and applications. Formal treatment of Hobbes' theory of the state and major criticisms of it; examples from international politics. Primarily for graduate students; undergraduates admitted with consent of instructor.

Same as: POLISCI 352.

**POLISCI 155. Applied Quantitative Research in Political Science. 5 Units.**

Introduction to methods of research design and data analysis used in quantitative political research. The course will cover issues that are typically missing from intro stats and econometrics courses but are central to applied political science research. Methods topics include: experimental and observational approaches to estimating causal effects, measuring political preferences from data, working with big data, and effective data presentation and visualization. These topics will be introduced using data sets from American politics, international relations, and comparative politics. The course will include an introduction to the widely used R statistical programming language. Satisfies quantitative methods requirement for the Political Science Research Honors Track. Prerequisites: Stat 60, Econ 102A, or instructor consent.

Same as: PUBLPOL 157.

**POLISCI 157. Sampling and Surveys. 5 Units.**

The importance of sample surveys as a source of social science data including public opinion, voting, welfare programs, health, employment, and consumer behavior. Survey design, sampling theory, and estimation. Nonresponse, self-selection, measurement error, and web survey methods. Prerequisite: 350B or equivalent.

Same as: POLISCI 357.

**POLISCI 204. Sanela Diana Jenkins International Human Rights Colloquium. 1 Unit.**

This one-unit seminar will comprise 10 international and domestic human rights scholars, judges and activists who have made significant contributions to international justice, the International Criminal Court (ICC) and the ad hoc tribunals (the ICTY and the ICTR) and hybrid tribunals (those in Sierra Leone, Cambodia and East Timor). We will examine the pros and the cons of the international criminal justice system, and its less formal cousins such as truth and reconciliation commissions and Gacaca. It is open to all Stanford undergraduate and graduate students. Course requirements are attendance, participation, and assignments through commentaries and reflections posted on the Program on Human Rights FB page.

Same as: INTNLREL 110, IPS 271, POLISCI 304.

**POLISCI 211P. International Security in South Asia: Pakistan, India and the United States.. 5 Units.**

This course critically examines the dynamics of continuity and change in American interactions with nuclear armed adversaries, India and Pakistan. It also aims to sensitize the students to Indian and Pakistani perspectives on regional security and the mainsprings of their interactions with United States. There will be an in-depth exploration of the impact of the Indo-US strategic partnership for evolving balance of power in South Asia.

**POLISCI 213S. A Post American Century? American Foreign Policy in a Multi-unipolar World. 5 Units.**

This seminar examines recent policy from Bush to Obama in the context of two classic traditions: Wilsonianism vs. Realism. What is the role of the international system, what is the weight of domestic forces like ideology, history and identity? Prerequisite: junior or senior standing.

**POLISCI 214G. International Political Economy and International Organizations: Theory and Practice. 3-5 Units.**

What is the appropriate balance between government regulation and market freedom? Introduction to important theoretical and policy debates in international political economy. Topics include: political economy of trade; exchange rate policy; the liberalization of trade and finance; the global move to openness; development, debt and aid; and the role of international organizations. Discussion of application of academic insights to key policy debates, including whether governments should offset the welfare costs of globalization, whether the IMF and World Bank should be reformed to meet the needs of the 21st century, and how the international community should respond to financial crises. Students will research, write and orally present policy briefs on specific policy questions.

Same as: IPS 221.

**POLISCI 214R. Challenges and Dilemmas in American Foreign Policy. 5 Units.**

This seminar will examine the complexities and trade offs involved in foreign policy decision-making at the end of the twentieth century and the dawn of the post-9/11 era. Students will analyze dilemmas confronting policymakers through case studies including post-conflict reconstruction and state-building, nuclear proliferation, democratization and peace negotiation. The seminar will conclude with a 48-hour crisis simulation. For advanced undergraduates and graduate students. Application for enrollment required. Pick up application in Political Science Department (Encina West 100).

Same as: POLISCI 314R.

**POLISCI 215. Explaining Ethnic Violence. 5 Units.**

What is ethnic violence and why does it occur? Should elite machinations, the psychology of crowds, or historical hatreds be blamed? Case studies and theoretical work on the sources and nature of ethnic violence. Counts as Writing in the Major for PoliSci majors.

**POLISCI 215F. Nuclear Weapons and International Politics. 5 Units.**

Why do states develop nuclear weapons and why do some states, that have the technological capacity to build nuclear weapons, refrain from doing so? What are the strategic consequences of new states deploying nuclear weapons? What is the relationship between the spread of nuclear energy and the spread of nuclear weapons? We will study the political science and history literature on these topics. Research paper required.

Same as: POLISCI 315F.

**POLISCI 216E. International History and International Relations Theory. 5 Units.**

The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system.

Same as: HISTORY 202, HISTORY 306E, POLISCI 316.

**POLISCI 218J. Japanese Politics and International Relations. 5 Units.**

The domestic politics, political economy, and international relations of contemporary Japan. The role of political parties, the bureaucracy, and private actors. Economic development and challenges. Relations with the United States and East Asia.

Same as: POLISCI 318J.

**POLISCI 218S. Political Economy of International Trade and Investment. 5 Units.**

How domestic and international politics influence the economic relations between countries. Why do governments promote or oppose globalization? Why do countries cooperate economically in some situations but not others? Why do countries adopt bad economic policies? Focus on the politics of international trade and investment. Course approaches each topic by examining alternative theoretical approaches and evaluate these theories using historical and contemporary evidence from many geographical regions around the world. Prerequisites: ECON 1A, ECON 1B, and a statistics course.

**POLISCI 218T. Terrorism. 5 Units.**

The course is primarily concerned with variation in terrorist group behavior and therefore concentrates on issues on the organizational level of analysis. We address questions such as: Why and how do terrorist groups emerge? Who joins terrorist groups? Which organizational challenges do terrorists face and how do they solve them? Why are some groups more lethal than others? Why has suicide terrorism increased in the 2000s? How and why do groups decline? Topics such as counterterrorism, macrostructural determinants of terrorism, or the effects of terrorism will be treated only peripherally.

**POLISCI 219. Directed Reading and Research in International Relations. 1-10 Units.**

May be repeated for credit.

**POLISCI 223F. Ethics and Politics. 5 Units.**

A discussion of critical ethical issues faced by American and other national leaders. Case studies of 20th- and 21st-century decisions, including those involved with violence (e.g., the use of drone missiles or torture to extract information from enemies), whistle-blowing in government (e.g., decisions to expose what was known about 9/11 in advance), disobedience of those in authority (e.g., Daniel Ellsberg's release of the Pentagon Papers), policies on distributing scarce goods in society (e.g. rationing health care), policies involving justice and equal treatment (e.g. affirmative action or gay marriage), policies regarding life and death (e.g., abortion and euthanasia laws), and others. Students will debate some of the key issues, relying on ethical principles that will be discussed each week, and develop their own case studies.

**POLISCI 223R. Pivotal Moments in American Institutions and Public Law, 1781-Present. 5 Units.**

American lawyers and policymakers work today in a system of institutions that are strikingly unique in comparative and historical terms. With some exceptions, that system is characterized by relatively stable political and legal institutions, low levels of explicit corruption, high bureaucratic capacity in public organizations, and relatively open, impersonal access to political, policymaking, and legal institutions. Although these characteristics are now too often taken for granted, the process through which they emerged remains remarkably opaque. In the 1780s under the Articles of Confederation, the United States was a poor developing country on the fringe of the Atlantic community with limited capacity and a striking inability to provide basic public goods, such as security. One hundred years later, it well along the way to becoming the richest nation in the world. How did this transformation occur? Drawing on judicial opinions, legal scholarship, political science, economics, and history, this course explores how institutions evolved to create such a system. It traces the problem of institutional development through several critical periods in the history of American public law, including the emergence of the Constitution, the events leading up to and following the Civil War, the Progressive era, World War II, 1964-75, and the emergence of the modern administrative state. Although the primary focus is on the American experience, we place these developments in comparative context as well.

**POLISCI 224H. Heretics to Headscarves. 5 Units.**

Broad survey of religious discrimination and persecution in the Euro-American tradition, and the rise of tolerationist ideas and practices, from Augustine's rationale for punishing dissenters to the current European debates over the regulation of Islam. Topics include the Inquisition; struggles over toleration in Reformation Europe; the impact of Locke, Bayle, and Spinoza; Spanish practice in the Americas; and the American constitutional experiment in free exercise.

Same as: HISTORY 202C, JEWISHST 182C.

**POLISCI 224L. The Psychology of Communication About Politics in America. 4 Units.**

Focus is on how politicians and government learn what Americans want and how the public's preferences shape government action; how surveys measure beliefs, preferences, and experiences; how poll results are criticized and interpreted; how conflict between polls is viewed by the public; how accurate surveys are and when they are accurate; how to conduct survey research to produce accurate measurements; designing questionnaires that people can understand and use comfortably; how question wording can manipulate poll results; corruption in survey research. Same as: COMM 164, COMM 264, PSYCH 170.

**POLISCI 226. Race and Racism in American Politics. 5 Units.**

Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.

Same as: AMSTUD 226, CSRE 226, POLISCI 326.

**POLISCI 229. Directed Reading and Research in American Politics. 1-10 Units.**

May be repeated for credit.

**POLISCI 230A. Classical Seminar: Origins of Political Thought. 4-5 Units.**

Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change. Same as: CLASSHIS 133, CLASSHIS 333, PHIL 176A, PHIL 276A, POLISCI 330A.

**POLISCI 231. High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests. 4-5 Units.**

Normative political theory combined with positive political theory to better explain how major texts may have responded to and influenced changes in formal and informal institutions. Emphasis is on historical periods in which catastrophic institutional failure was a recent memory or a realistic possibility. Case studies include Greek city-states in the classical period and the northern Atlantic community of the 17th and 18th centuries including upheavals in England and the American Revolutionary era. Same as: CLASSHIS 332, POLISCI 331.

**POLISCI 232T. The Dialogue of Democracy. 4-5 Units.**

All forms of democracy require some kind of communication so people can be aware of issues and make decisions. This course looks at competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small scale discussions or sound bites on television? Or social media? What is the role of technology in changing our democratic practices, to mobilize, to persuade, to solve public problems? This course will include readings from political theory about democratic ideals - from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. It will also include contemporary examinations of the media and the internet to see how those practices are changing and how the ideals can or cannot be realized. Same as: AMSTUD 137, COMM 137W, COMM 237, POLISCI 332T.

**POLISCI 233F. Science, Technology, and Society in the Face of the Looming Disaster. 3-5 Units.**

The major topic will be the indeterminacy regarding the survival of humankind. With the advent of the atomic bomb humankind became potentially the maker of its own demise. Will combine a number of significant case studies (environmental disasters, industrial catastrophes, threat of nuclear devastation, technological risks) with the lessons drawn from a form of literature that is at the intersection of STS and the Humanities, in particular the early warnings made by such thinkers as Ivan Illich, Martin Heidegger, Hans Jonas, Günther Anders, and Hannah Arendt. Same as: FRENCH 228, ITALIAN 228.

**POLISCI 234P. Deliberative Democracy and its Critics. 3-5 Units.**

This course examines the theory and practice of deliberative democracy and engages both in a dialogue with critics. Can a democracy which emphasizes people thinking and talking together on the basis of good information be made practical in the modern age? What kinds of distortions arise when people try to discuss politics or policy together? The course draws on ideas of deliberation from Madison and Mill to Rawls and Habermas as well as criticisms from the jury literature, from the psychology of group processes and from the most recent normative and empirical literature on deliberative forums. Deliberative Polling, its applications, defenders and critics, both normative and empirical, will provide a key case for discussion. Same as: AMSTUD 135, COMM 135, COMM 235, COMM 335, POLISCI 334P.

**POLISCI 235J. Creative Political Thinking: Three Cases. 5 Units.**

Same as: POLISCI 335J.

**POLISCI 236. Theories of Civil Society, Philanthropy, and the Nonprofit Sector. 5 Units.**

What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. Readings in political philosophy, political sociology, and public policy. WIM for PoliSci students who enroll in PoliSci 236S.

Same as: ETHICSOC 232T, POLISCI 236S.

**POLISCI 236S. Theories of Civil Society, Philanthropy, and the Nonprofit Sector. 5 Units.**

What is the basis of private action for the public good? How are charitable dollars distributed and what role do nonprofit organizations and philanthropic dollars play in a modern democracy? How do nongovernmental organizations operate domestically and globally? The historical development and modern structure of civil society emphasizing philanthropy and the nonprofit sector. Readings in political philosophy, political sociology, and public policy. WIM for PoliSci students who enroll in PoliSci 236S.

Same as: ETHICSOC 232T, POLISCI 236.

**POLISCI 237M. Politics and Evil. 5 Units.**

In the aftermath of the Second World War, the political theorist Hannah Arendt wrote that the problem of evil will be the fundamental question of postwar intellectual life in Europe. This question remains fundamental today. The acts to which the word evil might apply—genocide, terrorism, torture, human trafficking, etc.—persist. The rhetoric of evil also remains central to American political discourse, both as a means of condemning such acts and of justifying preventive and punitive measures intended to combat them. In this advanced undergraduate seminar, we will examine the intersection of politics and evil by considering works by philosophers and political theorists, with occasional forays into film and media. The thinkers covered will include: Hannah Arendt, Immanuel Kant, Niccolò Machiavelli, Friedrich Nietzsche, and Michael Walzer.

Same as: ETHICSOC 237M.

**POLISCI 238. Political Disagreement. 5 Units.**

Disagreement is a permanent and ubiquitous feature of political life. Furthermore, political disagreement can stem from a wide range of sources. Perhaps most importantly, democratic citizens disagree at the level of values: they disagree about the proper form of the good life as well as the human interests that political laws and institutions ought to serve. This course will focus primary attention on the implications of such value-based disagreement for how we should think about political justice.

**POLISCI 239. Directed Reading and Research in Political Theory. 1-10 Units.**

May be repeated for credit.

**POLISCI 240C. The Comparative Political Economy of Post-Communist Transitions. 3-4 Units.**

Dominant theoretical perspectives of comparative democratization and marketization; focus is on the political economy of transition in Eastern Europe and Eurasia while comparing similar processes in Latin America and Asia. Topics include: meanings of democracy, synergy between democracies and markets, causes of the collapse of communism, paths to political liberalization and democracy, civil society, constitutions, parliaments, presidents, the rule of law, electoral systems, market requirements, strategies of reform, the Russian experience of market building, exporting democracy and the market, and foreign aid and assistance.

Same as: REES 340.

**POLISCI 243E. Political Economy of Development in Rural India. 5 Units.**

When and why do farmers accept, manipulate, or overthrow the pre-existing distribution of political, economic and social power? This course will help students utilize political economy theories and methods of analysis to understand the institutional dynamics of change in rural India. First, it will provide students with a deeper understanding of the nature of change in a particularly dynamic, varied and influential state with a mainly-rural population: India. Second, it will focus on three major topics in political economy: control over land; taxation and investment; and anti-state resistance. The course will draw from political science's examinations of how and why states succeed, fail, and conduct major reforms by examining these questions in the context of rural India's small farmers. Indian political institutions are simultaneously lauded as extremely stable, highly-prone to decentralized rebellion, and models for voice and innovation from which the rest of the world has much to learn. Overall, this course will expect students to engage with the political economy literature, both historical and contemporary, in order to develop two short research papers and present well-argued positions in class-wide debates on the nature of political, economic and social change driven by and for small farmers in rural India.

**POLISCI 243L. Politics of Economic Reform. 5 Units.**

Description to come.

**POLISCI 244P. Religion and Politics in Latin America. 5 Units.**

The purpose of this seminar is to introduce students to the complexities of Politics and Religion in Latin America from a historical and sociological perspective. The seminar will examine the evolution of Church-State-Society-Community-Individual relations in Latin America, from Independence to present day. Topics will include new definitions of religious freedom, debates concerning the so called lay State (Estado laico), secularization, and the role of the lay or secular state and religious groups in the development of democratic or authoritarian regimes, as well as civil and religious freedoms, particularly sexual and reproductive rights and bioethical issues (contraception, abortion euthanasia, stem cell research, homosexual rights and homophobia). The course will combine a series of reading tests designed to introduce central questions of the texts with a critical discussion of the assigned source material, in order to develop a knowledgeable approach and research interest in the student.

**POLISCI 245R. Politics in Modern Iran. 5 Units.**

Modern Iran has been a smelting pot for political movements, ideologies, and types of states. Movements include nationalism, constitutionalism, Marxism, Islamic fundamentalism, social democracy, Islamic liberalism, and fascism. Forms of government include Oriental despotism, authoritarianism, Islamic theocracy, and liberal democracy. These varieties have appeared in Iran in an iteration shaped by history, geography, proximity to oil and the Soviet Union, and the hegemony of Islamic culture.

**POLISCI 246P. The Dynamics of Change in Africa. 4-5 Units.**

Crossdisciplinary colloquium; required for the M.A. degree in African Studies. Open to advanced undergraduates and PhD students. Addresses critical issues including patterns of economic collapse and recovery; political change and democratization; and political violence, civil war, and genocide. Focus on cross-cutting issues including the impact of colonialism; the role of religion, ethnicity, and inequality; and Africa's engagement with globalization.

Same as: AFRICAST 301A, POLISCI 346P.

**POLISCI 247G. Governance and Poverty. 5 Units.**

**POLISCI 248L. Political-Economy of Crime and Violence in Latin America. 5 Units.**

Latin America has experienced a significant wave of crime and violence in the past two decades. Criminal organizations have penetrated State organizations and are increasingly embedded in society. These organizations have created wide and solid networks all over the region, including the United States. The activities of criminal organizations in Latin America have eroded the social fabric, weakened State institutions, have caused a significant number of deaths, and have created strong disincentives for productive investment. The course aims at acquainting students with the political-economy of crime and violence. It focuses on understanding the incentives that individuals face for engaging in criminal activities; the incentives that criminal organizations have to use violence against each other, against citizens, and against State forces; the incentives that citizens face to side, or not, with criminal organizations; and the responses that States have structured against crime and violence. The course focuses on Latin America, but also learns from the case of the United States for which there is a relatively more extensive literature. The course makes extensive use of available data on the topic and emphasizes the learning of adequate methods for measuring these phenomena.

**POLISCI 249. Directed Reading and Research in Comparative Politics. 1-10 Units.**

May be repeated for credit.

**POLISCI 259. Directed Reading and Research in Political Methodology. 1-10 Units.**

May be repeated for credit.

**POLISCI 291. Political Institutions. 5 Units.**

This course focuses on the role of political institutions in shaping policy outcomes around the world, with special attention to the United States. Students will become familiar with a wide range of theoretical approaches to the study of institutions, and they will learn the basics of applied quantitative empirical analysis. Enrollment is restricted to Political Science Research Honors Track students.

**POLISCI 292. Political Behavior. 5 Units.**

This research seminar will survey important topics in the study of mass political behavior including public opinion, political participation, partisanship and voting. Open only to students in the Political Science Research Honors Track.

**POLISCI 293. Research Design. 5 Units.**

This course is designed to teach students how to design a research project. The course emphasizes the specification of testable hypotheses, the building of data sets, and the inferences from that may be drawn from that evidence. It is only open to students in the PS Research Honors Track.

**POLISCI 299A. Honors Thesis. 1-5 Units.**

Students conduct independent research work towards a senior honors thesis. Restricted to students in the Research Track Honors Program in Political Science.

**POLISCI 299B. Honors Thesis. 1-5 Units.**

Students conduct independent research work towards a senior honors thesis.

**POLISCI 299C. Honors Thesis. 1-5 Units.**

Students conduct independent research work towards a senior honors thesis.

**POLISCI 304. Sanela Diana Jenkins International Human Rights Colloquium. 1 Unit.**

This one-unit seminar will comprise 10 international and domestic human rights scholars, judges and activists who have made significant contributions to international justice, the International Criminal Court (ICC) and the ad hoc tribunals (the ICTY and the ICTY) and hybrid tribunals (those in Sierra Leone, Cambodia and East Timor). We will examine the pros and the cons of the international criminal justice system, and its less formal cousins such as truth and reconciliation commissions and Gacaca. It is open to all Stanford undergraduate and graduate students. Course requirements are attendance, participation, and assignments through commentaries and reflections posted on the Program on Human Rights FB page.

Same as: INTNLREL 110, IPS 271, POLISCI 204.

**POLISCI 314D. Democracy, Development, and the Rule of Law. 5 Units.**

Links among the establishment of democracy, economic growth, and the rule of law. How democratic, economically developed states arise. How the rule of law can be established where it has been historically absent. Variations in how such systems function and the consequences of institutional forms and choices. How democratic systems have arisen in different parts of the world. Available policy instruments used in international democracy, rule of law, and development promotion efforts. Same as: INTNLREL 114D, IPS 230, POLISCI 114D.

**POLISCI 314R. Challenges and Dilemmas in American Foreign Policy. 5 Units.**

This seminar will examine the complexities and trade offs involved in foreign policy decision-making at the end of the twentieth century and the dawn of the post-9/11 era. Students will analyze dilemmas confronting policymakers through case studies including post-conflict reconstruction and state-building, nuclear proliferation, democratization and peace negotiation. The seminar will conclude with a 48-hour crisis simulation. For advanced undergraduates and graduate students. Application for enrollment required. Pick up application in Political Science Department (Encina West 100).

Same as: POLISCI 214R.

**POLISCI 314S. Decision Making in U.S. Foreign Policy. 5 Units.**

Priority to IPS students. Formal and informal processes involved in U.S. foreign policy decision making. The formation, conduct, and implementation of policy, emphasizing the role of the President and executive branch agencies. Theoretical and analytical perspectives; case studies.

Same as: IPS 314S.

**POLISCI 315F. Nuclear Weapons and International Politics. 5 Units.**

Why do states develop nuclear weapons and why do some states, that have the technological capacity to build nuclear weapons, refrain from doing so? What are the strategic consequences of new states deploying nuclear weapons? What is the relationship between the spread of nuclear energy and the spread of nuclear weapons? We will study the political science and history literature on these topics. Research paper required.

Same as: POLISCI 215F.

**POLISCI 316. International History and International Relations Theory. 5 Units.**

The relationship between history and political science as disciplines. Sources include studies by historians and political scientists on topics such as the origins of WW I, the role of nuclear weapons in international politics, the end of the Cold War, nongovernmental organizations in international relations, and change and continuity in the international system.

Same as: HISTORY 202, HISTORY 306E, POLISCI 216E.

**POLISCI 318J. Japanese Politics and International Relations. 5 Units.**

The domestic politics, political economy, and international relations of contemporary Japan. The role of political parties, the bureaucracy, and private actors. Economic development and challenges. Relations with the United States and East Asia.

Same as: POLISCI 218J.

**POLISCI 319. Directed Reading in International Relations. 1-10 Units.**

May be repeated for credit.

**POLISCI 323R. The Press and the Political Process. 4-5 Units.**

(Graduate students register for COMM 260.) The role of mass media and other channels of communication in political and electoral processes.

Same as: COMM 160, COMM 260.

**POLISCI 324. Graduate Seminar in Political Psychology. 1-3 Units.**

For students interested in research in political science, psychology, or communication. Methodological techniques for studying political attitudes and behaviors. May be repeated for credit.

Same as: COMM 308.

**POLISCI 326. Race and Racism in American Politics. 5 Units.**

Topics include the historical conceptualization of race; whether and how racial animus reveals itself and the forms it might take; its role in the creation and maintenance of economic stratification; its effect on contemporary U.S. partisan and electoral politics; and policy making consequences.

Same as: AMSTUD 226, CSRE 226, POLISCI 226.

**POLISCI 326T. The Politics of Education. 5 Units.**

America's public schools are government agencies, and virtually everything about them is subject to political authority--and thus to decision through the political process. This seminar is an effort to understand the politics of education and its impacts on the nation's schools. Our focus is on the modern era of reform, with special attention to the most prominent efforts to bring about fundamental change through accountability (including No Child Left Behind), school choice (charter schools, vouchers), pay for performance, and more and more to the politics of blocking that has made genuine reform so difficult to achieve.

Same as: POLISCI 226T.

**POLISCI 329. Directed Reading and Research in American Politics. 1-10 Units.**

May be repeated for credit.

**POLISCI 330A. Classical Seminar: Origins of Political Thought. 4-5 Units.**

Political philosophy in classical antiquity, focusing on canonical works of Thucydides, Plato, Aristotle, and Cicero. Historical background. Topics include: political obligation, citizenship, and leadership; origins and development of democracy; and law, civic strife, and constitutional change.

Same as: CLASSHIS 133, CLASSHIS 333, PHIL 176A, PHIL 276A, POLISCI 230A.

**POLISCI 331. High-Stakes Politics: Case Studies in Political Philosophy, Institutions, and Interests. 4-5 Units.**

Normative political theory combined with positive political theory to better explain how major texts may have responded to and influenced changes in formal and informal institutions. Emphasis is on historical periods in which catastrophic institutional failure was a recent memory or a realistic possibility. Case studies include Greek city-states in the classical period and the northern Atlantic community of the 17th and 18th centuries including upheavals in England and the American Revolutionary era.

Same as: CLASSHIS 332, POLISCI 231.

**POLISCI 332T. The Dialogue of Democracy. 4-5 Units.**

All forms of democracy require some kind of communication so people can be aware of issues and make decisions. This course looks at competing visions of what democracy should be and different notions of the role of dialogue in a democracy. Is it just campaigning or does it include deliberation? Small scale discussions or sound bites on television? Or social media? What is the role of technology in changing our democratic practices, to mobilize, to persuade, to solve public problems? This course will include readings from political theory about democratic ideals - from the American founders to J.S. Mill and the Progressives to Joseph Schumpeter and modern writers skeptical of the public will. It will also include contemporary examinations of the media and the internet to see how those practices are changing and how the ideals can or cannot be realized.

Same as: AMSTUD 137, COMM 137W, COMM 237, POLISCI 232T.

**POLISCI 333. Rational and Social Agency. 2-5 Units.**

Contemporary discussions of practical reason, individual rational agency, planning agency, diachronic agency, intention, belief, intentional action, shared agency, identification and self-governance. Tentative list of authors whose work will be studied includes: Michael Bratman, Margaret Gilbert, Richard Holton, Christine Korsgaard, Alfred Mele, Kieran Setiya, Scott Shapiro, Michael Smith, David Velleman, Jay Wallace, and Gary Watson.

Same as: PHIL 377.

**POLISCI 334. Philanthropy and Civil Society. 1-3 Units.**

Associated with the Center for Philanthropy and Civil Society (PACS). Year-long workshop for doctoral students and advanced undergraduates writing senior theses on the nature of civil society or philanthropy. Focus is on pursuit of progressive research and writing contributing to the current scholarly knowledge of the nonprofit sector and philanthropy. Accomplished in a large part through peer review. Readings include recent scholarship in aforementioned fields. May be repeated for credit for a maximum of 9 units.

Same as: EDUC 374, SOC 374.

**POLISCI 334P. Deliberative Democracy and its Critics. 3-5 Units.**

This course examines the theory and practice of deliberative democracy and engages both in a dialogue with critics. Can a democracy which emphasizes people thinking and talking together on the basis of good information be made practical in the modern age? What kinds of distortions arise when people try to discuss politics or policy together? The course draws on ideas of deliberation from Madison and Mill to Rawls and Habermas as well as criticisms from the jury literature, from the psychology of group processes and from the most recent normative and empirical literature on deliberative forums. Deliberative Polling, its applications, defenders and critics, both normative and empirical, will provide a key case for discussion.

Same as: AMSTUD 135, COMM 135, COMM 235, COMM 335, POLISCI 234P.

**POLISCI 335J. Creative Political Thinking: Three Cases. 5 Units.**

Same as: POLISCI 235J.

**POLISCI 336. Introduction to Global Justice. 5 Units.**

Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

Same as: ETHICSOC 136R, INTNLREL 136R, PHIL 76, POLISCI 136R.



**POLISCI 336S. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors. Same as: ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S, PUBLPOL 103C, PUBLPOL 307.

**POLISCI 337S. Seminar on Liberation Technologies. 1 Unit.**

This one-unit seminar will present speakers relevant in a variety of ways to how various forms of information technology are being used to defend human rights, improve governance, deepen democracy, empower the poor, promote economic development, protect the environment, enhance public health, and pursue a variety of other social goods. Same as: CS 546.

**POLISCI 337T. Designing Liberation Technology. 3-4 Units.**

Small project teams work with NGOs to design new technologies for promoting development and democracy. Students conduct observations to identify needs, generate concepts, create prototypes, and test their appropriateness. Some projects may continue past the quarter toward full-scale implementation. Taught through the Hasso Plattner Institute of Design at Stanford (<http://dschool.stanford.edu>). Enrollment limited. Application required. Prerequisites: consent of instructor(s). Design Institute class; see <http://dschool.stanford.edu>. Same as: CS 379L.

**POLISCI 339. Directed Reading and Research in Political Theory. 1-5 Units.**

May be repeated for credit.

**POLISCI 340L. China in World Politics. 5 Units.**

The implications of the rise of China in contemporary world politics and for American foreign policy, including issues such as arms and nuclear proliferation, regional security arrangements, international trade and investment, human rights, environmental problems, and the Taiwan and Tibet questions. Same as: POLISCI 140L.

**POLISCI 346P. The Dynamics of Change in Africa. 4-5 Units.**

Crossdisciplinary colloquium; required for the M.A. degree in African Studies. Open to advanced undergraduates and PhD students. Addresses critical issues including patterns of economic collapse and recovery; political change and democratization; and political violence, civil war, and genocide. Focus on cross-cutting issues including the impact of colonialism; the role of religion, ethnicity, and inequality; and Africa's engagement with globalization. Same as: AFRICAST 301A, POLISCI 246P.

**POLISCI 348. Chinese Politics: The Transformation and the Era of Reform. 5 Units.**

Overview of the reforms in China since 1978 that have made its economy one of the fastest growing in the world yet it still has the Chinese Communist Party at the helm wielding one party rule. Key questions addressed include the following: What has been the process and challenges of reform that have reshaped China's economic landscape? What are the political consequences of these dramatic economic changes? Why has the CCP remained strong while other communist regimes have failed? Markets have spread but what is the role of the state? What are the opportunities for political participation and prospects for political change? Materials will include readings, lectures, and selected films. This course has no prerequisites. (Graduate students register for 348.) This fulfills the Writing in the Major requirement for PoliSci majors. Same as: POLISCI 148.

**POLISCI 348S. Latin American Politics. 5 Units.**

Fundamental transformations in Latin America in the last two decades: why most governments are now democratic or semidemocratic; and economic transformation as countries abandoned import substitution industrialization policies led by state intervention for neoliberal economic policies. The nature of this dual transformation.

**POLISCI 349. Directed Reading and Research in Comparative Politics. 1-10 Units.**

May be repeated for credit.

**POLISCI 350A. Political Methodology I. 5 Units.**

Introduction to probability and statistical inference, with applications to political science and public policy. Prerequisite: elementary calculus. Same as: PUBLPOL 303A.

**POLISCI 350B. Political Methodology II. 5 Units.**

Understanding and using the linear regression model in a social-science context: properties of the least squares estimator; inference and hypothesis testing; assessing model fit; presenting results for publication; consequences and diagnosis of departures from model assumptions; outliers and influential observations, graphical techniques for model fitting and checking; interactions among exploratory variables; pooling data; extensions for binary responses. Same as: PUBLPOL 303B.

**POLISCI 350C. Political Methodology III. 3-5 Units.**

Models for discrete outcomes, time series, measurement error, and simultaneity. Introduction to nonlinear estimation, large sample theory. Prerequisite: 150B/350B.

**POLISCI 351A. Foundations of Political Economy. 4 Units.**

Introduction to political economy with an emphasis on formal models of collective choice, public institutions, and political competition. Topics include voting theory, social choice, institutional equilibria, agenda setting, interest group politics, bureaucratic behavior, and electoral competition.

**POLISCI 351B. Economic Analysis of Political Institutions. 4 Units.**

Applying techniques such as information economics, games of incomplete information, sequential bargaining theory, repeated games, and rational expectations of microeconomic analysis and game theory to political behavior and institutions. Applications include agenda formation in legislatures, government formation in parliamentary systems, the implications of legislative structure, elections and information aggregation, lobbying, electoral competition and interest groups, the control of bureaucracies, interest group competition, and collective choice rules.

**POLISCI 351C. Testing Models of Governmental Decision-Making. 4 Units.**

This course surveys applications of formal models to several stages of decision making, primarily in the U.S. national government and with an emphasis on the legislative branch. The course begins with explicit consideration of issues in philosophy of science and introduces an analytic framework to be applied to specific research throughout remaining sessions. Substantive topics and applications covered include strategies of committees, roll call voting, policy formation, effects of special rules, congressional-presidential relations, and congressional-agency relations. Students should have taken POLECON 680 and POLECON 681. Also listed as Political Science 351C. Same as: POLECON 682.

**POLISCI 352. Introduction to Game Theoretic Methods in Political Science. 3-5 Units.**

Concepts and tools of non-cooperative game theory developed using political science questions and applications. Formal treatment of Hobbes' theory of the state and major criticisms of it; examples from international politics. Primarily for graduate students; undergraduates admitted with consent of instructor. Same as: POLISCI 152.

**POLISCI 353A. Workshop in Statistical Modeling. 1-2 Units.**

Theoretical aspects and empirical applications of statistical modeling in the social sciences. Guest speakers. Students present a research paper. Prerequisite: 350B or equivalent.

**POLISCI 353C. Workshop in Statistical Modeling. 1-2 Units.**

Continuation of 353A. May be repeated for credit. Prerequisite: 353A and B.

**POLISCI 357. Sampling and Surveys. 5 Units.**

The importance of sample surveys as a source of social science data including public opinion, voting, welfare programs, health, employment, and consumer behavior. Survey design, sampling theory, and estimation. Nonresponse, self-selection, measurement error, and web survey methods. Prerequisite: 350B or equivalent. Same as: POLISCI 157.

**POLISCI 359. Advanced Individual Study in Political Methodology. 1-10 Units.**

May be repeated for credit.

**POLISCI 400. Dissertation. 1-10 Units.****POLISCI 404. Dispute Resolution in International Economic Law. 1 Unitss.**

(Same as LAW 356.) Topics include: theoretical work on international trade and investment disputes; empirical work on WTO dispute resolution and the efficacy of developing country participation; and legal analysis of current, prominent disputes in the WTO and under international investment treaties. Substantial paper required. May be repeated for credit.

**POLISCI 410A. International Relations Theory, Part I. 5 Units.**

First of a three-part graduate sequence. History of international relations, current debates, and applications to problems of international security and political economy.

**POLISCI 410B. International Relations Theory, Part II. 5 Units.**

Second of a three-part graduate sequence. History of international relations theory, current debates, and applications to problems of international security and political economy. Prerequisite: 410A.

**POLISCI 410C. Research in International Relations. 5 Units.**

Third of a three-part graduate sequence. Focus is on developing research papers begun in 410A or B, and exploring active areas of research in the field. Prerequisite: 410B.

**POLISCI 411A. Workshop in International Relations. 1-2 Units.**

For graduate students. Contemporary work. Organized around presentation of research by students and outside scholars. May be repeated for credit.

**POLISCI 411B. Workshop in International Relations. 1-2 Units.**

For graduate students. Contemporary work. Organized around presentation of research by students and outside scholars. May be repeated for credit.

**POLISCI 420A. American Political Institutions. 5 Units.**

Theories of American politics, focusing on Congress, the presidency, the bureaucracy, and the courts.

**POLISCI 420B. Topics in American Political Behavior. 4-5 Units.**

For graduate students with background in American politics embarking on their own research. Current research in American politics, emphasizing political behavior and public opinion. Possible topics: uncertainty and ambivalence in political attitudes, heterogeneity in public opinion, the structure of American political ideology, political learning, the media as a determinant of public opinion, and links between public opinion and public policy.

**POLISCI 420C. Discovery in American Politics. 5 Units.**

What are the "novel facts" being generated in the study of American politics, and how are these discoveries being made? Emphasis on strengths and limitations of emerging methodologies and review of the substantive contributions they yield. Student-led replication of extant research and development of original research ideas a key component of the course. Prerequisites: 420A,B.

**POLISCI 421K. Questionnaire Design for Surveys and Laboratory Experiments: Social and Cognitive Perspectives. 4 Units.**

The social and psychological processes involved in asking and answering questions via questionnaires for the social sciences; optimizing questionnaire design; open versus closed questions; rating versus ranking; rating scale length and point labeling; acquiescence response bias; don't-know response options; response choice order effects; question order effects; social desirability response bias; attitude and behavior recall; and introspective accounts of the causes of thoughts and actions. Same as: COMM 339, PSYCH 231.

**POLISCI 422. Workshop in American Politics. 1-2 Units.**

Research seminar. Frontiers in mass political behavior. Sources include data sets from the 2004 election cycle. Prerequisite: 420B or equivalent. Course may be repeated for credit.

**POLISCI 423A. The Laboratory of the Study of American Values I. 1-5 Units.****POLISCI 423B. The Laboratory of the Study of American Values II. 1-5 Units.****POLISCI 426S. Theories of Racism in American Politics: A Critique. 0 Unit.****POLISCI 430A. Wealthy Hellas. 4-5 Units.**

Drawing on Herodotus and other literary sources, ancient historians have traditionally seen classical Greece as a very poor land. Recent research, however (much of it conducted here at Stanford), suggests that Greece in fact saw substantial economic growth and rising standards of living across the first millennium BCE. This seminar tests the poor Hellas/wealthy Hellas models against literary and archaeological data. We will develop and test hypotheses to explain the rate and pace of economic change in the Greek world.

Same as: CLASSHIS 330A.

**POLISCI 430B. Wealthy Hellas. 1-5 Units.**

Drawing on Herodotus and other literary sources, ancient historians have traditionally seen classical Greece as a very poor land. Recent research, however (much of it conducted here at Stanford), suggests that Greece in fact saw substantial economic growth and rising standards of living across the first millennium BCE. This seminar tests the poor Hellas/wealthy Hellas models against literary and archaeological data. We will develop and test hypotheses to explain the rate and pace of economic change in the Greek world.

Same as: CLASSHIS 330B.

**POLISCI 432R. Selections in Modern Political Thought. 5 Units.**

This graduate-level seminar will explore selections from the canon of Western political thought from the late fifteenth through nineteenth centuries. Throughout the course, we will engage in close textual readings of individual thinkers and consider some of the larger questions raised by political modernity. The readings will expose students to the republican, liberal, conservative, and democratic traditions that had a formative influence on the United States. The thinkers covered will include: Niccolò Machiavelli, John Locke, Jean-Jacques Rousseau, Edmund Burke, Publius (Alexander Hamilton, James Madison, and John Jay), and Alexis de Tocqueville.

**POLISCI 433. Workshop in Political Theory. 1-2 Units.**

For graduate students. May be repeated for credit.

**POLISCI 435R. Political Realism. 3-5 Units.**

This seminar will explore various articulations of political realism in their historical contexts. Realism is generally taken to be a pragmatic approach to a political world marked by the competition for material interests and the struggle for power. Yet beyond a shared critique of idealism and an insistence on the priority and autonomy of the political, realists tend to have very different normative visions and political projects. We will consider the works of several political realists from the history of political and international relations thought, including: Thucydides, Machiavelli, Hobbes, Carr, Niebuhr, and Morgenthau.  
Same as: PHIL 372R.

**POLISCI 436R. Amartya Sen's capability theory. 2-4 Units.**

Amartya Sen's pioneering work attempts to open up economics to missing informational and evaluative dimensions. This seminar will explore Sen's "capability approach" and its implications for the study of economics, gender, and justice. It will look at different ways that the capability approach has been developed, in particular, by Martha Nussbaum, but also by other political philosophers.  
Same as: PHIL 378.

**POLISCI 437. Autonomy. 5 Units.****POLISCI 440A. Theories in Comparative Politics. 5 Units.**

Required of Political Science Ph.D. students with comparative politics as first or second concentration; others by consent of instructor. Theories addressing major concerns in the comparative field including democracy, regime change, the state, revolutions, national heterogeneity, and economic performance.

**POLISCI 440B. Political Economy of Development. 5 Units.**

Required of Political Science Ph.D. students with comparative politics as a first or second concentration; others by consent of the instructor. The origins of political and economic institutions and their impact on long run outcomes for growth and democracy. Emphasis is on the analysis of causal models, hypothesis testing, and the quality of evidence.

**POLISCI 440C. Methods in Comparative Politics. 5 Units.**

Required of Political Science Ph.D. candidates with comparative politics as a first or second concentration; others by consent of instructor. Current methodological standards in comparative politics. Students develop their own research design that meets these standards.

**POLISCI 440D. Workshop in Comparative Politics. 1-2 Units.**

Faculty, guest speakers, and graduate students conducting research in comparative politics present work-in-progress. Graduate students may enroll for up to 5 total units apportioned by quarter. Auditors welcome. Graduate students whose major or minor field is comparative politics must make at least one presentation to the seminar. Course may be repeated for credit.

**POLISCI 443S. Political Economy of Reform in China. 5 Units.**

Content, process, and problems of China's post-Mao reforms. Changes in property rights, markets, credit, and the role of the state in economic development. Comparative insights about reform in the Chinese communist system that distinguishes it from the experience of regimes in E. Europe and the former Soviet Union.

**POLISCI 444. Comparative Political Economy: Advanced Industrial Societies. 3-5 Units.**

Political economy approaches to key policy outcomes including redistribution, the size of government, fiscal behavior, and pork-barrel politics. Theories related to institutions, interest groups, and geography, focusing on middle- and upper-income countries.

**POLISCI 448R. Workshop: China Social Science. 1 Unitss.**

For Ph.D. students in the social sciences and history. Research on contemporary society and politics in the People's Republic of China. May be repeated for credit. Prerequisite: consent of instructor.  
Same as: SOC 368W.

**POLISCI 451. Design and Analysis of Experiments. 3-5 Units.**

Political scientists increasingly rely on experimental methods. This course covers the principles and logic of experimental design as applied to laboratory, field and survey experiments. We discuss the strengths and limitations of experiments in relation to observational methods. Design considerations include randomization, the construction of treatments, the use of deception, the ethical implications of deception, and new developments in subject recruitment. Turning to the analysis of experimental data, we describe the methods for estimating treatment effects, interactions, and more complex indirect effects stemming from either mediator or moderator variables. We also cover appropriate data analytic strategies for quasi-experimental designs including interrupted time series, matching and propensity scores.

**POLISCI 801. TGR Project. 0 Unit.****POLISCI 802. TGR Dissertation. 0 Unit.**

## Portuguese Language Courses

**PORTLANG 1A. Accelerated First-Year Portuguese, Part 1. 4-5 Units.**

For students with two years of college level study of a Romance language, preferably Spanish. Goal is to use socially and culturally appropriate forms in conversations, providing and obtaining information, and expressing feelings, emotions, and opinions. Students learn the language as they contrast Brazilian culture with their own. Lab. Completion of PORTLANG 2A fulfills the University's foreign language requirement.

**PORTLANG 2A. Accelerated First-Year Portuguese, Part 2. 4-5 Units.**

Continuation of PORTLANG 1A. For students with two years of college level study of a Romance language, preferably Spanish. Goal is to use socially and culturally appropriate forms in conversations, providing and obtaining information, describing and narrating, and expressing feelings, emotions, and opinions. Students learn the language as they contrast Brazilian culture with their own. Lab. Completion of PORTLANG 2A fulfills the University's foreign language requirement. Prerequisite: Placement Test, PORTLANG 1A or consent of instructor.

**PORTLANG 11A. Accelerated Second-Year Portuguese, Part 1. 4-5 Units.**

Continuation of PORTLANG 2A. Goal is to use linguistically and culturally appropriate forms in oral narrations, descriptions, and expression of ideas and opinions. Emphasis is on expository speech. Prerequisite: Placement Test, PORTLANG 2A, PORTLANG 3, or consent of instructor.

**PORTLANG 12A. Accelerated Second-Year Portuguese, Part 2. 4-5 Units.**

Continuation of PORTLANG 11A. Goal is to use linguistically and culturally appropriate forms in narrations, descriptions, and expression of ideas and opinions. Emphasis on expository writing. Prerequisite: Placement Test, PORTLANG 11A, or consent of instructor.

**PORTLANG 99. Language Specials. 1-5 Units.**

Prerequisite: consent of instructor. (Staff).

**PORTLANG 101. Reading Brazil. 3-5 Units.**

Short expository readings, guest lectures, discussions, compositions on Brazilian issues. Review of grammatical structures. Vocabulary building with emphasis on common idiomatic expressions and troublesome lexical distinctions. Prerequisite: PORTLANG 12A or equivalent, or consent of instructor.

**PORTLANG 102. Brazil in Text: Advanced Grammar and Composition. 3-5 Units.**

3rd year course. Further development of academic writing. Short fictional and expository readings, guest lectures, discussions, compositions on Brazilian issues. Emphasis is on building paragraphs, organizing arguments, and justifying positions. May be used as workshop to write papers in Portuguese for another course. May be repeated once for credit. Prerequisite: PORTLANG 12A or equivalent, or consent of instructor.

**PORTLANG 103. Advanced Conversation: Brazil Today. 3-5 Units.**

3rd year course. Reading and discussions on issues from current newspapers and magazines, reading comprehension strategies with online news updates, and vocabulary building with emphasis on formal expository writing. Writing practice if desired. Students prepare short presentations and lead subsequent discussions. May be repeated once for credit. Prerequisite: PORTLANG 12A or consent of instructor.

**PORTLANG 161. Advanced Reading in Portuguese, Fourth-year Portuguese. 3-5 Units.**

The course emphasizes high-level reading comprehension and leads to advanced development of communication skills for extended formal and informal discourse in Portuguese. Prerequisite: Placement Test, PORTLANG 101, or consent of instructor.

**PORTLANG 162. Advanced Writing in Portuguese, Fourth-year Portuguese. 3-5 Units.**

The course has two tracks, depending on the interest of the student: a) technical writing (business letters, technical reports, expressing/supporting opinions, etc.) and b) creative writing ('crônicas' short stories, poems, etc.). Prerequisite: Placement Test, PORTLANG 102, or consent of instructor.

**PORTLANG 163. Contemporary Issues in the Lusophone World. Fourth-Year Portuguese. 3-5 Units.**

The class emphasizes formal presentations/discussions in Portuguese, based on contemporary issues in the lusophone world. Students use as linguistic models newspaper and magazine articles, TV news broadcasts, online news services, films, art exhibits, news on scientific advances, etc. Focus is on mastering high-level vocabulary/structures, as well as reading and rhetorical strategies, for appropriate use in professional settings. Prerequisite: Placement Test, PORTLANG 103 or consent of instructor.

**PORTLANG 164. Translating the Lusophone world, Fourth-Year Portuguese. 3-5 Units.**

For advanced students. Literary and technical translation. Readings on theoretical topics on translation; discussion, analysis and comparison of existing translations (literary and technical); individual translation projects according to students field of study, and discussion and analysis of those projects in class. Final translation project to be undertaken individually. Prerequisite: PORTLANG 250, completion of Port completion of 3rd year sequence or consent of instructor.

**PORTLANG 193Q. Spaces and Voices of Brazil through Film. 3-4 Units.**

The manners in which a country is perceived and defines itself is a result of many complex forces, and involves the reproduction of social relations and complex social constructions both on the part of those who live there and those who see it from a distance. The perceptions of what Brazil is and what defines the country has changed throughout times, but has conserved some clear pervasive defining traits. This course is an introduction to the history, culture, politics and artistic production of Brazil as seen through feature films, documentaries and some complementary readings. Movies include, among others, Banana is my Business, Black Orpheus, Olga, They Don't Use Black-Tie, City of God, Central Station, Gaijin, and Four Days in September-among others. In English. Same as: ILAC 193Q.

**PORTLANG 250. Reading in Portuguese. 4 Units.**

Introductory class for students with superior reading proficiency in Spanish or another Romance language. Reading competence for research and courses in Luso-Brazilian studies. Literary, journalistic, and academic readings. Fulfills University reading requirement for advanced degrees. May be offered alternate years.

**PORTLANG 297. Directed Reading. 1-4 Units.**

Prerequisite: consent of instructor. (Staff).

**PORTLANG 394. Graduate Studies in Portuguese Conversation. 1-3 Units.**

Prerequisite: consent of instructor. (Staff).

**PORTLANG 395. Graduate Studies in Portuguese. 2-5 Units.**

Prerequisite: consent of instructor. (Staff).

## Psychiatry Courses

**PSYC 76Q. Temperament and Creativity in Mood Disorders. 2 Units.**

Preference to sophomores. Western cultural notions of mad geniuses and artistic temperaments. How many individuals who suffer from depression, bipolar disorder, and related problems are nonetheless productively creative. Current psychological and neurobiological research, and assessment of mood, temperament, and creativity. Emphasis is on written and oral communications and multimedia presentations.

**PSYC 78Q. Mental Health in Collegiate Athletes. 3 Units.**

Developmental, psychological, social, and performance issues in collegiate sports. Topics include transition to Stanford, time management, optimizing mental fitness, coping with injuries.

**PSYC 79Q. Family Dynamics in Literature. 3 Units.**

Preference to sophomores. Using a psychological approach, explores relationships between and among the characters of well-known literary works. Primary readings include: Freud's Dora: An Analysis of a Case of Hysteria; Shakespeare's Henry IV, Part 1, which anticipates what Freud later calls "the unconscious,;" Kafka's Metamorphosis, the "identified patient" in family of seemingly unconventional make-up; and Flaubert's Madame Bovary.

**PSYC 111Q. Madness and the Womb: Medical and Artistic Approaches to Mental Illness in Women Through the Ages. 3 Units.**

Historical and current concepts of mental illness in women. Premenstrual dysphoric disorder (PMS), postpartum depression, menopausal mood disorders, and eating disorders. Historical biopsychosocial approach. Readings include women's diaries and advice books, physicians' casebooks, and 19th- and 20th-century medical texts. Guest speakers from art and literature departments. Literary and artistic images, and the social and cultural contexts of these disorders during the last 300 years.

**PSYC 135. Sleep and Dreams. 3 Units.**

Current research on how sleep affects our daily lives. Physiology of non-REM and REM sleep, dreams and dreaming, content, psychophysiological cause, lucid dreaming, sleep need, sleep debt, daytime alertness, and performance; biological clock and circadian rhythms; sleep disorders, insomnia, narcolepsy, sleep apnea, sleepwalking, jet lag, sleeping pills, sleep and mental illness, sleep and memory, and the impact of sleep deprivation and sleep disorders on academic and social life. Multimedia presentations, guest lectures, and projects. Same as: PSYC 235.

**PSYC 136A. Valuescience: Shedding Illusion to Live Better. 3-4 Units.**

Apply scientific methods and principles to discern and realize value. Read history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to emergence of valuescience as foundation for an increasing range of human action. Explore perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; and personal and social benefits of doing so. 4 units includes weekly practice (e.g., meditation, aerobic exercise). Same as: PSYC 236A.

**PSYC 136B. Valuescience: Shedding Illusion to Live Better. 3-4 Units.**

Continuation of 136A/236A. Apply scientific methods and principles to discern and realize value. Read history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to emergence of valuescience as foundation for an increasing range of human action. Explore perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; and personal and social benefits of doing so. 4 units includes weekly practice (e.g., meditation, aerobic exercise). Same as: PSYC 236B.

**PSYC 139. Changing Relationships: A Couples and Family Therapy Perspective. 3 Units.**

Basic concepts underlying family-systems theory and practice, drawing on concepts from psychology, psychiatry, biology, anthropology, and sociology. Major theoretical premises of the family-systems approach to the assessment of intimate relationships, including family structure, development, history, intimacy and sexuality, culture, and larger systems. Tools required for assessing and changing relationships are examined and videotaped case examples are used to develop case formulations and illustrate systemic intervention strategies of major contributors to the field. Finally, applications of the family-systems approach in educational, medical, business, and community settings are considered. Same as: PSYC 239.

**PSYC 195. Special Laboratory Projects. 1-3 Units.**

Assist Behavioral Neuroendocrinology Program with data entry, library organization, and study-related projects.

**PSYC 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**PSYC 211. Child and Adolescent Psychopathology. 1 Unitss.**

Common syndromes in child psychiatry. Topics include diagnosis, epidemiology, etiology, course, outcome and therapeutic interventions. Prerequisite: familiarity with the basics of psychiatric and psychological discourse; psychiatry clerkship or course in psychology.

**PSYC 212. Pediatric Psychosomatic Medicine: Psychological Issues in the Physically Ill Child. 1 Unitss.**

Open to MD and graduate students; qualified undergraduates by consent of instructor. Diagnosis and management of emotional disorders and difficulties in physically ill children and adolescents. Topics include psychotherapeutic and psychopharmacologic approaches to psychiatric disorders encountered in the pediatric medical health care setting. Oral and multimedia presentations. Prerequisite: familiarity with basic principles of psychopathology.

**PSYC 225. Stanford Klingenstein Fellowship Program. 1 Unitss.**

A mentoring program designed to expose first and second year medical students to the rewarding field of child and adolescent psychiatry, and to increase awareness and education about child and adolescent mental health issues. Offers a year-long program wherein medical students are paired with child and adolescent psychiatrists, meeting bimonthly for clinical experiences and mentoring. Also provides opportunities for the students to get involved in cutting-edge scientific research, networking opportunities, and opportunities to attend professional conferences.

**PSYC 233. Mindfulness: An Awareness-Based Stress Reduction Program in Medicine. 3 Units.**

An experiential program in which the participants learn the techniques of mindfulness meditation. Modeled after the program started by Jon Kabat-Zinn and featured on Bill Moyers' *Healing and the Mind*, there are approximately 400 hospitals around the world that provide mindfulness-based programs. Courses are designed to work with the mind/body relationship to stress and chronic illness. Participants are involved in a class with patients and observe the impact of the program on a variety of medical conditions. Requires daily practice of mindfulness meditation, attendance at weekly class meetings and the all day retreat, home reading, and a final paper covering the student's observations.

**PSYC 235. Sleep and Dreams. 3 Units.**

Current research on how sleep affects our daily lives. Physiology of non-REM and REM sleep, dreams and dreaming, content, psychophysiological cause, lucid dreaming, sleep need, sleep debt, daytime alertness, and performance; biological clock and circadian rhythms; sleep disorders, insomnia, narcolepsy, sleep apnea, sleepwalking, jet lag, sleeping pills, sleep and mental illness, sleep and memory, and the impact of sleep deprivation and sleep disorders on academic and social life. Multimedia presentations, guest lectures, and projects. Same as: PSYC 135.

**PSYC 236A. Valuescience: Shedding Illusion to Live Better. 3-4 Units.**

Apply scientific methods and principles to discern and realize value. Read history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to emergence of valuescience as foundation for an increasing range of human action. Explore perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; and personal and social benefits of doing so. 4 units includes weekly practice (e.g., meditation, aerobic exercise). Same as: PSYC 136A.

**PSYC 236B. Valuescience: Shedding Illusion to Live Better. 3-4 Units.**

Continuation of 136A/236A. Apply scientific methods and principles to discern and realize value. Read history, philosophy, ecology, economics, sociology, linguistics and psychology pertinent to emergence of valuescience as foundation for an increasing range of human action. Explore perceptual, cognitive, and cultural impediments to valuescience; strategies for overcoming these; and personal and social benefits of doing so. 4 units includes weekly practice (e.g., meditation, aerobic exercise). Same as: PSYC 136B.

**PSYC 239. Changing Relationships: A Couples and Family Therapy Perspective. 3 Units.**

Basic concepts underlying family-systems theory and practice, drawing on concepts from psychology, psychiatry, biology, anthropology, and sociology. Major theoretical premises of the family-systems approach to the assessment of intimate relationships, including family structure, development, history, intimacy and sexuality, culture, and larger systems. Tools required for assessing and changing relationships are examined and videotaped case examples are used to develop case formulations and illustrate systemic intervention strategies of major contributors to the field. Finally, applications of the family-systems approach in educational, medical, business, and community settings are considered. Same as: PSYC 139.

**PSYC 247. Principles and Practices in Care of the Dying. 1 Unitss.**

Detailed, systematic survey of a generalized terminal illness and elaboration of the basic principles underlying approaches to the care of the dying. Particular attention is paid to problem areas involving medical ethics and multi-culture. Practical strategies for managing the special medical and emotional problems that arise in the care of the dying patient. There may be guest speakers and patient interviews. No final examination. (Minimum: 4 students).

**PSYC 250. Methodology of Research in Behavioral Sciences. 1-3 Units.**

Statistical and methodological issues in two major psychiatric research themes: clinical psychiatric research (Aut) neuroimaging research (Win). Autumn series includes: basics of inferential statistics, group comparison, analysis of variance, regression analysis, multivariate analysis, and longitudinal analysis in the context of psychiatric and behavioral research. Also included are conceptual topics such as risk factors, mediation, moderation, and causal inference. Winter series includes: functional and structural neuroimaging research methods (e.g. functional magnetic resonance imaging (fMRI), structural MRI (sMRI), diffusion tensor imaging (DTI), transcranial magnetic stimulation (TMS), near-infrared spectroscopy (NIRS), electroencephalogram (EEG)). Basic principles, statistical analysis methods, advantages and limitations, and applications are discussed. Prerequisite: Some exposure to statistical methods, either from course work or from participation in research having some behavioral aspects, or consent of instructor. 1 unit for class participation only, 2 units includes weekly assignments, 3 units includes a final project.

**PSYC 290. Teaching in Psychiatry. 1-10 Units.**

Practical experience in teaching by serving as a teaching assistant in a psychiatry course. Unit values are allotted individually to reflect the level of teaching responsibility assigned to the student.

**PSYC 299. Directed Reading in Psychiatry. 1-18 Units.**

Prerequisite: consent of instructor.

**PSYC 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**PSYC 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Psychology Courses

**PSYCH 1. Introduction to Psychology. 5 Units.**

Human behavior and mental processes including the nervous system, consciousness, learning, memory, development, emotion, psychopathology, interpersonal process, society, and culture. Current research.

**PSYCH 7Q. Language Understanding by Children and Adults. 3 Units.**

How do we first learn to find meaning in strings of speech sounds? Understanding spoken language requires the rapid integration of acoustic information with linguistic knowledge and with conceptual knowledge based on experience with how things happen in the world. Topics include research on early development of language understanding and laboratory methods of how young children make sense of speech. Observations of preschool children and visits to Stanford laboratories. Might be repeatable for credit.

**PSYCH 8N. The New Longevity. 3 Units.**

Adult development from the perspective of life-span theory -- a conceptual framework that views development as a series of adaptations to physical, societal and individual resources and constraints. Students will learn about demographic and medical changes, ways that individuals typically change socially, emotionally and cognitively as they move through adulthood. An understanding of the conceptual foundations of the life-span approach and place aging of young people today in historical context.

**PSYCH 10. Introduction to Statistical Methods: Precalculus. 5 Units.**

Techniques for organizing data, computing, and interpreting measures of central tendency, variability, and association. Estimation, confidence intervals, tests of hypotheses, t-tests, correlation, and regression. Possible topics: analysis of variance and chi-square tests, computer statistical packages.

Same as: STATS 60, STATS 160.

**PSYCH 11N. Origin of Mental Life. 3 Units.**

Preference to freshmen. Mental life in infancy; how thinking originates. How do babies construe the objects, events, people, and language that surround them? Recent advances in psychological theory, hypotheses, and evidence about how the infant human mind develops.

**PSYCH 12N. Self Theories. 3 Units.**

Preference to freshmen. The impact of people's belief in a growing versus fixed self on their motivation and performance in school, business, sports, and relationships. How such theories develop and can be changed.

**PSYCH 13N. Emotion Regulation. 3 Units.**

This seminar provides a selective overview of the scientific study of emotion regulation. Topics include: theoretical foundations, cognitive consequences, developmental approaches, personality processes and individual differences, and clinical and treatment implications. Our focus is on interesting, experimentally tractable ideas. Meetings will be discussion based.

**PSYCH 13S. Dynamical models of mental processes: Development, analysis, and simulation. 2 Units.**

Mathematical modeling has been a critical component in modern psychological and cognitive neuroscience research on the dynamics of mental processes. This course is designed to equip the new generation of such scientists with tailored mathematical knowledge to develop models of their own. I will use classical models and my own experience in modeling decision making as examples to demonstrate the process from vague ideas to the development, refinement, analysis and simulation of dynamical models. Along the way, systematic knowledge in differential equations, numerical methods, principle component analysis etc will be provided to facilitate the general ground for future models of students, choosing. Open to graduate students and advanced undergraduates.

**PSYCH 15N. Interpersonal Influence. 3 Units.**

This course will examine how individuals influence each other, both intentionally as well as nonconsciously. The focus will be on individuals in dyads rather than in groups. We will examine a) subtle interpersonal influence processes such as nonverbal communication, b) structural sources of interpersonal influence such as gender, race, social class, and culture, and c) interpersonal influence within different relationships such as organizational and romantic relationships. Familiarity with technology and video editing is useful. Students will have the opportunity to make brief podcasts and iMovie videos, as weekly responses to readings, as well as for the final class project.

**PSYCH 17N. Language and Society: How Languages Shape Lives. 3 Units.**

Do people who speak different languages think differently? What role does language play in politics, law, and religion? The role of language in individual cognition and in society. Breaking news about language and society; the scientific basis for thinking about these broad issues.

**PSYCH 25N. Psychology, Inequality, and the American Dream. 3 Units.**

Despite legal prohibitions against discrimination and the fact that many people endorse egalitarian values, inequality persists in America. What role do psychological factors play in perpetuating inequality? How can psychologically "wise" reforms promote equal opportunity? Topics include prejudice and discrimination, school achievement, social class, and race/ethnicity.

**PSYCH 26N. Language Acquisition: Exploring the Minds of Children. 3 Units.**

Language is an extraordinary competence distinguishing humans from other species, yet there is debate about the role of biology in guiding language acquisition. Does language development follow an innate (bioprogram); or does it build on more general cognitive abilities, influenced by early experience? Topics include biological and experiential influences on the emergence of linguistic ability as children learn a first language. Discussions of theory and research, visits to Stanford laboratories and observations of very young language learners.

**PSYCH 27N. The Psychology of Prejudice. 3 Units.**

Preference for freshmen. Social psychological theories and research on stereotypes, prejudice, discrimination, and racism. Psychological perspectives include those emphasizing personologic, cognitive, motivational, and sociocultural contributions to prejudice. Emphasis is on applying each approach to understanding real-world contexts such as educational and occupational contexts, and to the implications of this research for efforts to reduce prejudice and discrimination.

**PSYCH 30. Introduction to Perception. 3 Units.**

Behavioral and neural aspects of perception focusing on visual and auditory perception. Topics include: scientific methods for studying perception, anatomy and physiology of the visual and auditory systems, color vision, depth perception, motion perception, stereopsis, visual recognition, pitch and loudness perception, speech perception, and reorganization of the visual system in the blind.

**PSYCH 35. Introduction to Cognitive and Information Sciences. 4 Units.**

The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major.  
Same as: LINGUIST 144, PHIL 190, SYMSYS 100.

**PSYCH 45. Introduction to Learning and Memory. 3 Units.**

The literature on learning and memory including cognitive and neural organization of memory, mechanisms of remembering and forgetting, and why people sometimes falsely remember events that never happened. Cognitive theory and behavioral evidence integrated with data from patient studies and functional brain imaging. Recommended: 1.

**PSYCH 50. Introduction to Cognitive Neuroscience. 4 Units.**

Survey of topics relating brain activity to cognitive processes and behavior. The course begins with an overview of neurophysiology and techniques to measure brain activity. We then discuss perceptual and motor processes before investigating neural responses related to attention, memory, and cognitive control. The course concludes with a discussion of brain processes related to reward, decision making, and social cognition.

**PSYCH 55. Introduction to Cognition and the Brain. 4 Units.**

Major topics in cognitive psychology and neuroscience, including empirical approaches to perception, language, learning, memory, knowledge representation, problem solving, and reasoning.

**PSYCH 60. Introduction to Developmental Psychology. 3 Units.**

Psychological development from birth to adulthood, emphasizing infancy and the early and middle childhood years. The nature of change during childhood and theories of development. Recommended: 1.

**PSYCH 60A. Introduction to Developmental Psychology Section. 2 Units.**

Guided observation of children age 2-5 at Bing Nursery School.  
Corequisite: 60.

**PSYCH 70. Introduction to Social Psychology. 4 Units.**

Topics related to the influence of other people on individuals' thoughts, emotions, and behaviors. Factors that affect the way that we perceive ourselves and others; how people influence others; how persuasion happens; what causes us to like, love, help, or hurt others; and how social psychology helps to understand questions about law, business, and health. Fulfills WIM requirement.

**PSYCH 75. Introduction to Cultural Psychology. 5 Units.**

The cultural sources of diversity in thinking, emotion, motivation, self, personality, morality, development, and psychopathology.

**PSYCH 80. Introduction to Personality and Affective Science. 3 Units.**

How do we measure personality and emotion? What parts of your personality and emotions are set at birth? What parts of your personality and emotions are shaped by your sociocultural context? Can your personality and emotions make you sick? Can you change yours personality and emotions? There are questions we begin to address in this introductory course on personality and emotion. Prerequisite: 1.

**PSYCH 90. Introduction to Clinical Psychology. 3 Units.**

History of clinical psychology, models and assessment of personality, behavior, cognition, psychopathology, and approaches to the treatment of abnormal behavior. Emphasis is on current theory, research, issues in, and the role of clinical psychology in contemporary society. Recommended: 1.

**PSYCH 95. Introduction to Abnormal Psychology. 3 Units.**

Theories of and approaches to understanding the phenomenology, etiology, and treatment of psychological disorders among adults and children. Research findings and diagnostic issues. Recommended: PSYCH 1.

**PSYCH 101. Community Health Psychology. 4 Units.**

Social ecological perspective on health emphasizing how individual health behavior is shaped by social forces. Topics include: biobehavioral factors in health; health behavior change; community health promotion; and psychological aspects of illness, patient care, and chronic disease management. Prerequisites: HUMBIO 3B or PSYCH 1, or equivalent.  
Same as: HUMBIO 128.

**PSYCH 102. Longevity. 4 Units.**

Interdisciplinary. Challenges to and solutions for the young from increased human life expectancy: health care, financial markets, families, work, and politics. Guest lectures from engineers, economists, geneticists, and physiologists.  
Same as: HUMBIO 149L, NENS 202.

**PSYCH 104. Uniquely Human. 3 Units.**

Are humans the only species that displays altruism, experiences uncertainty, and is capable of language and deception? Sources include empirical and theoretical papers in comparative psychology. Prerequisite: 1.

**PSYCH 104S. Introduction to Cognitive Neuroscience. 3 Units.**

Introduction to the neurobiology of mental processes and behaviors including the history of cognitive neuroscience, biology of nervous system, the neural basis for perception, attention, learning, memory, emotion, decision making and social behaviors. Introduction to different research techniques that are prevalent in current neuroscience studies including fMRI, EEG, TMS and single unit recording.

**PSYCH 105. Social Neuroscience. 3 Units.**

Over the last 20 years, neuroscientists have become increasingly interested in studying topics that were previously the purview of social psychologists. In this seminar, we will survey neuroimaging research on topics such as self perception, person perception, empathy, and social influence. More broadly, we will consider the contributions that neuroscience can (and cannot) make to social psychological theory. Students will be responsible for leading discussions and producing one in-depth review or research paper at the end of the quarter.

**PSYCH 105S. General Psychology. 3 Units.**

In what ways does the scientific study of psychology increase our understanding of the thoughts, feelings, and behaviors we observe and experience in everyday life? What are the main areas of psychology and the different questions they seek to answer? This course will give you an introduction to the field of psychology and its many different areas. You will learn about the central methods, findings, and unanswered questions of these areas, as well as how to interpret and critically evaluate research findings.

**PSYCH 106. Seminar on Visual Development. 3 Units.**

Describe basic development of visual system, introduce research methods/experimental designs, and present pathologies of visual development.

**PSYCH 107S. Introduction to Social Psychology. 3 Units.**

A comprehensive overview of social psychology with in-depth lectures exploring the history of the field, reviewing major findings and highlighting areas of current research. Focus is on classic studies that have profoundly changed our understanding of human nature and social interaction, and, in turn, have triggered significant paradigm shifts within the field. Topics include: individuals and groups, conformity and obedience, attraction, intergroup relations, and judgment and decision-making.

**PSYCH 108S. Social Psychology. 3 Units.**

This course attempts to blend a comprehensive overview of social psychology with in-depth lectures exploring the history of the field, reviewing major findings and highlighting areas of current research. The course will focus on classic studies that have profoundly changed our understanding of human nature and social interaction, and, in turn, have triggered significant paradigm shifts within the field. Some of the topics covered in the class will include: individuals and groups, conformity and obedience, attraction, intergroup relations, and judgment and decision-making.

**PSYCH 109S. Cognitive Psychology. 3 Units.**

How are you understanding this question as you read it? How are you perceiving these words? How do you remember what you just read? Together, we will discuss how these questions are addressed in the areas of memory, language, perception, reasoning, judgment and decision-making. This course will be divided into 3 sections, each devoted to one basic question of cognitive psychology: how do we perceive? How do we remember? How do we think? The goals of this course are to examine these questions and to introduce the theories and empirical findings in the field of cognitive psychology.

**PSYCH 110. Research Methods and Experimental Design. 5 Units.**

Structured research exercises and design of an individual research project. Prerequisite: consent of instructor.

**PSYCH 111S. Abnormal Psychology. 3 Units.**

This course will provide an introduction to abnormal psychology and psychological treatments for mental illness. We will begin by exploring the basic question, ¿What does it mean to be abnormal exactly?¿ We will then go on to discuss various mental disorders, including depression, anxiety, obsessive compulsive personality disorder, and schizophrenia. While covering each disorder, we will pay particular attention to discussing how emotion ¿ and emotion regulation ¿ processes break down. In the second part of the course, we will discuss various psychological treatments for mental disorders, including cognitive behavioral therapy, interpersonal therapy, and more recent approaches such as cognitive bias modification and mindfulness meditation.

**PSYCH 113S. Developmental Psychology. 3 Units.**

This class will introduce students to the basic principles of developmental psychology. As well as providing a more classic general overview, we will also look towards current methods and findings. Students will gain an appreciation of how developmental psychology as a science can be applied to their general understanding of children and the complicated process of growing into adults.

**PSYCH 115S. Personality Psychology. 3 Units.**

This course will focus on current empirical and theoretical approaches to personality. Lectures will be organized around the following questions central to personality research: How and why do people differ? How do we measure individual differences? Does personality change over time? How does personality interact with sociocultural factors to influence behavior? What makes people happy? What are the physical, mental, and social consequences of personalities?.

**PSYCH 118F. Literature and the Brain. 5 Units.**

Recent developments in and neuroscience and experimental psychology have transformed the way we think about the operations of the brain. What can we learn from this about the nature and function of literary texts? Can innovative ways of speaking affect ways of thinking? Do creative metaphors draw on embodied cognition? Can fictions strengthen our "theory of mind" capabilities? What role does mental imagery play in the appreciation of descriptions? Does (weak) modularity help explain the mechanism and purpose of self-reflexivity? Can the distinctions among types of memory shed light on what narrative works have to offer? Same as: ENGLISH 118, ENGLISH 218, FRENCH 118, FRENCH 318.

**PSYCH 119. Psychology and Public Policy. 5 Units.**

Applications of psychology to public and social policy. Factors that affect the influence of psychological research and individual psychology on the creation of policy, and the influence of policy on attitudes and behavior at the personal and societal levels. Topics include education, health care, and criminal justice.

Same as: PUBLPOL 172.

**PSYCH 119S. The Psychology of Stigma. 3 Units.**

What obese people, African Americans, people with physical disabilities, lesbians, and Muslims have in common: social stigma. The social and psychological experiences of individuals living with social stigmas. Classic and current theory and research. Topics include: function, nature, and types of stigma; how stigmatized individuals view their identities and cope; mental and cognitive consequences; and interactions between stigmatized and non-stigmatized. Literature employing research methods including neuroimaging and social interaction studies.

**PSYCH 120. Cellular Neuroscience: Cell Signaling and Behavior. 4 Units.**

Neural interactions underlying behavior. Prerequisites: PSYCH 1 or basic biology.

Same as: BIO 153.

**PSYCH 121. Ion Transport and Intracellular Messengers. 1-3 Units.**

(Graduate students register for 228.) Ion channels, carriers, ion pumps, and their regulation by intracellular messengers in a variety of cell types. Recommended: 120, introductory course in biology or human biology. Same as: PSYCH 228.

**PSYCH 124S. Applying Psychology to Modern Life. 3 Units.**

A scientific examination of everyday modern life. Topics include: how research on attention and memory can be applied to improve study strategies; how advertisers persuade and how their techniques can be resisted; how interpersonal conflicts can be avoided through knowledge of common errors in judging other people; and how studies on attraction and love can improve close relationships.



**PSYCH 125. Beyond Stereotype Threat: Claiming a Rightful Place in an Academic Community. 3 Units.**

Stereotype threat as mitigating the quality of a student's test performance; its impact on academic success at Stanford. How to reduce the impact of stereotype threat on Stanford students.

Same as: CTL 130.

**PSYCH 131. Language and Thought. 4 Units.**

The psychology of language including: production and understanding in utterances; from speech sounds to speaker's meaning; children's acquisition of the first language; and the psychological basis for language systems.

Language functions in natural contexts and their relation to the processes by which language is produced, understood, and acquired. Prerequisite: 1 or LINGUIST 1.

Same as: PSYCH 262.

**PSYCH 134. Seminar on Language and Deception. 3 Units.**

Deceptive, exploitative, and other noncooperative uses of language. How is language used to deceive or exploit? Where are these techniques practiced and why? What are the personal, ethical, and social consequences of these practices? Prerequisite: 131, LINGUIST 1, or PHIL 181.

**PSYCH 138. Wise Interventions. 4 Units.**

Classic and contemporary psychological interventions; the role of psychological factors in social reforms for social problems involving healthcare, the workplace, education, intergroup, relations, and the law. Topics include theories of intervention, the role of laboratory research, evaluation, and social policy.

Same as: PSYCH 238.

**PSYCH 140S. Sport Psychology. 3 Units.**

Focus is on research methods and findings and how to apply these findings to students' own performance. Topics include methods of performance enhancement, psychological characteristics of top performers, group dynamics and processes, effective leadership practices, the effects of stereotyping on sport participation and performance, and debates in the field. Emphasis will be on sports, although most topics can be applied to performance in general.

**PSYCH 141. Cognitive Development. 3 Units.**

How children's thinking and mental abilities change from infancy on. The major theories and explanations of intellectual growth. Sources include classic findings and state-of-the-art research on cognitive development. Prerequisite: 1.

**PSYCH 141S. Health Psychology. 3 Units.**

Why is it so difficult for people to stick to an exercise plan? Why don't people take their doctor's advice? Why aren't public health announcements more effective? This course addresses these questions by providing an overview of health psychology: the scientific study of behaviors and cognitive processes related to health states. In this course, we will discuss the mind/body connection, the influence of social/cultural and physical environments on our health, cognitive processing of health information, health belief models, and the link between emotion and health. Understanding the interactions between these biological, psychological, and social influences on individuals' health states is crucial for developing effective health communication and intervention programs. We will approach all course topics from both theory-driven and applied perspectives.

**PSYCH 142S. The Psychology of Social Media. 3 Units.**

People interact with the world around them largely through mediated means: internet, television, radio, etc. This course will survey current social media: e.g. Facebook, Twitter, YouTube, etc. and popular culture in order to highlight the psychological processes at play. Topics will include: social belonging, interpersonal attraction, identity, bias, and cyberbullying. Students will be expected to learn how to study social media and popular culture using psychological methods.

**PSYCH 143. Developmental Anomalies. 3 Units.**

For advanced students. Developmental disorders and impairments. What the sparing of mental abilities in otherwise devastating disorders (or vice versa) tells about the mind and its development in the normal case. Examples of disorders and impairments: autism, congenital blindness, deafness, mental retardation, attachment disorder, and Williams syndrome. Limited enrollment. Prerequisite: consent of instructor.

**PSYCH 145. Seminar on Infant Development. 1-2 Units.**

For students preparing honors research. Conceptual and methodological issues related to research on developmental psycholinguistics; training in experimental design; and collection, analysis, and interpretation of data.

**PSYCH 146. Observation of Children. 3-5 Units.**

Learning about children through guided observations at Bing Nursery School, Psychology's lab for research and training in child development. Physical, emotional, social, cognitive, and language development.

Recommended: 60.

**PSYCH 147. Development in Early Childhood. 3-5 Units.**

Supervised experience with young children at Bing Nursery School. 3 units require 4 hours per week in Bing classrooms throughout the quarter; 4 units require 7 hours per week; 5 units require 10.5 hours per week. Seminar on developmental issues in the Bing teaching/learning environment.

Recommended: 60 or 146, or consent of instructor.

**PSYCH 148. Introduction to Counseling. 3 Units.**

The goal of counseling is to help others to create more satisfying lives for themselves. Clients learn to create and capitalize on unexpected events to open up new opportunities. The success of counseling is judged, not by the words and actions of the counselor, but by the progress that the client makes in the real world after counseling itself is ended. Students are encouraged to exert their full efforts within reasonable time limits to improve their competence.

Same as: EDUC 130.

**PSYCH 149. The Infant Mind: Cognitive Development over the First Year. 3 Units.**

How do babies learn so much in so little time? Emphasis is on cognitive and perceptual development, and the relationship between brain and behavior in infancy. Prerequisite: 1. Recommended: 60 or 141.

**PSYCH 150. Race and Crime. 3 Units.**

The goal of this course is to examine social psychological perspectives on race, crime, and punishment in the United States. Readings will be drawn not only from psychology, but also from sociology, criminology, economics, and legal studies. We will consider the manner in which social psychological variables may operate at various points in the criminal justice system- from policing, to sentencing, to imprisonment, to re-entry. Conducted as a seminar.

**PSYCH 151. Emotion Regulation and Psychopathology. 3 Units.**

A broad overview of specific emotion regulation impairments in various psychopathologies and discussion of how current treatment protocols are likely to aid recovery by forming more adaptive emotion regulation ability. Topics include: Foundations and Emotion regulation models, Emotion regulation impairments in Mood disorders (Unipolar Depression and Bipolar Disorder), Anxiety disorders (Social Phobia, Post Traumatic Stress Disorder, General Anxiety Disorder), Eating disorders (Anorexia and Bulimia Nervosa), and Personality Disorders (Narcissistic Personality Disorder, Borderline Personality Disorder).

**PSYCH 152. Mediation for Dispute Resolution. 3 Units.**

Mediation as more effective and less expensive than other forms of settling disputes such as violence, lawsuits, or arbitration. How mediation can be structured to maximize the chances for success. Simulated mediation sessions.

Same as: EDUC 131.

**PSYCH 154. Judgment and Decision-Making. 3 Units.**

Survey of research on how we make assessments and decisions particularly in situations involving uncertainty. Emphasis will be on instances where behavior deviates from optimality. Overview of recent works examining the neural basis of judgment and decision-making.

**PSYCH 155. Introduction to Comparative Studies in Race and Ethnicity. 5 Units.**

How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows. Same as: ANTHRO 33, CSRE 196C, ENGLISH 172D, SOC 146.

**PSYCH 157. Social Foundations of Expertise and Intelligence. 3 Units.**

Psychological conceptions of expertise, ability, and intelligence and the research methods used to study these attributes. Topics include: research on how expertise in a diverse set of disciplines is developed; the role of practice in nurturing expertise; whether intelligence predicts life outcomes; the genetic and environmental determinants of intelligence; whether genes or environment explain racial differences such as the Black-White performance gap and the East Asian achievement advantage; and the Flynn effect.

**PSYCH 158. Emotions: History, Theories, and Research. 1-3 Units.**

Graduate students register for 259. Theoretical and empirical issues in the domain of emotions. The history of emotion theories, current approaches, and the interaction between emotion and cognition. Same as: PSYCH 259.

**PSYCH 159. Psychology of Attitude Change and Social Influence. 3 Units.**

Review of classic and current research on attitudes, attitude change and persuasion. Increase appreciation for the ways that our thoughts, actions, and feelings are shaped and manipulated by social influences.

**PSYCH 161. Emotion. 3 Units.**

(Graduate students register for 261.) The scientific study of emotion. Topics: models of emotion, emotion antecedents, emotional responses (facial, subjective, and physiological), functions of emotion, emotion regulation, individual differences, and health implications. Focus is on experimentally tractable ideas. Same as: PSYCH 261.

**PSYCH 167. Seminar on Aggression. 3 Units.**

The causes and modification of individual and collective aggression. Major issues in aggression: social labeling of injurious conduct, social determinants of aggression, effects of the mass media, institutionally sanctioned violence, terrorism, psychological mechanisms of moral disengagement, modification of aggressive styles of behavior, and legal sanctions and deterrence doctrines.

**PSYCH 170. The Psychology of Communication About Politics in America. 4 Units.**

Focus is on how politicians and government learn what Americans want and how the public's preferences shape government action; how surveys measure beliefs, preferences, and experiences; how poll results are criticized and interpreted; how conflict between polls is viewed by the public; how accurate surveys are and when they are accurate; how to conduct survey research to produce accurate measurements; designing questionnaires that people can understand and use comfortably; how question wording can manipulate poll results; corruption in survey research. Same as: COMM 164, COMM 264, POLISCI 224L.

**PSYCH 171. Research Seminar on Aging. 4 Units.**

Two quarter practicum exposes students to multiple phases of research by participating in a laboratory focusing on social behavior in adulthood and old age. Review of current research; participation in ongoing data collection, analysis, and interpretation. Prerequisites: 1, research experience, and consent of instructor. May be repeated for credit.

**PSYCH 179. The Psychology of Everyday Morality. 4 Units.**

(Graduate students register for 270.) For graduate students, coterms, and senior Psychology majors. Traditional approaches focusing on how morality colors mundane human activities such as eating and on morality as defined by actors themselves rather than social scientists. Moral hypocrisy, food and disgust, taboo trade-offs, moral reproach, and prejudice with compunction. Limited enrollment. Prerequisite: 70 and consent of instructor. Same as: PSYCH 270.

**PSYCH 183. Mind, Culture, and Society Research Core. 2-3 Units.**

Required of students in the mind, culture, and society specialization track. Research training on a variety of projects that explore how social identities such as race, class, gender, and culture affect psychological experiences across domains including education, law, business and health. Must participate for two consecutive quarters. Permission of instructor required. May be repeated for credit.

**PSYCH 186. The Psychology of Everyday Morality. 3 Units.**

Recent literature on morality from a social psychological perspective. Topics include moral judgment, moral intuitions, moral hypocrisy, moral identity, moralization, moral reproach, shame and guilt, temptations, and self-regulation. Contemporary psychological research emphasizing descriptive approaches (what people actually do) rather than normative ones (what one should do). Same as: PSYCH 286.

**PSYCH 189. Stanford Center on Longevity Practicum. 3 Units.**

Student involvement in an interdisciplinary center aimed at changing the culture of human aging using science and technology. May be repeated for credit.

**PSYCH 190. Special Research Projects. 1-6 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**PSYCH 192. Career and Personal Counseling. 3 Units.**

Theories and methods for helping people create more satisfying lives for themselves. Simulated counseling experiences. Same as: EDUC 134, EDUC 234.

**PSYCH 193. Special Laboratory Research. 1-6 Units.**

May be repeated for credit. Prerequisites: 1, 10, and consent of instructor.

**PSYCH 193A. Special Laboratory Research. 1-6 Units.**

May be repeated for credit. Prerequisites: 1, 10, and consent of instructor.

**PSYCH 194. Reading and Special Work. 1-3 Units.**

Independent study. May be repeated for credit. Prerequisite: consent of instructor.

**PSYCH 195. Special Laboratory Projects. 1-6 Units.**

Independent study. May be repeated for credit. Prerequisites: 1, 10, and consent of instructor.

**PSYCH 196. Contemporary Psychology: Overview of Theory, Research, Applications. 3 Units.**

Capstone experience for juniors and seniors that bridges course work with research opportunities. Lectures representing the department's areas: social, personality, developmental, neuroscience, and cognitive psychology. Faculty present current research. Discussions led by advanced graduate students in the field represented by that week's guest. Students write research proposals. Small grants available to students to conduct a pilot study of their proposed research. Limited enrollment. Prerequisite: consent of instructor.

**PSYCH 197. Advanced Research. 1-4 Units.**

Limited to students in senior honors program. Weekly research seminar, independent research project under the supervision of an appropriate faculty member. A detailed proposal is submitted at the end of Autumn Quarter. Research continues during Winter and Spring quarters as 198. A report demonstrating sufficient progress is required at the end of Winter Quarter.

**PSYCH 198. Senior Honors Research. 1-4 Units.**

Limited to students in the senior honors program. Finishing the research and data analysis, written thesis, and presentation at the Senior Honors Convention. May be repeated for credit.

**PSYCH 199. Temptations and Self Control. 2 Units.**

(Graduate students register for 299.) Why do people do things that that they come to regret? How can people minimize behavior such as exercise avoidance, angry words, overeating, unsafe sex, and dangerous driving? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Real-world applications. Same as: PSYCH 299.

**PSYCH 201. Social Psychology Lecture Series. 3 Units.**

Required of social psychology graduate students. Guest lecturers from Stanford and other institutions. May be repeated for credit. (Miller).

**PSYCH 202. Cognitive Neuroscience. 3 Units.**

Graduate core course. The anatomy and physiology of the brain. Methods: electrical stimulation of the brain, neuroimaging, neuropsychology, psychophysics, single-cell neurophysiology, theory and computation. Neuronal pathways and mechanisms of attention, consciousness, emotion, language, memory, motor control, and vision. Prerequisite: 207 or consent of instructor.

**PSYCH 203. MODELS OF LANGUAGE ACQUISITION. 3 Units.**

How do children learn to understand and produce their native language? Language acquisition is a core topic in cognitive science and has been a key test case for formal approaches. Topics include: learnability theory, grammatical approaches, connectionist models, and probabilistic models.

**PSYCH 204. Computation and cognition: the probabilistic approach. 3-4 Units.**

This course will introduce the probabilistic approach to cognitive science, in which learning and reasoning are understood as inference in complex probabilistic models. Examples will be drawn from areas including concept learning, causal reasoning, social cognition, and language understanding. Formal modeling ideas and techniques will be discussed in concert with relevant empirical phenomena.

**PSYCH 204A. Human Neuroimaging Methods. 3 Units.**

This course introduces the student to human neuroimaging using magnetic resonance scanners. The course is a mixture of lectures and hands-on software tutorials. The course begins by introducing basic MR principles. Then various MR measurement modalities are described, including several types of structural and functional imaging methods. Finally algorithms for analyzing and visualizing the various types of neuroimaging data are explained, including anatomical images, functional data, diffusion imaging (e.g., DTI) and magnetization transfer. Emphasis is on explaining software methods used for interpreting these types of data.

**PSYCH 204B. Computational Neuroimaging: Analysis Methods. 1-3 Units.**

Neuroimaging methods with focus on data analysis techniques. Basic MR physics and BOLD signals. Methods for neuroimaging data using real and simulated data sets. Topics include: linearity of the fmri signal; time versus space resolution tradeoffs; noise in neuroimaging; correlation analysis; visualization methods; cortical reconstruction, inflation, and flattening; reverse engineering; can cognitive states be predicted from brain activation? Prerequisite: consent of instructor.

**PSYCH 205. Foundations of Cognition. 1-3 Units.**

Topics: attention, memory, language, similarity and analogy, categories and concepts, learning, reasoning, and decision making. Emphasis is on processes that underlie the capacity to think and how these are implemented in the brain and modeled computationally. The nature of mental representations, language and thought, modular versus general purpose design, learning versus nativism. Prerequisite: 207 or consent of instructor.

**PSYCH 206. Cortical Plasticity: Perception and Memory. 1-3 Units.**

Seminar. Topics related to cortical plasticity in perceptual and memory systems including neural bases of implicit memory, recognition memory, visual priming, and perceptual learning. Emphasis is on recent research with an interdisciplinary scope, including theory, behavioral findings, neural mechanisms, and computational models. May be repeated for credit. Recommended: 30, 45.

**PSYCH 207. Professional Seminar for First-Year Ph.D. Graduate Students. 2-3 Units.**

Required of and limited to first-year Ph.D. students in Psychology. Major issues in contemporary psychology with historical backgrounds.

**PSYCH 207B. Professional Development Seminar in Psychology. 0-1 Units.**

For graduate students who wish to gain professional development skills to pursue an academic career. May be repeated for credit. Course is intended for second year Ph.D. student in Psychology but open to all years.

**PSYCH 208. Advanced Topics in Self-Defense. 1-3 Units.**

Seminar. Threat to the self and how people deal with them. Readings from social psychological areas including social comparison, self-affirmation, self-completion, self-discrepancy, shame and guilt, terror management, dimensions of self-worth, self-regulation, self-presentation, psychophysiology, and moral identity. Enrollment limited to 15.

**PSYCH 209. Models of Cognitive Processes. 4 Units.**

For advanced undergraduates and graduate students. Models of cognitive and developmental processes, including perception, attention, memory, decision making, acting and thinking; and on modeling cognitive development, domain learning, and skill acquisition as processes that take place over time. Models considered will include parallel distributed processing models and other types of artificial neural network models as well as process models spanning a spectrum from abstract to neurally realistic. Students learn about classic models and carry out exercises in the first six weeks and will undertake projects and learn about recent developments during the last four weeks of the quarter. Recommended: computer programming ability, familiarity with differential equations, linear algebra, and probability theory, and courses in cognitive psychology and/or cognitive/systems neuroscience.

**PSYCH 211. Developmental Psychology. 1-3 Units.**

Prerequisite: 207 or consent of instructor.

**PSYCH 212. Social Psychology. 1-3 Units.**

Classic studies in experimental social psychology. Group and group dynamics; compliance and social pressure; conformity, cooperation, conflict, and social dilemmas; attraction and preference; attitudes and attitude change; social comparison, emotion, and affiliation; dissonance, consistency, and self-justification; attribution and self-perception; judgment and decision making, motivation, automaticity, and culture.

**PSYCH 213. Affective Science. 3 Units.**

This seminar is the core graduate course on affective science. We consider definitional issues, such as differences between emotion and mood, as well as issues related to the function of affect, such as the role affect plays in daily life. We review autonomic, neural, genetic, and expressive aspects of affective responding. Later in the course we discuss the role of affect in cognitive processing, specifically how affective states direct attention and influence memory, as well as the role of affect in decision making. We will also discuss emotion regulation and the strategic control of emotion; the cultural shaping of emotional experience and regulation; disorders of emotion; and developmental trajectories of experience and control from early to very late life. Meetings are discussion based. Attendance and active participation are required. Prerequisite: 207 or consent of instructor.

**PSYCH 215. Mind, Culture, and Society. 3 Units.**

Social psychology from the context of society and culture. The interdependence of psychological and sociocultural processes: how sociocultural factors shape psychological processes, and how psychological systems shape sociocultural systems. Theoretical developments to understand social issues, problems, and polity. Works of Baldwin, Mead, Asch, Lewin, Burner, and contemporary theory and empirical work on the interdependence of psychology and social context as constituted by gender, ethnicity, race, religion, and region of the country and the world. Prerequisite: 207 or consent of instructor.

**PSYCH 216. Public Policy and Social Psychology: Implications and Applications. 4 Units.**

Theories, insights, and concerns of social psychology relevant to how people perceive issues, events, and each other, and links between beliefs and individual and collective behavior. Topics include: situationist and subjectivist traditions of applied and theoretical social psychology; social comparison, dissonance, and attribution theories; social identity, stereotyping, racism, and sources of intergroup conflict and misunderstanding; challenges to universality assumptions regarding human motivation, emotion, and perception of self and others; the problem of producing individual and collective changes in norms and behavior. Same as: IPS 207B, PUBLPOL 305B.

**PSYCH 216A. Statistics and data analysis in MATLAB. 1-3 Units.**

This course will cover basic statistical principles that are widely useful for the analysis of neuroscience and behavioral data, such as error bars and confidence intervals, multivariate probability distributions, regression and classification, linear and nonlinear models, cross-validation, bootstrapping, and model selection. In each class, we will cover the theory behind a statistical principle and learn how to implement the principle efficiently in MATLAB. Example material can be found at <http://randomanalyses.blogspot.com>. Prerequisites: Familiarity with basic statistics and programming in MATLAB.

**PSYCH 217. Topics and Methods Related to Culture and Emotion. 1-3 Units.**

Preference to graduate students. How cultural factors shape emotion and other feeling states. Empirical and ethnographic literature, theories, and research on culture and emotion. Applications to clinical, educational, and occupational settings. Research in psychology, anthropology, and sociology. May be repeated for credit.

**PSYCH 218. Early Social Cognitive Development. 1-3 Units.**

Current literature on social and cognitive development in infancy emphasizing the interface between the two domains. May be repeated for credit. Prerequisite: consent of instructor.

**PSYCH 220. Special Topics in Cognitive Development. 1-3 Units.**

For graduate students and advanced undergraduates. How research from cognitive development, decision making, and preference change can inform interventions on important social issues. May be repeated for credit.

**PSYCH 220S. Temptations and Self Control. 3 Units.**

Why do people do things they come to regret, such as lack of exercise, angry words, overeating, unsafe sex, or dangerous driving? How can they minimize such behaviors? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Emphasis is on real-world applications. Same as: PSYCH 120S.

**PSYCH 221. Applied Vision and Image Systems. 1-3 Units.**

This course is an introduction to imaging technologies including hardware and the image processing pipeline. There is an emphasis on how these technologies accommodate the requirements of the human visual system. The course is intended for students interested in various aspects of imaging technologies, including - Digital cameras and displays - Image processing and compression - Image quality analysis - Human color, pattern and motion vision The course consists of lectures, tutorials and a project. Lectures cover the tools used in digital imaging and image quality measurement. Tutorials and projects include extensive software simulations of the digital imaging pipeline. Some background in mathematics (linear algebra) and programming (Matlab) is valuable.

**PSYCH 223. Social Norms. 4 Units.**

This course covers research and theory on the origins and function of social norms. Topics include the estimation of public opinion, the function of norms as ideals and standards of judgment, and the impact of norms on collective and individual behavior. In addition to acquainting students with the various forms and functions of social norms the course will provide students with experience in identifying and formulating tractable research questions. Same as: OB 630.

**PSYCH 224. Research Topics in Emotion Regulation. 1 Unit.**

Current research findings and methods, ongoing student research, and presentations by visiting students and faculty. May be repeated for credit. Prerequisite: consent of instructor.

**PSYCH 225. Special Neuroscience Seminar with Dr. Shinobu Kitayama. 1-2 Units.**

How will culture influence the human mind? Is culture a superficial overlay on the basic, universal computational machine called the mind? Alternatively, is culture a crucial constitutive element of the mind? If so, what are specific mechanisms underlying this constitution process? And what theoretical framework do we need to make a visible progress on these questions? More generally, how can we start discussing meaningfully and productively about various problematic dichotomies such as mind versus body, culture versus biology, and nurture versus nature? An emerging field of cultural neuroscience has the potential of addressing these and other important questions and thus bridging natural, behavioral, and social sciences of the human mind. This seminar reviews the field of cultural neuroscience. It starts with a discussion of some theoretical foundations of the field, including cultural psychology, cognitive and social neuroscience, evolutionary psychology, and population genetics (PART 1). We will then discuss several specific content domains with a focus on cross-cultural variations in brain responses (PART 2). The seminar will conclude with a discussion on gene x environment interaction in varying cultural contexts (PART 3). Students can take the seminar for credit. One unit for attending all five sessions, two units for all five session and a short paper.

**PSYCH 226. Models and Mechanisms of Memory. 1-3 Units.**

Current topics in memory as explored through computational models addressing experimental findings and physiological and behavioral investigations. Topics include: explicit and implicit learning; role of MTL structures in learning and memory; and single versus dual processes approaches to recognition. May be repeated for credit.

**PSYCH 228. Ion Transport and Intracellular Messengers. 1-3 Units.**  
(Graduate students register for 228.) Ion channels, carriers, ion pumps, and their regulation by intracellular messengers in a variety of cell types. Recommended: 120, introductory course in biology or human biology. Same as: PSYCH 121.

**PSYCH 231. Questionnaire Design for Surveys and Laboratory Experiments: Social and Cognitive Perspectives. 4 Units.**  
The social and psychological processes involved in asking and answering questions via questionnaires for the social sciences; optimizing questionnaire design; open versus closed questions; rating versus ranking; rating scale length and point labeling; acquiescence response bias; don't-know response options; response choice order effects; question order effects; social desirability response bias; attitude and behavior recall; and introspective accounts of the causes of thoughts and actions. Same as: COMM 339, POLISCI 421K.

**PSYCH 232. Brain and Decision Making. 3 Units.**  
Neuroeconomics combines experimental techniques from neuroscience, psychology, and experimental economics, such as electrophysiology, fMRI, eye tracking, and behavioral studies, and models from computational neuroscience and economics. May be repeated for credit. Prerequisite: consent of instructor.

**PSYCH 233. MATLAB and PsycToolbox for the Behavioral Sciences. 1-3 Units.**  
Topics such as experiment design, stimulus presentation, counterbalancing, response collection, data analysis, and plotting. Programming experiments. Final project programming a complete behavioral experiment relevant to student's research.

**PSYCH 234. Topics in Depression. 1-3 Units.**  
Current research topics including epidemiology and phenomenology of affective disorders, psychological theories of depression, gender differences in affective disorders, cognitive and social functioning of depressed persons, psychobiology of affective disorders, depression in children, postpartum depression, suicide issues in the treatment of depression, and cultural aspects of affective disorders. Prerequisite: graduate standing in Psychology or consent of instructor. May be repeated for credit.

**PSYCH 236C. SEM IN SEMANTICS: Representations of meaning. 3 Units.**  
Representations of meaning from psychological, linguistic, and computational viewpoints. Topics include lambda calculus, probabilistic programming, and vector spaces. Special emphasis on the challenges of semantic composition. May be repeated for credit. Same as: LINGUIST 236.

**PSYCH 238. Wise Interventions. 4 Units.**  
Classic and contemporary psychological interventions; the role of psychological factors in social reforms for social problems involving healthcare, the workplace, education, intergroup, relations, and the law. Topics include theories of intervention, the role of laboratory research, evaluation, and social policy. Same as: PSYCH 138.

**PSYCH 239. Formal and Computational Approaches in Psychology and Cognitive Science. 3 Units.**

Do psychology and cognitive science need formal theories and/or explicit computational models? What insights should such things provide? What is the proper relationship between different theoretical and modeling approaches? Between different levels or kinds of analysis? Where do informally stated theories fit in and what are the roles of formal and computational modeling approaches in relation to other less explicitly specified forms of theorizing? This seminar will explore these issues and compare different formal and computational model variants, especially connectionist and probabilistic models, within 3-4 different target domains. Possible target domains include categorization, property induction, causal learning, perceptual decision making, language acquisition, semantics and pragmatics, and mid-level vision.

**PSYCH 243. General Development Seminar. 1-2 Units.**  
May be repeated for credit. Prerequisite: consent of instructors. Restricted to Developmental graduate students.

**PSYCH 244. Psychology of Aging. 1-3 Units.**  
Theory and research in gerontology. Normal and abnormal changes that occur in biological, cognitive, and psychological aging. Emphasis is on the environmental factors that influence the aging process. Prerequisite: graduate standing in Psychology or consent of instructor.

**PSYCH 245. Social Psychological Perspectives on Stereotyping and Prejudice. 3 Units.**  
Classic and contemporary social psychological approaches to prejudice and stereotyping. Emphasis is on how stereotypes are employed and maintained, and the influence of stereotyping and prejudice on behavior in domains including education, employment, politics, and law. Limited enrollment.

**PSYCH 246. Cognitive and Neuroscience Friday Seminar. 1 Unit.**  
Participant presentations. May be repeated for credit. Prerequisite: graduate standing in psychology or neuroscience program.

**PSYCH 247. Fundamentals of Neuroscience for Non-Life-Scientists. 2 Units.**  
Human behavior and the human brain and how it enables perception, learning, decision making, planning, and action with a focus on how neuroscience may be presented or used in law, business, or education contexts. Neurotechnology and experimental methods used to conduct research.

**PSYCH 249. Human Motivation. 1-3 Units.**  
Current research and theory including questions concerning the nature of human motives, intrinsic motivation, self-regulation, the roles of affect and cognition, and lifespan and cultural influences on motivation. Prerequisite: 207 or consent of instructors.

**PSYCH 250. High-Level Vision: Object Representation. 1-3 Units.**  
(Formerly CS423 High-Level Vision: Behaviors, Neurons, and Computational Models) Interdisciplinary seminar focusing on understanding how computations in the brain enable rapid and efficient object perception. Covers topics from multiple perspectives drawing on recent research in Psychology, Neuroscience, Computer Science and Applied Statistics. Emphasis on discussing recent empirical findings, methods and theoretical debates in the field. Topics include: theories of object perception, neural computations underlying invariant object perception, how visual exemplars and categories are represented in the brain, what information is present in distributed activations across neural populations and how it relates to object perception, what modern statistical and analytical tools there are for multi-variate analysis of brain activations. Same as: CS 431.

**PSYCH 251. Affective Neuroscience. 3 Units.**  
Theory and research. Comparative and human research approaches map affective function to neuroanatomical and neurochemical substrates. Prerequisite: consent of instructor.

**PSYCH 252. Statistical Methods for Behavioral and Social Sciences. 1-6 Units.**

For students who seek experience and advanced training in empirical research. Analysis of data from experimental through factorial designs, randomized blocks, repeated measures; regression methods through multiple regression, model building, analysis of covariance; categorical data analysis through two-way tables. Integrated with the use of statistical computing packages. Prerequisite: 10 or equivalent.

**PSYCH 253. Statistical Theory, Models, and Methodology. 3 Units.**

Practical and theoretical advanced data analytic techniques such as loglinear models, signal detection, meta-analysis, logistic regression, reliability theory, and factor analysis. Prerequisite: 252 or EDUC 257.

**PSYCH 254. Lab in Experimental Methods. 3 Units.**

Laboratory class in experimental methods for psychology, with a focus on technical/computer-based methods. Programming experience helpful although not required. Topics include data collection on the web, data management and data analysis.

**PSYCH 257. Individually Supervised Practicum. 3-5 Units.**

Satisfies INS requirements for curricular practical training. Relevant experience for graduate students as part of their program of study. May be repeated for credit. Prerequisites: graduate standing in Psychology, consent of adviser. (Staff).

**PSYCH 258. Graduate Seminar in Social Psychology Research. 1-3 Units.**

For students who are already or are planning to become involved in research on social construal and the role that it plays in a variety of phenomena, notably the origin and escalation of conflict.

**PSYCH 259. Emotions: History, Theories, and Research. 1-3 Units.**

Graduate students register for 259. Theoretical and empirical issues in the domain of emotions. The history of emotion theories, current approaches, and the interaction between emotion and cognition. Same as: PSYCH 158.

**PSYCH 261. Emotion. 3 Units.**

(Graduate students register for 261.) The scientific study of emotion. Topics: models of emotion, emotion antecedents, emotional responses (facial, subjective, and physiological), functions of emotion, emotion regulation, individual differences, and health implications. Focus is on experimentally tractable ideas. Same as: PSYCH 161.

**PSYCH 261A. Learning and Cognition in Activity. 3 Units.**

Methods and results of research on learning, understanding, reasoning, problem solving, and remembering, as aspects of participation in social organized activity. Principles of coordination that support cognitive achievements and learning in activity settings in work and school environments. Same as: EDUC 295.

**PSYCH 262. Language and Thought. 4 Units.**

The psychology of language including: production and understanding in utterances; from speech sounds to speaker's meaning; children's acquisition of the first language; and the psychological basis for language systems. Language functions in natural contexts and their relation to the processes by which language is produced, understood, and acquired. Prerequisite: 1 or LINGUIST 1. Same as: PSYCH 131.

**PSYCH 265. Social Psychology and Social Change. 2-3 Units.**

The course is intended an exploration of the major ideas, theories, and findings of social psychology and their applied status. Special attention will be given to historical issues, classic experiments, and seminal theories, and their implications for topics relevant to education. Contemporary research will also be discussed. Advanced undergraduates and graduate students from other disciplines are welcome. Same as: EDUC 371X.

**PSYCH 267. Human Memory: Facts, Fallacies, and Fragile Powers. 1-3 Units.**

Seminar. Applications of memory concepts in everyday life and in social and clinical settings. Topics include personal identity, childhood amnesia, autobiographic memory, emotions and memory, memory distortions, illusions, self-serving biases, recovery of repressed memories, false memories, implicit memories, and unconscious influences on social behavior, with applications to psychopathology.

**PSYCH 269. Graduate Seminar in Affective Science. 1 Unitss.**

May be repeated for credit. Prerequisite: graduate standing in Psychology. (Tsai).

**PSYCH 270. The Psychology of Everyday Morality. 4 Units.**

(Graduate students register for 270.) For graduate students, coterm, and senior Psychology majors. Traditional approaches focusing on how morality colors mundane human activities such as eating and on morality as defined by actors themselves rather than social scientists. Moral hypocrisy, food and disgust, taboo trade-offs, moral reproach, and prejudice with compunction. Limited enrollment. Prerequisite: 70 and consent of instructor. Same as: PSYCH 179.

**PSYCH 272. Special Topics in Psycholinguistics. 1-3 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**PSYCH 273. Graduate Seminar on Language, Cognition, and Perception. 3 Units.**

Current topics and debates. Readings from psychology, linguistics, neuroscience, ethology, anthropology, and philosophy. May be repeated for credit.

**PSYCH 274. Graduate Research Workshop on Psychological Interventions. 3 Units.**

Psychological research has the potential to create novel interventions that promote the public good. This workshop will expose students to psychologically 'wise' intervention research and to support their efforts to conduct such interventions, especially in the context of education, broadly conceived, as well as other areas. The first part of the class will address classic interventions and important topics in intervention research, including effective delivery mechanisms, sensitive behavioral outcomes, the role of theory and psychological process, and considerations of the role of time and of mechanisms that can sustain treatment effects over time. In the second part of the class, students will present and receive feedback on their own ongoing and/or future intervention research. Prerequisite: Graduate standing in Psychology or Education, or consent of instructor. Same as: EDUC 287X.

**PSYCH 275. Graduate Research. 1-15 Units.**

Intermediate-level research undertaken with members of departmental faculty. Prerequisite: consent of instructor. (Staff).

**PSYCH 279. Topics in Cognitive Control. 1-3 Units.**

The processes that enable flexible behavior by biasing contextually relevant perceptual, mnemonic, and response representations or processing pathways. Cognitive control is central to volitional action, allowing work with memory, task/goal states, and overriding inappropriate responses. Current models of cognitive control, functional neuroimaging, and neuropsychological evidence. Recommended: 45. May be repeated for credit.

**PSYCH 281. Practicum in Teaching. 1-5 Units.**

Enrollment limited to teaching assistants in selected Psychology courses. May be repeated for credit.

**PSYCH 282. Practicum in Teaching PSYCH 1. 1-2 Units.**

Logistical TA training including: preparing for sections; creating, correcting exams; grading an iterative writing assignment; office hours; review sessions; developing audiovisual expertise; communicating via coursework. Review of student evaluations with instructor to set goals and strategies. Second quarter focuses on pedagogical improvement. Limited to current PSYCH 1 TAs. May be repeated for credit.

**PSYCH 284. Computational Modeling of a Range of Neural Circuits. 1-3 Units.**

Lectures, student presentations, and extensive software exercises. Focus on quantifiable models of neural signaling, starting with physical specification of input signals, sensory transductions, spiking, and mean electrical field potentials, and the inter-relation to BOLD signals (fMRI). Applications will be drawn from many examples, but a there will be a particular focus on the visual pathways and how measurements and models relate to visual perception.

**PSYCH 286. The Psychology of Everyday Morality. 3 Units.**

Recent literature on morality from a social psychological perspective. Topics include moral judgment, moral intuitions, moral hypocrisy, moral identity, moralization, moral reproach, shame and guilt, temptations, and self-regulation. Contemporary psychological research emphasizing descriptive approaches (what people actually do) rather than normative ones (what one should do). Same as: PSYCH 186.

**PSYCH 288. Hierarchical Linear Modeling for Psychological Sciences. 1-3 Units.**

HLM is a statistical theory and a computer program used to analyze multi-level data, such as trials within participants or students within classrooms. HLM allows researchers to analyze data at each level of analysis separately, to partition the total variance across different levels, to explain variance at each level separately using level-appropriate predictors, and to model cross-level interactions. How to use the HLM program and to model various types of multi-level data using it. May be repeated for credit.

**PSYCH 289. Sensory Representations in Language and Memory. 1-3 Units.**

Is recollecting an experience similar to re-experiencing it? How closely tied is our knowledge to the perceptual representations and processes that may have given rise to it? What role do perceptuo-motor representations play in understanding language? We will review the recent literature on perceptual re-activation in episodic memory, perceptual grounding in semantic representations, and neural reuse of perceptual mechanisms for abstract thought. Emphasis will be placed on recent research with an interdisciplinary scope, including discussion of theory, behavioral findings, neural mechanisms, and computational models. Prerequisite: Psych 207 or consent of instructor.

**PSYCH 290. Graduate Research Methods. 2 Units.**

Primary tool use for psychologists: basics of experiment design; computer-based experiments; web-based experiments; data analysis packages and data presentation; exploratory statistics; eye-tracking methods; psychophysiology methods; survey construction; corpus and discourse analysis; and perhaps hypnosis. Prerequisite: Ph.D. student in Psychology.

**PSYCH 291. Psychology Teaching Methods. 1-2 Units.**

Open to graduate students and advanced undergraduates. Principles of good teaching. Students practice teaching skills.

**PSYCH 293. Communication, Intentionality, and the Origins of Language. 3 Units.**

How did language evolve to become a ubiquitous, definitional part of human life? What relationship does children's early language have to their understanding of intentionality and other methods of non-verbal communication? This seminar will survey theoretical and experimental work on the foundations of human language, communication, and intentionality, with the goal of understanding what we know and what questions are still open. Areas of focus include developmental work on communication; whether early language use is referential/intentional and whether early words are general or particular; and research on language evolution and animal communication.

**PSYCH 294. Human Prosociality. 3 Units.**

Human beings engage in a vast amount of prosocial behaviors (including altruism and cooperation) that critically support our success as a social species. That said, the psychological underpinnings of prosociality remain surprisingly enigmatic. This seminar will survey classic and modern theories of prosocial behavior from evolutionary biology, economics, psychology, and neuroscience, with an emphasis on common ideas about the cognitive and affective mechanisms supporting such behaviors. Students will be responsible for leading discussions and producing one in-depth review or research paper at the end of the quarter.

**PSYCH 297. Seminar for Coterminal Master of Arts. 1-2 Units.**

Contemporary issues and student research. Student and faculty presentations.

**PSYCH 299. Temptations and Self Control. 2 Units.**

(Graduate students register for 299.) Why do people do things that that they come to regret? How can people minimize behavior such as exercise avoidance, angry words, overeating, unsafe sex, and dangerous driving? Sources include classical and current research from experimental psychology, neuroscience, behavioral economics, and neuroeconomics. Real-world applications. Same as: PSYCH 199.

**PSYCH 303. Human and Machine Hearing. 3 Units.**

Topics: Linear and nonlinear system theory applied to sound and hearing; understanding how to model human hearing in the form of algorithms that can process general sounds efficiently; how to construct, display, and interpret "auditory images"; how to extract features compatible with machine-learning systems; how to build systems that extract information from sound to do a job; and example applications of machine hearing to speech, music, security and surveillance, personal sound diaries, smart house, etc. Prerequisites: basic calculus and algorithms.

**PSYCH 373. Research Seminar: Mind, Brain, and Computation. 1 Units.**

Faculty and student research presentations focusing on work linking cellular, systems, cognitive, behavioral, and computational neuroscience. Limited to affiliates of the Center for Mind, Brain and Computation. May be repeated for credit.

**PSYCH 380. Collaborating with the Future: Launching Large Scale Sustainable Transformations. 3-4 Units.**

This project-based d.school class combines Design Thinking Processes, Behavioral Sciences, and elements of Diffusion Theory. Tools and theories introduced in class will be used to structure large-scale transformations that simultaneously create value on environmental, societal, and economic fronts. We encourage students to use this class as a launching pad for real initiatives. Primarily meant for Graduate Students. (Especially qualified/motivated Seniors will be considered). Admission to the class is through an application process which ends on March 3. Please find instructions and applications at <https://dschool.stanford.edu/groups/largetransformations/>. Same as: ENVRES 380, ME 380.

**PSYCH 383. International Conflict: Management and Resolution. 3 Units.**

(Same as LAW 656) Interdisciplinary. Theoretical insights and practical experience in resolving inter-group and international conflicts. Sources include social psychology, political science, game theory, and international law. Personal, strategic, and structural barriers to solutions. How to develop a vision of a mutually bearable shared future, trust in the enemy, and acceptance of loss that a negotiated settlement may produce. Spoilers who seek to sabotage agreements. Advantages and disadvantages of unilateral versus reciprocal measures. Themes from the Stanford Center of International Conflict and Negotiation (SCICN). Prerequisite for undergraduates: consent of instructor.  
Same as: IPS 250.

**PSYCH 459. Frontiers in Interdisciplinary Biosciences. 1 Units.**

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See <http://biox.stanford.edu/courses/459.html>. Recommended: basic mathematics, biology, chemistry, and physics.  
Same as: BIO 459, BIOC 459, BIOE 459, CHEM 459, CHEMENG 459.

**PSYCH 801. Master's TGR Project. 0 Unit.****PSYCH 802. PhD TGR Dissertation. 0 Unit.**

## Public Policy Courses

**PUBLPOL 20SI. Business and Policy of Sustainability. 1-2 Units.**

How academia and business, specifically Stanford and Google, are redefining sustainability. Guest lectures include entrepreneurs, venture capitalists, and policy makers, investigating how the Silicon Valley is defining sustainability as more than just a buzzword. Focus on food, material waste, and marketing/finance, as examined through a multidimensional framework of practical economics, politics, business practices, and ethics.

**PUBLPOL 55N. Public Policy and Personal Finance. 3 Units.**

The seminar will provide an introduction and discussion of the impact of public policy on personal finance. Voters regularly rate the economy as one of the most important factors shaping their political views and most of those opinions are focused on their individual bottom lines. In this course we will discuss the rationale for different public policies and how they affect personal financial situations. We will explore personal finance issues such as taxes, loans, charity, insurance, and pensions. Using the context of (hypothetical) personal finance positions, we will discuss the public policy implications of various proposals and how they affect different groups of people, for example: the implications of differential tax rates for different types of income, the promotion of home ownership in the U.S., and policies to care for our aging population. While economic policy will be the focus of much of the course, we will also examine some of the implications of social policies on personal finance as well.  
Same as: ECON 25N.

**PUBLPOL 101. Politics and Public Policy. 4-5 Units.**

How policies come to be formed. How interests compete within public institutions to turn ideas into policies. Examples of this process from contemporary policy areas, including tax, social welfare, and environmental policy; results evaluated using equity and efficiency criteria.  
Same as: POLISCI 123, PUBLPOL 201.

**PUBLPOL 102. Organizations and Public Policy. 4-5 Units.**

Analysis of organizational processes emphasizing organizations that operate in a non-market environment. Prerequisite: ECON 1A.  
Same as: PUBLPOL 202.

**PUBLPOL 103B. Ethics and Public Policy. 5 Units.**

Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations.  
Same as: MSE 197, STS 110.

**PUBLPOL 103C. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors.  
Same as: ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 307.

**PUBLPOL 104. Economic Policy Analysis. 4-5 Units.**

The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Theoretical foundations of policy making and analysis, and applications to program adoption and implementation. Prerequisites: ECON 50 and ECON 102B.  
Same as: ECON 150, PUBLPOL 204.

**PUBLPOL 106. Law and Economics. 4-5 Units.**

Law as a tool for correcting market and cognitive failures. Design and consequences of laws, given alternative policy objectives. Welfarist approach to legal policy; deontological perspectives including Kant, Mill, and Rawls. Economic efficiency and agent rationality, effects of law on expectations and incentives, balancing costs of type I and type II legal errors. Empirical studies of law's effects. Applications: property, tort, contract, antitrust, discrimination, crime, legal procedure. Examples chiefly from U.S. law, but analytical tools of general applicability. Prerequisite: ECON 50.  
Same as: ECON 154, PUBLPOL 206.

**PUBLPOL 107. Public Finance and Fiscal Policy. 5 Units.**

What role should and does government play in the economy? What are the effects of government spending, borrowing, and taxation on efficiency, equity and economic stability and growth? The course covers economic analysis, statistical evidence and historical and current fiscal policy debates in the U.S. and around the world. Policy topics: Fiscal crises, budget surpluses/deficits; tax reform; social security, public goods, and externalities; fiscal federalism; public investment; and cost-benefit analysis. Prerequisites: ECON 51, ECON 52 (can be taken concurrently).  
Same as: ECON 141.

**PUBLPOL 121. Policy and Climate Change. 4-5 Units.**

Science and economics, including recent findings. History and evolution of local, state, regional, national, and international policy. California's recent landmark climate change bill. Future policy prospects, emphasizing national and international levels.



**PUBLPOL 122. Biosecurity and Bioterrorism Response. 2-6 Units.**

Open to medical, graduate, and undergraduate students. Explores the questions of how well the US and global healthcare systems are prepared to withstand a bioterrorism attack, what the parallels are to withstanding a pandemic, what can be done to prevent an attack. How the medical/healthcare field, government, and the technology sectors are involved in biosecurity and bioterrorism response, how these sectors interface, and the multidisciplinary challenges involved. Focus is on current biosecurity challenges, including global bio-surveillance, making the medical diagnosis, isolation, containment, hospital surge capacity, stockpiling and distribution of countermeasures, food and agriculture biosecurity, new promising technologies for detection of bio-threats and countermeasures. 4 unit option for class participation and short paper. 6 unit option includes a research paper. 2 unit option for once a week attendance (Wednesdays only) and short paper.

Same as: PUBLPOL 222, SURG 222.

**PUBLPOL 124. American Political Institutions: Congress, the Executive Branch, and the Courts. 5 Units.**

How politicians, once elected, work together to govern America. The roles of the President, Congress, and Courts in making and enforcing laws. Focus is on the impact of constitutional rules on the incentives of each branch, and on how they influence law. Fulfills the Writing in the Major Requirement for Political Science majors.

Same as: POLISCI 120C.

**PUBLPOL 125. Law and Public Policy. 5 Units.**

How lawyers argue and judges decide cases versus other forms of rhetoric and decision making. Legal reasoning and dispute resolution within Anglo-American common law and in comparative perspective across diverse societies. The relationship between law and public policy on current issues related to culture, technology, race, education, sexuality, abortion, gun control, civil liberties, national security and the environment. Sources include judicial opinions, interdisciplinary legal scholarship, ethnography, literature, and film.

**PUBLPOL 128. International Problem-Solving Through NGOs: Policy, Players, Strategies, and Ethics. 2 Units.**

This course will focus on advanced international problem-solving through the lens of international NGOs, while integrating other relevant players that address global issues within a lens of ethics and accountability. Particular aspects of NGOs that will be assessed are: policy, business, strategy, and engagement with other players. Students will consider the major issues that international NGOs face in their effort to effect positive change in an increasingly complex global environment. The course draws heavily on a series of sophisticated case studies involving a variety of NGOs, areas of specialization, and geographic regions. Topics may include: poverty and famine; the natural resources curse; terrorism; HIV/Aids and other epidemics and neglected diseases; natural disasters and emergencies; climate change; and contagion of unethical behavior. A final project tailored to each student's interest will be in lieu of a final exam. Students will have the opportunity to work with several internationally prominent guests.

Same as: INTNLREL 128B, PUBLPOL 228.

**PUBLPOL 133. Urban Politics. 5 Units.**

The major actors, institutions, processes, and policies of sub-state government in the U.S., emphasizing city general-purpose governments through a comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances. Prerequisite: POLISCI 2 or consent of instructor.

Same as: URBANST 111.

**PUBLPOL 135. Regional Politics and Decision Making in Silicon Valley. 3 Units.**

Dynamics of regional leadership and decision making in Silicon Valley, a complex region composed of 40 cities and four counties without any overarching framework for governance. Formal and informal institutions shaping outcomes in the region. Case studies include transportation, workforce development, housing and land use, and climate change.

**PUBLPOL 144. Amplifying Your Impact: Philanthropy by Design. 4 Units.**

Seminar and practicum. Students drive an actual \$10,000 philanthropic process and design their own social change strategy. Topics: strategic planning, nonprofit assessment and site visits, innovative social change models, and leadership development. Speakers include philanthropic leaders and social entrepreneurs. Class activities: group grant assessments and selection, creative problem solving, and decision-making simulations. Individual project: Social Impact Strategic Plan. Must attend first class; limited enrollment. Recommended: PUBPOL 183.

**PUBLPOL 154. Politics and Policy in California. 5 Units.**

State politics and policy making, including the role of the legislature, legislative leadership, the governor, special interests, campaign finance, the public, ballot initiatives, the state constitution, the media, and the role of research organizations. Case studies include pension reform, health care, term limits and other political reform measures, open primaries, infrastructure improvements, and the budget. Changes in constitutional and in state statutes that can improve policy making in California.

**PUBLPOL 155. Disruption for Good- Technology, Innovation and Philanthropy. 2 Units.**

A new breed of technologies and nonprofits are driving unprecedented innovation in how we create, deliver and measure social change. Innovative models and technology's extraordinary potential to transform billions of individual lives. Topics: social network campaigns, mobile platforms and international development, apps for good, crowdsourcing, crowdfunding, creative swarms, nonprofit evaluators, and new generation corporate philanthropy. Readings: articles, blogs, studies, and websites. Guest speakers include technology, nonprofit and philanthropic leaders. Class activities: strategy development breakouts, creative solution generation, onsite corporate interviews, field research and reporting. Individual Project: Tech for Good strategic plan. Must attend first class; limited enrollment.

**PUBLPOL 156. Health Care Policy and Reform. 5 Units.**

Focuses on healthcare policy at the national, state, and local levels. Includes sessions on international models, health insurance, the evolution of healthcare policy in the U.S., key U.S. healthcare topics (Patient Protection and Affordable Care Act [PPACA], Medicare, Medicaid, public employee retiree health care), the role of technology, reform proposals (single payer, national health care, market-based systems, regulated markets, state and local reform efforts), efficiency/cost drivers and prospects for future policy. We expect to spend at least two sessions on recent developments surrounding PPACA (aka Obamacare) and its implementation.

**PUBLPOL 157. Applied Quantitative Research in Political Science. 5 Units.**

Introduction to methods of research design and data analysis used in quantitative political research. The course will cover issues that are typically missing from intro stats and econometrics courses but are central to applied political science research. Methods topics include: experimental and observational approaches to estimating causal effects, measuring political preferences from data, working with big data, and effective data presentation and visualization. These topics will be introduced using data sets from American politics, international relations, and comparative politics. The course will include an introduction to the widely used R statistical programming language. Satisfies quantitative methods requirement for the Political Science Research Honors Track. Prerequisites: Stat 60, Econ 102A, or instructor consent.

Same as: POLISCI 155.

**PUBLPOL 168. Global Organizations: Managing Diversity. 5 Units.**

Analytical tools derived from the social sciences to analyze global organizations and projects, and applied to the tradeoffs between different designs of teams and organizations. Focus is on tribal mentality and how to design effective organizations and projects for policy implementation within and across institutional settings. Recommended: PUBLPOL 102, MS&E 180, or SOC 160.  
Same as: SOC 168, SOC 268.

**PUBLPOL 170. Political Corruption. 2 Units.**

Sources and effects of political corruption in the United States, with focus on potential solutions. Perspectives include political contribution and lobbying laws, rational and passionate collective action incentives, welfare effects of congressional control of the administrative state, voter behavior, agency theory, and the role of competition among politicians and interest groups. Grading based on participation and term paper. Enrollment is limited to 15 students and permission of the instructor required. Email [bruceowen@stanford.edu](mailto:bruceowen@stanford.edu)  
Same as: PUBLPOL 270.

**PUBLPOL 183. Philanthropy and Social Innovation. 4 Units.**

Philanthropic innovation, action and social transformation in the 21st century. Topics: individual giving; philanthropic landscape and models; foundation mission and infrastructure; philanthropic strategy and grantmaking; accountability and knowledge management; global, venture and corporate philanthropy; public policy and advocacy. Readings: business school cases and industry articles. Guest speakers include individual donors and foundation presidents. Class activities: case discussions, role-plays, breakouts, and debates. Individual project: \$10 million Foundation Business Plan. Must attend first class; limited enrollment.

**PUBLPOL 184. Poverty and Policies in Developing Economies. 5 Units.**

Economic models of growth and poverty, differences in growth rates among countries, and the persistence of poverty. Models of physical and human capital accumulation, and recent theories of the importance of institutions, social capital, and political factors. The effectiveness of social policies in developing countries, emphasizing India, in the light of theories of growth and poverty, and in terms of immediate goals and long-term consequences. Policies include schooling and health, anti-poverty, banking, and political decentralization. Prerequisites: ECON 1A,B, and ECON 50.

**PUBLPOL 194. Technology Policy. 3-4 Units.**

How the U.S. federal government promotes, uses, and regulates new technologies; how it decides technology policies; and debates over how to use technology to advance national goals. Topics: American attitudes towards technology; technologies for defense, homeland security, energy, health, and economic competitiveness; and when and how to regulate nanotechnology, medical enhancements, government surveillance, and Internet privacy. Recommended: POLISCI 2.  
Same as: PUBLPOL 294.

**PUBLPOL 197. Junior Honors Seminar. 5 Units.**

Primarily for students who expect to write an honors thesis. Weekly sessions discuss writing an honors thesis proposal (prospectus), submitting grant applications, and completing the honors thesis. Readings focus on writing skills and research design. Students select an adviser, outline a program of study for their senior year, and complete a prospectus by the end of the quarter. Enrollment limited to 25.  
Same as: ECON 198.

**PUBLPOL 198. Directed Readings in Public Policy. 1-5 Units.****PUBLPOL 199. Senior Research. 1-15 Units.**

May be repeated for credit.

**PUBLPOL 200A. Senior Seminar: Conducting Policy Analysis for Local Agencies. 5 Units.**

Small student teams conduct policy analyses requested by local policymakers. With guidance from the instructor and policymaker, each team researches a real-world problem and devises implementable policy recommendations to help address it. The project culminates in a professional report and presentation to the policymaker. Prerequisites: core courses in Public Policy or consent of instructor.

**PUBLPOL 200B. Senior Seminar: Conducting Policy Analysis for Local Agencies. 5 Units.**

Small student teams conduct policy analyses requested by local policymakers. With guidance from the instructor and policymaker, each team researches a real-world problem and devises implementable policy recommendations to help address it. The project culminates in a professional report and presentation to the policymaker. Prerequisites: core courses in Public Policy or consent of instructor.

**PUBLPOL 200C. Senior Seminar: Conducting Policy Analysis for Local Agencies. 5 Units.**

Small student teams conduct policy analyses requested by local policymakers. With guidance from the instructor and policymaker, each team researches a real-world problem and devises implementable policy recommendations to help address it. The project culminates in a professional report and presentation to the policymaker. Prerequisites: core courses in Public Policy or consent of instructor.

**PUBLPOL 200H. Senior Honors Seminar. 3 Units.**

Students conduct original research for oral presentations and a paper on a policy-related topic. Topic and methods of analysis determined by student in consultation with instructor. Goal is to improve analytical, research, writing, and communication skills. Prerequisites: core courses in Public Policy or consent of instructor.

**PUBLPOL 201. Politics and Public Policy. 4-5 Units.**

How policies come to be formed. How interests compete within public institutions to turn ideas into policies. Examples of this process from contemporary policy areas, including tax, social welfare, and environmental policy; results evaluated using equity and efficiency criteria.  
Same as: POLISCI 123, PUBLPOL 101.

**PUBLPOL 202. Organizations and Public Policy. 4-5 Units.**

Analysis of organizational processes emphasizing organizations that operate in a non-market environment. Prerequisite: ECON 1A.  
Same as: PUBLPOL 102.

**PUBLPOL 204. Economic Policy Analysis. 4-5 Units.**

The relationship between microeconomic analysis and public policy making. How economic policy analysis is done and why political leaders regard it as useful but not definitive in making policy decisions. Economic rationales for policy interventions, methods of policy evaluation and the role of benefit-cost analysis, economic models of politics and their application to policy making, and the relationship of income distribution to policy choice. Theoretical foundations of policy making and analysis, and applications to program adoption and implementation. Prerequisites: ECON 50 and ECON 102B.  
Same as: ECON 150, PUBLPOL 104.

**PUBLPOL 206. Law and Economics. 4-5 Units.**

Law as a tool for correcting market and cognitive failures. Design and consequences of laws, given alternative policy objectives. Welfarist approach to legal policy; deontological perspectives including Kant, Mill, and Rawls. Economic efficiency and agent rationality, effects of law on expectations and incentives, balancing costs of type I and type II legal errors. Empirical studies of law's effects. Applications: property, tort, contract, antitrust, discrimination, crime, legal procedure. Examples chiefly from U.S. law, but analytical tools of general applicability. Prerequisite: ECON 50.

Same as: ECON 154, PUBLPOL 106.

**PUBLPOL 222. Biosecurity and Bioterrorism Response. 2-6 Units.**

Open to medical, graduate, and undergraduate students. Explores the questions of how well the US and global healthcare systems are prepared to withstand a bioterrorism attack, what the parallels are to withstanding a pandemic, what can be done to prevent an attack. How the medical/healthcare field, government, and the technology sectors are involved in biosecurity and bioterrorism response, how these sectors interface, and the multidisciplinary challenges involved. Focus is on current biosecurity challenges, including global bio-surveillance, making the medical diagnosis, isolation, containment, hospital surge capacity, stockpiling and distribution of countermeasures, food and agriculture biosecurity, new promising technologies for detection of bio-threats and countermeasures. 4 unit option for class participation and short paper. 6 unit option includes a research paper. 2 unit option for once a week attendance (Wednesdays only) and short paper.

Same as: PUBLPOL 122, SURG 222.

**PUBLPOL 228. International Problem-Solving Through NGOs: Policy, Players, Strategies, and Ethics. 2 Units.**

This course will focus on advanced international problem-solving through the lens of international NGOs, while integrating other relevant players that address global issues within a lens of ethics and accountability. Particular aspects of NGOs that will be assessed are: policy, business, strategy, and engagement with other players. Students will consider the major issues that international NGOs face in their effort to effect positive change in an increasingly complex global environment. The course draws heavily on a series of sophisticated case studies involving a variety of NGOs, areas of specialization, and geographic regions. Topics may include: poverty and famine; the natural resources curse; terrorism; HIV/Aids and other epidemics and neglected diseases; natural disasters and emergencies; climate change; and contagion of unethical behavior. A final project tailored to each student's interest will be in lieu of a final exam. Students will have the opportunity to work with several internationally prominent guests.

Same as: INTNLREL 128B, PUBLPOL 128.

**PUBLPOL 231. Health Care Regulation, Finance and Policy. 3 Units.**

(SAME AS LAW 348, MGTECON 331) Provides the legal, institutional, and economic background necessary to understand the financing and production of health services in the U.S. Potential topics include: health reform, health insurance (Medicare and Medicaid, employer-sponsored insurance, the uninsured), medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons.

Same as: HRP 391.

**PUBLPOL 235. From Innovation to Implementation: How Government Can Develop and Apply New Ideas. 3-5 Units.**

What are the barriers to reform and innovative thinking in government? What are the factors that need to be taken into account when implementing change? What are the bureaucratic structures and power relationships that policy-makers must understand and navigate in order to embed reform? The aim of this seminar is to give students a detailed understanding of how political change happens and an understanding of why it often doesn't. Using cases studies from successful and unsuccessful reform programs around the world, this course will expose students to innovations in key public sector issue areas including education, healthcare, well-being, and government transparency and accountability; provides a sense of what's it's like actually trying to make change happen in a government context, and will equip students with the skills and understanding to be able to make change happen in a government setting.

Same as: IPS 235.

**PUBLPOL 236. Law and Public Policy: Issues in Implementation. 3 Units.**

(Same as LAW 636). This seminar will focus on issues related to achieving successful implementation of the goals of legislation. It is widely recognized that the goals of legislation often are not realized and that the failure frequently rests in breakdowns in the implementation process by the agencies and organizations charged with implementing the legislation. In response to problems in implementation, the institutional context of public policy implementation is changing. One category of innovations, known by names such as "management-based regulation" and "evidence-based" social service delivery, gives broad discretion to street-level service providers but subjects them to intensive monitoring and disciplined performance comparison. Another category applies market concepts to regulation or social services, for example, by creating tradeable rights (e.g., pollution allowances) or vouchers (for schools, housing, or healthcare). These, and other, new approaches are affecting both the contours of public law doctrine and the nature of lawyering in the public sector. Lawyers in the public sector are increasingly drawing on skills of institutional design and monitoring of the kind associated with private sector transactional practice. The seminar will examine some of the emerging general themes of innovative policy implementation and look at a range of case studies. Topics will include the conditions under which financial and other rewards and sanctions are useful in bringing about desired behaviors, the pluses and minuses of the creation of markets as alternatives to government run programs, and efforts at improving implementation by improving management activities. Examples will be taken from both regulation and social services, and are likely to include environmental protection, education, child protective services, healthcare. food and workplace safety, nuclear power safety, and regulation of financial institutions.

**PUBLPOL 270. Political Corruption. 2 Units.**

Sources and effects of political corruption in the United States, with focus on potential solutions. Perspectives include political contribution and lobbying laws, rational and passionate collective action incentives, welfare effects of congressional control of the administrative state, voter behavior, agency theory, and the role of competition among politicians and interest groups. Grading based on participation and term paper. Enrollment is limited to 15 students and permission of the instructor required. Email [bruceowen@stanford.edu](mailto:bruceowen@stanford.edu)

Same as: PUBLPOL 170.

**PUBLPOL 294. Technology Policy. 3-4 Units.**

How the U.S. federal government promotes, uses, and regulates new technologies; how it decides technology policies; and debates over how to use technology to advance national goals. Topics: American attitudes towards technology; technologies for defense, homeland security, energy, health, and economic competitiveness; and when and how to regulate nanotechnology, medical enhancements, government surveillance, and Internet privacy. Recommended: POLISCI 2.

Same as: PUBLPOL 194.

**PUBLPOL 298. Directed Readings in Public Policy. 1-5 Units.****PUBLPOL 301A. Microeconomics. 4 Units.**

Microeconomic concepts relevant to decision making. Topics include: competitive market clearing, price discrimination; general equilibrium; risk aversion and sharing, capital market theory, Nash equilibrium; welfare analysis; public choice; externalities and public goods; hidden information and market signaling; moral hazard and incentives; auction theory; game theory; oligopoly; reputation and credibility. Prerequisites: ECON 50 and MATH 51 or equiv. Same as: IPS 204A.

**PUBLPOL 301B. Cost-Benefit Analysis and Evaluation. 4-5 Units.**

Relationship between microeconomic analysis and public policy making. Economic rationales for policy interventions. Economic models of politics and application to policy making. Relationship of income distribution to policy choice. Welfare evaluation of public and private decisions. Education policy, social security, and health care. Prerequisites: PUBLPOL 301A (for graduate students) or ECON 50, and 102B (for undergraduates). Same as: IPS 204B.

**PUBLPOL 302A. Introduction to American Law. 3-5 Units.**

For undergraduates. The structure of the American legal system including the courts; American legal culture; the legal profession and its social role; the scope and reach of the legal system; the background and impact of legal regulation; criminal justice; civil rights and civil liberties; and the relationship between the American legal system and American society in general.

Same as: AMSTUD 179, POLISCI 122.

**PUBLPOL 302B. Economic Analysis of Law. 4 Units.**

(Same as LAW 528.) This course will provide a broad overview of the scholarly field known as "law and economics." The focus will be on how legal rules and institutions can correct market failures. We will discuss the economic function of contracts and, when contracts fail or are not feasible, the role of legal remedies to resolve disputes. We will also discuss at some length the choice between encouraging private parties to initiate legal actions to correct externalities and governmental actors, such as regulatory authorities. Extensive attention will be given to the economics of litigation, and to how private incentives to bring lawsuits differs from the social value of litigation. The economic motive to commit crimes, and the optimal governmental response to crime, will be studied in depth. Specific topics within the preceding broad themes include: the Coase Theorem; the tradeoff between the certainty and severity of punishment; the choice between ex ante and ex post sanctions; negligence versus strict liability; property rules; remedies for breach of contract; and the American rule versus the English rule for allocating litigation costs. Because this course is part of the core curriculum for the Master in Public Policy degree, intermediate-level training in microeconomics (at the undergraduate level) and some comfort in the use of calculus is required.

**PUBLPOL 303A. Political Methodology I. 5 Units.**

Introduction to probability and statistical inference, with applications to political science and public policy. Prerequisite: elementary calculus. Same as: POLISCI 350A.

**PUBLPOL 303B. Political Methodology II. 5 Units.**

Understanding and using the linear regression model in a social-science context: properties of the least squares estimator; inference and hypothesis testing; assessing model fit; presenting results for publication; consequences and diagnosis of departures from model assumptions; outliers and influential observations, graphical techniques for model fitting and checking; interactions among exploratory variables; pooling data; extensions for binary responses.

Same as: POLISCI 350B.

**PUBLPOL 303C. Bayesian Statistics and Econometrics. 5 Units.**

(Same as LAW 243.) Linear and nonlinear regression, covariance structures, panel data, qualitative variable models, nonparametric and semiparametric methods, time series, Bayesian model averaging and variable selection. It explores Bayesian methodology including Markov Chain Monte Carlo methods, hierarchical models, model checking, mixture models, empirical Bayes approaches, approximations, and computational issues and gives some attention to foundations. Prerequisite: graduate-level econometrics or equivalent.

**PUBLPOL 303D. Applied Econometrics for Public Policy. 4 Units.**

This course aims to present the theory and practice of empirical research in economics with particular emphasis on topics relating to public policy questions. We will start with a quick re-cap of basic probability theory and statistics, then move on to basic regression analysis and introduce the statistical software STATA. The course will put a substantial amount of effort on work with STATA in analyzing actual data sets, reproducing and criticizing results in scientific research and learning the actual practice of econometrics. The final part of the course will focus on the identification of causal effects and the various econometric techniques available to learn about causality. While this is primarily a methodology module, most examples and applications will be drawn from the area of public policy.

**PUBLPOL 304A. Collective Action: Ethics and Policy. 4 Units.**

Individually rational actions can give rise to results that are collectively irrational. For example, the collective result of our consumption decisions is to warm the planet, destroy the world's fisheries, and increase reliance on factory farming; at the same time, the decisions of a single individual seem to have no tangible effect on such things. In light of this, what (if anything) are you as an individual required to do in these and other collective action situations, especially when others are not doing their part to prevent things from getting out of control? For example, are you required to reduce your carbon footprint and avoid products that are produced in ethically objectionable ways? Do you have a duty to vote? Is free-riding always ethically objectionable? Can you be required to 'cooperate' in a situation where you know that most others will 'defect'? Finally, from a real-world policy perspective, how can we bring about the best solutions to these and other collective action problems? Is the best policy response always a straightforward function of the variable features of each case? Interdisciplinary readings from authors in philosophy, politics, economics, and law such as Elinor Ostrom, Peter Singer, and Cass Sunstein.

Same as: ETHICSOC 180M, PHIL 73.

**PUBLPOL 305A. Judgment and Decision Making. 4 Units.**

(Same as LAW 333.) Introduction to problem framing and problem solving. Theories and research on heuristics and biases in human inference, judgment, and decision making. Experimental and theoretical work in prospect theory emphasizing loss and risk aversion. Challenges that psychology offers to the rationalist expected utility model; attempts to meet this challenge through integration with modern behavioral economics. Decision making biases and phenomena of special relevance to public policy such as group polarization, group think, and collective action. Same as: IPS 207A.

**PUBLPOL 305B. Public Policy and Social Psychology: Implications and Applications. 4 Units.**

Theories, insights, and concerns of social psychology relevant to how people perceive issues, events, and each other, and links between beliefs and individual and collective behavior. Topics include: situationist and subjectivist traditions of applied and theoretical social psychology; social comparison, dissonance, and attribution theories; social identity, stereotyping, racism, and sources of intergroup conflict and misunderstanding; challenges to universality assumptions regarding human motivation, emotion, and perception of self and others; the problem of producing individual and collective changes in norms and behavior. Same as: IPS 207B, PSYCH 216.

**PUBLPOL 306. Writing and Rhetoric for Policy Audiences. 4 Units.**

This course offers hands-on learning of effective writing and presentation techniques for audiences that include policy makers, decision and stakeholders, interest groups, the media, and the public. Class time will be spent learning lessons in rhetoric, reviewing different written genres (op-ed, report, memo), editing and peer review using large screens and laptops, as well as analyzing and practicing presentations (PPT, elevator pitch, radio broadcast, board meeting). Sources include policy briefings, memos, model videos, rhetoric handouts, style manual. Students will write and make oral and multimedia arguments, individually and in teams; students will also be responsible for peer review, introducing speakers, and moderating discussions at the colloquia. Enrollment limited. Prerequisite: consent of instructor.

**PUBLPOL 307. Justice. 4-5 Units.**

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include financing schools and elections, regulating markets, discriminating against people with disabilities, and enforcing sexual morality. Counts as Writing in the Major for PoliSci majors. Same as: ETHICSOC 171, IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 103C.

**PUBLPOL 309. Practicum. 1-10 Units.**

Applied policy exercises in various fields. Multidisciplinary student teams apply skills to a contemporary problem in a major policy exercise with a public sector client such as a government agency. Problem analysis, interaction with the client and experts, and presentations. Emphasis is on effective written and oral communication to lay audiences of recommendations based on policy analysis.

**PUBLPOL 309X. Public Policy Research Project. 1-10 Units.**

Supervised research internship. Individual students perform policy research for outside client, applying analytical skills from core curriculum. Requires permission of program director.

**PUBLPOL 310. Master of Arts Thesis. 1-5 Units.**

Restricted to students writing a master's thesis in Public Policy. May be repeated for credit.

**PUBLPOL 311. Public Policy Colloquium. 1 Unitss.**

Weekly colloquia speaker series required for M.P.P. and M.A. in Public Policy students. Themes vary each quarter.

**PUBLPOL 313. Issues in Science Policy. 1 Unitss.**

Lecture series on significant issues in science and technology policy. Guest speakers will discuss issues including but not limited to: who should make science policy, educational dimension of science policy, manufacturing and science policy, California's stem cell policy, immigration and science policy, and the role of industry in science policy.

**PUBLPOL 317. Comparing Institutional Forms: Public, Private, and Nonprofit. 4 Units.**

For students interested in the nonprofit sector, those in the joint Business and Education program, and for Public Policy MA students. The focus is on the missions, functions, and capabilities of nonprofit, public, and private organizations, and the managerial challenges inherent in the different sectors. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials. Same as: EDUC 377, GSBGEN 346, SOC 377.

**PUBLPOL 321. Sentencing and Corrections. 3 Units.**

(Same as LAW 621). This introductory course will familiarize students with the history, structure, and performance of America's sentencing and corrections system. Sentencing is the process by which criminal sanctions are imposed in individual cases following criminal convictions. Corrections deals with the implementation and evaluation of criminal sentences after they are handed down. In fact, the two subject areas are inseparable. The course will examine sentencing and corrections from global and historical views, from theoretical and policy perspectives, and with close attention to many problem-specific areas. We will explore sentencing theories and their application, the nature, scope and function of corrections, the impact of mass incarceration on crime and communities, the effectiveness of rehabilitation, the relationship between sanctions and crime, and the consequences of prisoner reentry. These topics will be considered as they play out in current political and policy debates. Guest lectures may include presentations by legal professionals, victims, offenders, and correctional leaders.

**PUBLPOL 353. Science and Technology Policy. 4-5 Units.**

U.S. policies for science and technology, political institutions that create and carry out these policies, processes for conducting science and developing technology, international aspects of science and technology, and the roles of scientists, engineers, and physicians in creating and implementing policy. Assignments: analyzing the politics of particular legislative proposals, assessing options for trying to reach a policy objective, and preparing mock memos and testimony.

**PUBLPOL 364. Policy & Strategy Issues in Financial Engineering. 2 Units.**

(Same as LAW 564). This is a non-technical course that will focus on a series of case studies each designed to illuminate a serious public policy issue raised by the evolution of modern financial engineering. These will include discussions of Freddie Mac, Fannie Mae, sub-prime and Alt-A mortgages and the flaws of AAA CDOs; the spectacular losses by Orange County and the Florida Local Government Investment Pool and the challenges posed by unregulated investment pools; how credit default swaps are likely to change with central clearing using the PIIGS (Portugal/ Ireland/ Iceland/ Greece/ Spain), the monolines, AIG, Lehman and MF Global as examples; views of rogue trading using the similarities and disparities of Askin, Madoff, Barings, Soc Gen and UBS for discussion; and Risk Management 101 : the why/ how/ where/ when firms went wrong plus what to keep and what to throw out in the next phase of risk programs among other case studies. The subject matter, by necessity, is multi-disciplinary and so the course is particularly suited to those students having an interest in public policy and the evolution of modern financial markets. This includes students from the law or business schools, or the public policy, economics, EES, political science, or financial math and engineering programs among others. Several themes will tie the case studies, reading and discussions together:-Is this an example of an innovation that got too far ahead of existing operations, risk management, legal, accounting, regulatory or supervisory oversight?-How might temporary infrastructure be implemented without stifling innovation or growth?-How might losses be avoided by requiring permanent infrastructure sooner? Will Dodd-Frank, Basel III, etc., help to prevent such problems? What are the potential unintended consequences?-Is this an example of improperly viewing exposures that are subject to uncertainty or incorrectly modeling risk or both? Guest speakers will be invited to share their experiences. This course will aim to provide a practitioner(s) view of financial engineering over the past 3 ½ decades as well as a broad understanding of what went right and what went wrong plus cutting edge views of the future of financial engineering. Same as: ECON 152, ECON 252.

## ROTC Air Force Courses

### ROTCAF 1. Air Force ROTC Lab. 1 Unitss.

Practical leadership exercises including physical fitness training.

### ROTCAF 11. The Foundation of the United States Air Force I. 1 Unitss.

Introduces students to the Air Force and AFROTC with an overview of basic characteristics, missions, and organization of the Air Force; additional topics include officership and professionalism, career opportunities, military customs and courtesies, and an introduction to communications skills.

### ROTCAF 21. The Evolution of USAF Air and Space Power I. 2 Units.

Examines general aspects of air and space power through historical study and analysis and provides the student with a knowledge level understanding of the capabilities, function and doctrinal employment of aerospace forces; emphasizes development of oral and written communication skills.

### ROTCAF 131. Air Force Leadership Studies I. 2 Units.

Study of leadership, management fundamentals, professional knowledge, Air Force personnel system, ethics, and communication skills; develops application level knowledge of skills required of junior Air Force officer through case studies, practical exercises, and seminar discussion.

### ROTCAF 141. National Security Affairs. 2 Units.

Examines the national security process, international and regional relations, advanced leadership ethics, and Air Force doctrine with focus on the military as a profession, officership, military justice, civilian control of the military and current issues affecting military professionalism.

## ROTC Army Courses

### ROTCARMY 1. ARMY ROTC LAB. 1 Unitss.

Leadership laboratories, held weekly for three hours, are required of all students. Performance during lab periods is reflected in the student's course grade. Labs include activities such as rappelling, terrain navigation, marksmanship, drill and ceremonies, and tactical field training exercises.

### ROTCARMY 11. Leadership and Personal Development. 1 Unitss.

Introduces students to the personal challenges and competencies that are critical for effective leadership. Students learn how the personal development of life skills such as goal setting, time management, physical fitness, and stress management relate to leadership and officership. Students develop their own personal fitness program under the guidance of an Army master fitness trainer.

### ROTCARMY 12. Foundations in Leadership I. 1 Unitss.

An overview of leadership fundamentals such as setting direction, problem solving, listening, presenting briefs, providing feedback and using effective writing skills. Students begin to explore leadership dimensions and values.

### ROTCARMY 13. Foundations in Leadership II. 1 Unitss.

An overview of the leadership framework with practical applications in fundamentals such as problem solving, listening, presenting briefs, and using effective writing skills. Students explore dimensions of leadership, values, attributes, skills, and actions in the context of practical, hands-on, and interactive exercises.

### ROTCARMY 21. Innovative Leadership. 2 Units.

Explores the dimensions of creative leadership strategies and styles by studying historical cases and engaging in interactive exercises. Students practice aspects of personal motivation and team building within the context of planning, executing and assessing team exercises. Focus will be on the continued development of the knowledge of leadership values and attributes through an understanding of organizational customs and courtesies. Leadership case studies provide tangible context for learning Individual Creeds and Organizational Ethos.

### ROTCARMY 22. Leadership in Changing Environments I. 2 Units.

Examines the challenges of leadership in complex contemporary operational environments. Dimensions of the cross-cultural challenges of leadership in a constantly changing world and their application to leadership tasks and situations. Case studies stressing importance of teamwork and tactics in real-world settings.

### ROTCARMY 23. Leadership in Changing Environments II. 2 Units.

Examines the decision-making process and plans/orders that enable small units to complete assigned tasks. Planning techniques used to develop orders and briefing plans and decisions.

### ROTCARMY 131. Adaptive Team Leadership. 2 Units.

Challenges students to study, practice, and evaluate adaptive leadership skills as they are presented with the demands of the ROTC Leader Development Assessment Course. Challenging scenarios related to small unit tactical operations are used to develop self-awareness and critical thinking skills. Students receive systematic and specific feedback on their leadership abilities.

### ROTCARMY 132. Situational Leadership I. 2 Units.

Study of intense situational leadership challenges to build student awareness and skills in leading small units. Skills in decision-making, persuading, and motivating team members when "under fire" are explored, evaluated, and developed.

### ROTCARMY 133. Situational Leadership II. 2 Units.

Practical applications of intense situational leadership challenges that will provide awareness and specific feedback on leadership abilities. Student skills are evaluated using practical applications in decision making, persuading, and motivating team members when "under fire." Aspects of military operations are reviewed as a means of preparing for the ROTC Leader Development Assessment Course (LDAC).

### ROTCARMY 141. Developing Adaptive Leaders. 2 Units.

Students develop proficiency in planning, executing, and assessing complex operations; in functioning as a member of a staff; and in providing leadership performance feedback to subordinates. Students are given situational opportunities to assess risk, make ethical decisions, and provide coaching to fellow ROTC students. Students are challenged to instruct younger students. Students identify responsibilities of key staff roles and use situational opportunities to develop subordinates.

### ROTCARMY 142. Leadership in a Complex World I. 2 Units.

Explores the dynamics of leadership in the complexity of current military operations. Students examine customs and courtesies, military law, principles of war and rules of engagement in the face of international terrorism. Aspects of interacting with nongovernmental organizations, civilians on the battlefield, and host nation support are examined and evaluated.

### ROTCARMY 143. Leadership in a Complex World II. 2 Units.

Significant emphasis is placed on preparing students for their first unit of assignment and transition to lieutenant. Case studies, scenarios, and exercises are used to prepare students to face the complex ethical and practical demands of leading as commissioned officers in the U.S. Army.

### ROTCARMY 176. Military History. 2 Units.

A survey of the military and diplomatic aspects of American involvement in conflicts from the Anglo-Indian Wars to the present.

## ROTC Navy Courses

### **ROTCNAVY 1. Naval ROTC Lab. 1 Units.**

Activities consist of drill, athletics, and professional information events. Students gain experience in actual leadership situations and learn the fundamentals of seamanship, military formations, movements, commands, discipline, courtesies, and honors. During information briefings, special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

### **ROTCNAVY 11. Introduction to Naval Science. 1 Units.**

An introduction to the naval profession and to the concepts of seapower. The mission, organization, and warfare components of the Navy and Marine Corps, including an overview of officer and enlisted ranks, rates, and career patterns; naval courtesy and customs, military justice, leadership, and nomenclature are discussed.

### **ROTCNAVY 12. Sea Power. 2 Units.**

Provides an understanding of the role that the United States Navy has played in its nation's history, both in times of peace and in times of war, from 1775 to present day. Covers the early development of sea power and its effect on world events. Examines the continued importance of sea power and the many roles of the United States Navy from war fighting entity to international maritime peacekeeper to foreign policy instrument.

### **ROTCNAVY 21. Leadership and Management. 2 Units.**

Introduces basic management, decision making, and moral leadership. The student will learn to establish meaningful goals, prioritize among competing demands, and plan and forecast in a task-centered organization. The course includes exposure to measures of organizational effectiveness, methods to overcome resistance to change, effective communications, and techniques to aid in counseling, team building, and resolution of disciplinary and personnel matters.

### **ROTCNAVY 22. Naval Ship Systems - Engineering. 2 Units.**

Introduces the principles of the design, construction, and propulsion of ships. Includes the analysis of ship stability and thermodynamic cycles, and provides an introduction to ship main propulsion and auxiliary systems.

### **ROTCNAVY 131. Navigation. 2 Units.**

Introduces the fundamentals of marine navigation emphasizing piloting and electronic navigation procedures. Covers coordinate systems, chart projections, navigational aids, instruments, compass observations, time, and study of tides and currents.

### **ROTCNAVY 132. Naval Operations & Seamanship. 2 Units.**

Application of the nautical rules and maneuvering board in order to avoid collisions at sea. Other aspects of naval surface ship operations that are introduced include visual and electronic communications methods, tactical disposition of forces, ship handling theory, and deck seamanship topics.

### **ROTCNAVY 141. Naval Ship Systems - Weapons. 2 Units.**

Examines the principles and theories used in the development of naval weapons systems. Extensive study is made of detection systems, especially radar and sonar, followed by discussions of ancillary systems for computing, stabilizing, tracking, and weapons control and delivery.

### **ROTCNAVY 142. Leadership and Ethics. 2 Units.**

Integrates an intellectual exploration of Western moral traditions and ethical philosophy with a variety of topics, such as military leadership, core values, and professional ethics; the Uniform Code of Military Justice and Navy regulations; and discussions relating to the roles of enlisted members, junior and senior officers, command relationships and the conduct of warfare. The course provides midshipmen with a foundation of moral traditions, combined with a discussion of actual and historical events in the United States Navy and Marine Corps to prepare them for the roles and responsibilities of Naval leadership.

## Radiation Oncology Courses

### **RADO 101. Readings in Radiation Biology. 1-18 Units.**

### **RADO 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

### **RADO 202. The Basic Science of Radiation Therapy. 1 Units.**

For residents or fellows in the training program in the Division of Radiation Therapy, and for interested medical students. Basic processes of radiation biology that underly the treatment of malignant diseases by radiation. Carcinogenesis and mutagenesis by radiation are also covered. Prerequisite: familiarity with cell biology and physiology; consent of instructor.

### **RADO 244. Radiation and Cancer Biology Seminar Series. 1 Units.**

Open to graduate and undergraduate students. Current research in radiation and cancer biology summarized by two laboratories.

### **RADO 280. Early Clinical Experience in Radiation Oncology. 1-2 Units.**

Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

### **RADO 299. Directed Reading in Radiation Oncology. 1-18 Units.**

Prerequisite: consent of instructor.

### **RADO 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

### **RADO 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Radiology Courses

### **RAD 101. Readings in Radiology Research. 1-18 Units.**

Prerequisite: consent of instructor.

### **RAD 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

### **RAD 220. Introduction to Imaging and Image-based Human Anatomy. 3-4 Units.**

The physics of medical imaging and human anatomy through medical images. Emphasis is on normal anatomy, contrast mechanisms, and relative strengths of each imaging modality. Labs reinforce imaging techniques and anatomy.

Same as: BIOE 220.

### **RAD 222A. Multimodality Molecular Imaging in Living Subjects I. 4 Units.**

Focuses on instruments and chemistries for imaging of cellular and molecular processes in vivo. Basics of instrumentation physics, chemistry of molecular imaging probes, and an introduction to preclinical and clinical molecular imaging modalities.

Same as: BIOE 222A.

### **RAD 222B. Multimodality Molecular Imaging in Living Subjects II. 4 Units.**

Focuses on molecular probes that target specific disease mechanisms. The ideal characteristics of molecular probes; how to optimize their design for use as effective imaging reagents that target specific steps in biological pathways and reveal the nature of disease through noninvasive assays.

Same as: BIOE 222B.

**RAD 222C. Multimodality Molecular Imaging in Living Subjects III. 4 Units.**

Focuses on emerging chemistries and instruments that address unmet needs for improved diagnosis and disease management in cancer, neurological disease, cardiovascular medicine and musculoskeletal disorders. Objective is to identify problems or controversies in the field, and to resolve them through understanding the relevant primary literature.  
Same as: BIOE 222C.

**RAD 223. Physics and Engineering of X-Ray Computed Tomography. 3 Units.**

CT scanning geometries, production of x-rays, interactions of x-rays with matter, 2D and 3D CT reconstruction, image presentation, image quality performance parameters, system components, image artifacts, radiation dose. Prerequisites: differential and integral calculus. Knowledge of Fourier transforms (EE261) recommended.  
Same as: BIOE 223.

**RAD 225. Ultrasound Imaging and Therapeutic Applications. 3 Units.**

Covers the basic concepts of ultrasound imaging including acoustic properties of biological tissues, transducer hardware, beam formation, and clinical imaging. Also includes the therapeutic applications of ultrasound including thermal and mechanical effects, visualization of the temperature and radiation force with MRI, tissue assessment with MRI and ultrasound, and ultrasound-enhanced drug delivery.  
Same as: BIOE 224.

**RAD 226. In Vivo Magnetic Resonance Spectroscopy and Imaging. 3 Units.**

Collections of identical independent nuclear spins are described by the classical vector model of magnetic resonance imaging (MRI); however, interactions among spins, as occur in many in vivo processes, require a more complete description. Physics and engineering principles of these in vivo magnetic resonance phenomena with emphasis on current research questions and clinical applications. Topics: quantum mechanical description of magnetic resonance, density matrix theory, product operator formalism, relaxation theory and contrast mechanisms, spectroscopic imaging, spectral editing, and multinuclear studies. Prerequisites: EE 369B or familiarity with magnetic resonance, working knowledge of linear algebra.

**RAD 227. Functional MRI Methods. 3 Units.**

Basics of functional magnetic resonance neuroimaging, including data acquisition, analysis, and experimental design. Journal club sections. Cognitive neuroscience and clinical applications. Prerequisites: basic physics, mathematics; neuroscience recommended.  
Same as: BIOPHYS 227.

**RAD 228. Magnetic Resonance Imaging Programming Topics. 3 Units.**

Primarily for students working on research projects involving MRI pulse sequence programming. Introductory and student-initiated topics in seminars and hands-on labs. Image contrast mechanisms achieved by pulse sequences that control radiofrequency and gradient magnetic fields in real time, while acquiring data in an organized manner for image reconstruction. Prerequisites: EE 369B and consent of instructor.

**RAD 260. Computational Methods for Biomedical Image Analysis and Interpretation. 3-4 Units.**

The latest biological and medical imaging modalities and their applications in research and medicine. Focus is on computational analytic and interpretive approaches to optimize extraction and use of biological and clinical imaging data for diagnostic and therapeutic translational medical applications. Topics include major image databases, fundamental methods in image processing and quantitative extraction of image features, structured recording of image information including semantic features and ontologies, indexing, search and content-based image retrieval. Case studies include linking image data to genomic, phenotypic and clinical data, developing representations of image phenotypes for use in medical decision support and research applications and the role that biomedical imaging informatics plays in new questions in biomedical science. Includes a project. Enrollment for 3 units with reduced project requirements requires instructor consent. Prerequisites: programming ability at the level of CS 106A, familiarity with statistics, basic biology. Knowledge of Matlab highly recommended.  
Same as: BIOMEDIN 260.

**RAD 261. Computational Methods for Biomedical Image Analysis and Interpretation: Lectures. 2 Units.**

Lecture component of RAD/BIOMEDIN 260. The latest biological and medical imaging modalities and their applications in research and medicine. Focus is on computational analytic and interpretive approaches to optimize extraction and use of biological and clinical imaging data for diagnostic and therapeutic translational medical applications. Topics include major image databases, fundamental methods in image processing and quantitative extraction of image features, structured recording of image information including semantic features and ontologies, indexing, search and content-based image retrieval. Case studies include linking image data to genomic, phenotypic and clinical data, developing representations of image phenotypes for use in medical decision support and research applications and the role that biomedical imaging informatics plays in new questions in biomedical science. Prerequisites: familiarity with statistics, basic biology. Knowledge of Matlab and programming recommended.  
Same as: BIOMEDIN 261.

**RAD 280. Early Clinical Experience in Radiology. 1-2 Units.**

Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

**RAD 299. Directed Reading in Radiology. 1-18 Units.**

Prerequisite: consent of instructor.

**RAD 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**RAD 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## Religious Studies Courses

**RELIGST 5. Biblical Greek. 3-5 Units.**

This is a one term intensive class in Biblical Greek. After quickly learning the basics of the language, we will then dive right into readings from the New Testament and the Septuagint, which is the ancient Greek translation of the Hebrew Bible. By the end of the term everyone will be able to read the Greek Bible with ease. No previous knowledge of Greek required. Those wishing to continue study of Biblical Greek may enroll in Biblical Greek II (CLASSGRK 5B) when offered.  
Same as: CLASSGRK 5, JEWISHST 5.



**RELIGST 5B. Biblical Greek II. 3-5 Units.**

This is a continuation of the Winter Quarter Biblical Greek Course. We will be reading selections primarily from the New Testament (both Gospels and Epistles) as well as focusing on knowledge of key vocabulary and grammar needed to read the Greek Bible with ease. Readings will be supplemented with sections from the Septuagint and Early Christian texts (Apostolic Fathers and Early Creeds). Pre-requisite: ClassGrk 5 or a similar introductory course in Ancient Greek.

Same as: CLASSGRK 5B, JEWISHST 5B.

**RELIGST 5N. Religion and Politics: comparing Europe to the US. 3-4 Units.**

This course explores the relationship between religion and politics as it is understood in the United States and Europe. In recent years, this relationship has turned somewhat tense, in part because of the rise of Islam as a public religion in Europe, and in part due to the rising influence of religious groups in public culture. We will study the different understandings and definitions of the separation of "church and state" in Western democratic cultures, and the differing notions of the "public sphere." Through case studies, we will investigate the nature of public conflicts, what particular issues lead to conflict, and why. For instance, why has the head covering of Muslim girls and women become politicized in Europe, and how? What are the arguments surrounding the Cordoba House, known as the Ground Zero Mosque, and how does this conflict compare to the controversies surrounding recent constructions of mosques in European cities? The course is interdisciplinary and comparative in nature. It considers historical, political, sociological, and religious studies approaches, introducing students to the particular perspectives of these disciplines. For resources we will draw on various forms of media, documentaries, and scholarly literature.

Same as: JEWISHST 5N.

**RELIGST 6N. Buddhist Meditation Teachings. 3 Units.**

Preference to freshmen. Who was the historical Buddha Gautama and what is known about him, and his time and society? The oldest texts attributed to him and what they reveal about him, and his ideas and spirituality. Sources include Indian literary works in translation, Buddhist art, and contemporary films about the Buddha's life.

**RELIGST 8N. Francis of Assisi: An Exemplary Saint. 3 Units.**

Preference to freshmen. The making of a new model of saint at a time of cultural change in the Middle Ages. What Francis as a paradigm of the model self reveals about the ethical and religious imagination, past and present. Texts include Francis' writings and primary documents that chronicle the founding of the Franciscan order.

**RELIGST 10N. The Problem of God: Aquinas to the New Atheism. 4 Units.**

Critical inquiry the meaning and credibility of theistic belief through exemplary classic formulations, modern critics, and contemporary defenders. What has the idea of God meant to serious minds in the past? And in the modern or postmodern world?.

**RELIGST 11N. The Meaning of Life: Philosophical, Aesthetic, and Religious Perspectives. 3 Units.**

Raise ultimate questions about life. Yes, the unexamined life is not worth living, but also the un-lived life is not worth examining. Students and professor examine their own lives in the light of questions that the readings and lectures bring up: 1. The big picture: Is there such a thing as "the" meaning of life? 2. What is entailed in making personal-existential sense of one's own life? 3. What constitutes the good life, lived in society? 4. How can a university education bear upon the search for a meaningful life? 5. What "methods" for or approaches to life can one learn from studies in the humanities? After introductory lectures, the seminar studies a series of artworks, poems, diverse texts, and a film, all of which bear on the questions mentioned above -- works such: 1. Plato's Allegory of the Cave, from "The Republic" 2. Manet's "A bar at the Folies Bergere" 3. A comparison/contrast of Monet's early (1862) "Still Life" and van Gogh's late (1889) "Irises" 4. Lyric poetry T.S. Eliot: "The Love Song of J. Alfred Prufrock," "The Waste Land," and "East Coker"; Edwin Muir: "The Heart Could Never Speak"; Philip Larkin: "Days" 5. Martin Heidegger's "What Is Metaphysics?" 6. Jean-Paul Sartre's novel "Nausea" 7. Marx's Paris Manuscripts of 1844 8. Bergman's "The Seventh Seal".

**RELIGST 11SC. Religion in Science Fiction and Fantasy. 2 Units.**

How the literature of science fiction and fantasy explores current conceptions about religion. Religious themes such as free will and determinism, immortality, apocalypse, and redemption. How religion figures in the contemporary imagination.

**RELIGST 12. Exploring Hinduism. 4 Units.**

Hindu traditions, from approx. 1500 BCE to the present, will be selectively studied through multiple approaches, including texts, practices, rituals, arts, and politics.

**RELIGST 13A. Religion and Material Culture. 4 Units.**

Temples, prayer beads, icons, robes, books, relics, candles and incense, scarves and hats, sacred food and holy water - objects of all sorts play a prominent role in all religions, evoking a wide range of emotional responses, from reverence, solace and even ecstasy, to fear, hostility and violence. At the same time, many see a tension or even contradiction between religion and material pursuits. This course adopts a comparative approach, drawing on a variety of traditions to examine the place of images, food, clothing, ritual objects, architecture and relics in religious thought and practice.

**RELIGST 13N. Mystics and Mysticism. 3 Units.**

What makes a mystic a mystic? This question has many sides. Why do we call someone a mystic? Is there such a thing as mystical experience? Do experiences make a mystic? Do beliefs? Practices? Many religious traditions have records of visionaries whose lives and writings open windows on the more hidden and aspirational aspects of belief and practice. These writings also take many forms: poem, letters, teachings, and accounts of visions, which we will encounter in the course of the quarter. Readings for the course will cover a cross-section of texts taken from Christian, Jewish, Muslim, Buddhist, and Native American sources.

**RELIGST 14. Exploring Buddhism. 4 Units.**

From its beginnings to the 21st century. Principal teachings and practices, institutional and social forms, and artistic and iconographical expressions.

**RELIGST 15A. The Bible and Archaeology. 4 Units.**

An introduction to how archaeology has been used to illumine the Bible and biblical history. Did Abraham exist? Was there an Exodus? Did Joshua really conquer Canaan? What does archaeology reveal about ancient Israel beyond what is recorded in the Bible? This course will address such questions as it seeks to introduce biblical archaeology to students with no prior introduction to either the Bible or to archaeology.

Same as: CLASSGEN 15, JEWISHST 15A.

**RELIGST 16N. The Story of Human Virtues. 4 Units.**

Bravery, Temperance, Generosity, Justice, Wisdom, and Friendship. Plato and Aristotle on human virtues, and select Muslim, Jewish, Christian, and secular appropriations and transformations of that Greek heritage.

**RELIGST 16SI. Religion and Spirituality: LGBTQ Perspectives,. 1-2 Units.**

Many lesbian, gay, bisexual, transgender, and queer (LGBTQ) people today are finding that mainstream religious institutions do not meet their unique spiritual needs, and they are looking elsewhere to create meaningful spiritual lives. Examine various ways that LGBTQ people are creating and practicing religion and spirituality in the United States. Explore the diversity of American LGBTQ religious and spiritual traditions, both within and beyond the boundaries of traditional religions. Religious and spiritual practices created by and for LGBTQ people and communities, rather than the responses of religious institutions towards the reality of LGBTQ people in their midst. Students will be required to attend an LGBTQ worship service in a tradition of their choice. By the end of the course, students will have a better understanding of, and appreciation for, the diversity of religious and spiritual traditions within LGBTQ communities.

Same as: JEWISHST 16SI.

**RELIGST 18. Zen Buddhism. 4 Units.**

Classical Zen thought in China, and its background, origins, and development.

**RELIGST 19S. Angels in America: Western Religion and Contemporary Culture. 3 Units.**

How religion is presented in the media. Cultural representations that shape and disrupt this image of the relationship between being religious and being modern. How believers and doubters in Islam, Judaism, and Christianity are portrayed in popular culture. Sources include the music of Dar Williams and M.I.A., the plays of Tony Kushner, and the Canadian sitcom *Little Mosque on the Prairie*. How gay believers, agnostic leaders, terrorists, and born-again children of secular parents complicate the notion of religious belief in today's world.

**RELIGST 20. Beyond Good and Evil: A Thematic Introduction to the Zoroastrian Religion. 3 Units.**

Introduction to Zoroastrianism through a survey of its defining themes, including an examination of the figure of the prophet Zarathustra, modes of transmitting sacred knowledge, the nature of good and evil, and the importance of ritual practice and practitioners. Discuss how Zoroastrianism views the individual with respect to the body, the life cycle, and issues of gender and sexuality. Also discuss the intersection of "religion" and "ethnicity" that has defined Zoroastrianism from its origins in the 2nd millennium BCE in Central Asia up to the present day.

**RELIGST 20A. The Sun Also Shines on the Wicked: The Problem of Evil in Religious Thought. 3 Units.**

If God is omnipotent, omniscient, and omnibenevolent, then why is there Evil in the world? We will read and discuss the key thinkers and foundational texts from Plato and the Book of Job to Nietzsche and Dostoevsky in order to appreciate the diverse responses to this question. We will survey approaches such as skepticism and theodicy in the works of the Classical authors and among Christian, Jewish, and Islamic thinkers like Augustine, Maimonides, and al-Ghazali. We will also engage with earlier dualist traditions such as Zoroastrianism and Manicheism, and with the responses of Enlightenment thinkers such as Leibniz, Hume, and Kant. We will conclude with the most strident atheistic responses from contemporary philosophers like Richard Dawkins and Daniel Dennett.

**RELIGST 21. Religion in Science Fiction and Fantasy. 4 Units.**

Science fiction and fantasy create alternate worlds that incorporate religious institutions and beliefs that illuminate how we think about religion now and for the future. Texts work off diverse religious traditions: Islam, Buddhism, Catholic and Protestant forms of Christianity, ancient Sumerian and Mayan religion, and Voodoo are some that appear. Themes of free will and determinism, immortality, apocalypse and redemption. Myth, ritual, prophecy, the messianic hero, monasticism and mysticism. Texts like *Dune*, *Snow Crash*, *Count Zero* and the like explore religion in the contemporary imagination. Main assignment: write a short story.

**RELIGST 23. Exploring Judaism. 4 Units.**

Introduction to the varied beliefs, ritual practices, and sacred stories of Judaism, moving from foundational texts like the Bible and the Talmud to recent changes in Jewish religious life that have arisen in response to secular and feminist critiques, the Holocaust, and the emergence of the State of Israel.

Same as: JEWISHST 23.

**RELIGST 24. Exploring Christianity. 4 Units.**

The historical development of Christian religious thought and practice from Jesus to the present. Emphasis is on the formation of Christianity's major teachings and their transformation and diverse expressions in the medieval, reformation, and modern periods. Readings focus on primary texts.

**RELIGST 27. Exploring Islam. 4 Units.**

Introduction to Islam, its core beliefs and practices, through architecture and the arts. Explore the visual language through which these have been expressed across diverse Muslim societies.

**RELIGST 28SI. Interfaith@Noon. 1 Unitss.**

While most religious traditions make a distinction between believers and non-believers, some also posit a sense of responsibility to those outside the community, to "strangers" on the margins or beyond the boundaries of the group. This course is an attempt to explore how different religious traditions conceive of one's obligation to the stranger--of how to treat the stranger, the foreigner, the outsider--and to relate such perspectives to the issue of how immigrants are treated in contemporary society. A collaboration of the Office for Religious Life, the Haas Center for Public Service and the Religious Studies department, and intended as a companion experience for Stanford's response to President Obama's Interfaith and Community Service Campus Challenge, the course will explore these issues in the light of a series of guest lectures from scholars of religion, law, sociology, cultural studies, education, and social justice and will aim to help students draw connections between religion (and non-belief) and one's role as a global citizen.

**RELIGST 29. Men and Masculinity in Islam: Through the Prism of Texts, Art, and Films. 4 Units.**

Explore the meanings of manhood and constructions of masculine identity in Islamic tradition through major texts, art and films produced in Islamic societies and cultures.

**RELIGST 35. Introduction to Chinese Religions. 4 Units.**

An overview of major themes and historical developments in 5000 years of Chinese religion. In this course, we will try as much as possible to appreciate Chinese religion from the Chinese perspective, paying particular attention to original texts in translation in an attempt to discern the logic of Chinese religion and the role it has played in the course of Chinese history. To a greater extent perhaps than any other civilization, Chinese have left behind a continuous body of written documents and other artifacts relating to religion stretching over thousands of years, providing a wealth of material for studying the place of religion in history and society.

**RELIGST 37. Introduction to Japanese Religions. 4 Units.**

Major themes in Japanese religious culture, including gods, religious sites, and specialist and popular practices. Films and readings from literary, ethnographic, and historical sources in translation.

**RELIGST 46. Introduction to Daoism. 4 Units.**

(Formerly 56.) Historical survey from origins to the present. Main schools, notions, communal rites, and individual practices, and the relation of Daoism to facets of Chinese culture.

**RELIGST 49. Compassion and the World Religions: A Comparative Inquiry. 1-2 Units.**

The course explores the topic of compassion in the world religions. Questions addressed will include: Is compassion a shared value across world religions? What are the different perspectives on what compassion means or how it can be developed? What is the relationship between spiritual practice, social service, and the development of compassion according to various religious traditions? What is the relationship between self-compassion and compassion? Guest speakers will be brought to the class from multiple religions and also to represent the scientific perspective. The first half of the course will focus on early and Mahayana Buddhist perspectives on compassion, drawing on both texts and practices. The second half will examine texts and practices from other religious traditions. This course is offered in partnership with the Stanford Center for Compassion and Altruism Research and Education.

**RELIGST 54. The Roots of Right and Wrong in Christianity, Judaism, and Islam. 4 Units.**

What Christian, Jewish, and premodern Muslim thinkers have to say about these questions: what makes an act right or wrong; can a basis for right and wrong be identified independently of revealed religion; is observing commands and prohibitions sufficient to lead a life of virtue and refinement? Readings in primary texts.

**RELIGST 57. Millennium, Messiahs, and Mayhem. 4 Units.**

How the apocalypse has captured the imaginations and influenced the behaviors of many Jews and Christians who predict the end of the world during their lifetimes, whether facilitated by the arrival of a human or divine emissary, preceded by a cataclysm, or announced by a renunciation of normative morals. Examples include the Book of Revelations, the Dead Sea Scrolls, the Brotherhood of the Free Spirit, Shabtai Tzvi, Jacob Frank, the Mormons, and Chabad Chasidism.

**RELIGST 62. Philosophy of Religion. 4 Units.**

Classic and modern questions in the philosophy of religion traced through Western and Eastern traditions: the coherence of theism, relativism, verification and ethics of belief, and mystical experience. Readings from traditional and modern texts.

**RELIGST 62S. Philosophy of Religion. 3 Units.**

Key philosophical questions concerning the nature of the divine and the religious through a close reading of some classic philosophical texts, while aiming to develop critical thinking about these issues. Topics include: the existence and nature of God, the problem of evil, the justification of religious belief, the nature of and relationship between faith and reason, and the function(s) of religion. Key texts will include Plato, St. Anselm, Hume, and Nietzsche.

Same as: PHIL 77S.

**RELIGST 65. The Future of Christianity. 4 Units.**

Developments affecting the world's largest religion in the new millennium: shifting demographics leading to declining numbers in mainline Christian denominations in North America and Europe and the emergence of 'global Christianity' in Africa, Asia, and South America; the explosion of international Pentecostalism and other new Christianities; Christianity, global politics, and the global economy; Christian Muslim relations and conflicts. Will Christianity have a future? What kind of future?.

**RELIGST 66SI. Catholic Social Teaching. 1 Unitss.**

Catholic Social Teaching (CST) is a large and rapidly growing corpus of thought generated by the Catholic Church in its ongoing quest to understand and explore the proper role of the human person in society. In developing and promulgating CST, the Church seeks to apply the basic principles of Catholic theology and natural law to the various realms of human thought which touch on human communities and social interaction: political philosophy, economics, labor relations, war & peace, international trade, and many others. CST seeks to explore this body of knowledge through the lens of the seven key themes of CST popularized by the United States Conference of Catholic Bishops. Study various papal encyclicals and pastoral letters associated with CST, read commentary on and criticism of CST in its various aspects, and discuss the varying interpretations of CST that have emerged over the past decades, especially in the United States. As CST puts great emphasis on engagement with the community and service to the less fortunate, this course will also integrate several service learning experiences, in which we will leave Stanford to explore the praxis of the principles we study in modern society.

**RELIGST 67SI. Learning the Dialogue Method: An Approach to the Palestinian-Israeli Conflict. 1 Unitss.**

The class provides a safe, inclusive and productive environment for dialogue in difficult areas of conflict where religion and other cultural issues are intertwined with politics. Weekly topics include listening skills, difficult conversations, dealing with prejudice, and understanding narratives. The case we focus on is the Palestinian-Israeli conflict, but the skills we develop will be applicable to many other situations. Religious identity will be one of the perspectives that we explore, but an important aspect of our learning will be that religion cannot be isolated from other factors in political conflicts that involve religion.

**RELIGST 72. Philosophy of Religion. 3 Units.**

Course traces efforts within the Western tradition from Boethius through Anselm, Aquinas, Descartes, Hume, Kant, and Kierkegaard to Camus to establish a rational foundation for theist belief and its consistency or coherence with everyday experience. We will deal extensively with the criticisms that that effort has cast up and then turn to investigate issues that extraordinary or mystical experience raises. We will incorporate a look at Buddhist traditions as well as those in the west to gain insight into these questions. And finally, we will look at the ethics of belief, at our responsibility toward our commitments, and some of the varying positions available to us.

**RELIGST 82. Approaches to the Study of Religion: Christianity. 4 Units.**

Historical and contemporary Christianity from four viewpoints: ritual and prayer; sacred texts and creeds; ethics and life; and community governance.

**RELIGST 84. Mystics, Pilgrims, Monks, and Scholars: Religious Devotion in Medieval Christianity. 4 Units.**

The variety and vitality of religious expression in medieval Christian Europe. How Christians sought God through mystical encounter, the structure of monastic life, visits to shrines, devotion to the saints, and the study of scripture and ancient Christian wisdom. Readings focus on primary texts.

**RELIGST 90. Buddhism and Gender. 4 Units.**

In the Buddhist tradition there are contradictory approaches to gender: in some cases, gender is described as an illusion; in others, the female body is an impediment to enlightenment. How do Buddhists - men and women, lay and monastic - interpret these divergent views? Different Buddhist approaches to the category of gender. Values associated with masculinity and femininity in Buddhist philosophy, the gendered symbolism surrounding buddhahood, images of the masculine and feminine in Buddhist texts, and the experiences of lay and monastic men and women.

**RELIGST 95. How to Read the Bible. 4 Units.**

What does the Bible mean? Seeks to help students answer this question for themselves by introducing some of the many ways in which the Bible has been read over the ages. The focus will be the book of Genesis, but the real subject is the history of biblical interpretation; how Genesis has been understood by theologians, writers, artists, scholars and others; and the ultimate goal is not merely to engage the Bible itself but to gain a better appreciation of the act of reading, why people read differently and the consequences of that difference for religious history.

Same as: JEWISHST 95.

**RELIGST 101. Who is Allah?. 3 Units.**

Introduction to classical Islamic theology. How did notions about God's nature define theological communities? What made some ideas more likely than others to function as markers of group identity? Were the different sects distinguished by different methods of reading scriptures? Did differences in the interpretation of the Qur'an generate the communal divisions, or did differing communal identities generate different interpretations of the Qur'an? God's power (free will versus predestination) the age of the Universe (pre-eternal world vs coming into being at some point) roots of ethics (what makes an act right or wrong.) Readings of the greatest philosophers and theologians in classical Islam.

**RELIGST 102. Modern Islam. 5 Units.**

How Muslims have engaged in diverse ways with the Modern World and with new ethical, social and political challenges from the 19th century on.

**RELIGST 103. Religious Perspectives on Violence and Nonviolence, War and Peace. 2 Units.**

How do religious texts, traditions, believers and interpreters argue and act with regard to violence and nonviolence, war and peace? A series of distinguished lecturers from Stanford and beyond will speak on topics such as just war theory, pacifism, martyrdom, gender violence, law, nationalism, and inner peace, viewed through the lenses of religious identity, thought and practice.

**RELIGST 104. The Daoist Body. 4 Units.**

The human body as seen in Daoist traditions and related areas, particularly cosmology and medicine. Major sources including images and charts, and the views of the human being that they reflect.

**RELIGST 105. Religion and War in America. 4 Units.**

Scholars have devoted much attention to wars in American history, but have not agreed as to whether religion was a major cause or simply a cover for political, economic, and other motives. We will compare interpretations that leave religion out, with those that take it into account. We will also look at the impact of war on the religious lives of ordinary Americans. We will examine both secondary as well as primary sources, beginning with King Philip's War in the 17th century, and ending with the "War on Terror" in the present day.

Same as: HISTORY 154D.

**RELIGST 107. Hindus and Muslims in South Asia. 4 Units.**

The history of Hindus and Muslims living together in S. Asia for over 1,000 years. Peace and conflict, composite cultures, and interdependent social worlds. Partition in 1947 and the creation of separate nations. Religion, arts, society, and politics.

**RELIGST 108. The Mahabharata. 4 Units.**

How the Sanskrit epic and its versions in other languages are interwoven with the history of Hinduism and S. Asian arts, philosophy, and social and political thought. How the text is interpreted through performance, including village ritual dramas, classical dance, and mass market television.

**RELIGST 108A. Religious Epics of India: The Ramayana. 4 Units.**

The much-loved Ramayana story, from the ancient Sanskrit epic poem of Valmiki to other avatars through the ages--vernacular and Sanskrit poetry, theater, the chart-busting television serial of the late 1980s, classic comics, animated film. Religion, politics, cultural ideals, gender, media. Recent battles over "Ram's birthplace" in Ayodhya and their effects on Hindu-Muslim relations and political power.

**RELIGST 108D. Technology and Religion in South Asia. 3-5 Units.**

The history of technology (depending on how we choose to define the term) in South Asia is deeply connected to the history of colonialism and the practice of religion. In this class we will trace the arrival of the printing press, cinematic technology and television in the subcontinent and look at the impact it had on the practice of religion, national identity and consumption. This seminar is inter-disciplinary in approach and will study the intertwining of Hinduism and visual culture through Indian literary texts, sculpture, painting, dance, theatre and film; with a focus on the visual and the modern. No attempt will be made to comprehensively survey all related modes and texts; rather the seminar will focus on specific forms based on their relation to contemporary themes of technology, the self, the popular, divinity and power. Each body of material will be placed within its specific socio-economic, historical, religious and artistic context.

Same as: FILMSTUD 208D.

**RELIGST 109. Emperor, Explorer, and God: Alexander the Great in the Global Imagination. 3 Units.**

Survey of the image of Alexander the Great from the Hellenistic world to the contemporary. We shall discuss the appropriation of Alexander's life and legend and examine his reception as both a divine and a secular figure in a variety of cultures both East and West. Students will engage with a variety of media including texts (primary and secondary) and images (statues, coins, mosaics, illuminated manuscripts, film, and TV) in the Hellenistic, Roman, Byzantine, Jewish, Islamic, Medieval, Renaissance, and Early Modern contexts. Finally, we will evaluate contemporary representations of Alexander in TV, film and popular culture, such as William Shatner's and Adam West's 1968 TV pilot, Oliver Stone's 2004 film, and Andy Warhol's Pop art.

Same as: CLASSGEN 109.

**RELIGST 110. Islam, Art, Modernity. 3-5 Units.**

Taught in conjunction with a major exhibition of modern Islamic art at the Cantor Museum. We will consider theoretical discussions regarding art and modern Muslim identities and examine the use of Islamic motifs in art and architecture in detail.

Same as: RELIGST 310.

**RELIGST 111. Religions of Mexico. 4 Units.**

Key issues in the study of religion and religions of Mexico. Sacred cities of the Aztec and Maya, the encounter between Christianity and indigenous religions and contemporary religious performances in Mexico and among Mexican Americans. Theoretical frames of Mircea Eliade, Emile Durkheim, and Victor Turner. Emphasis is on the recently recovered indigenous codex known as the Mapa de Cuauhtinchan #2.

**RELIGST 112. Handmaids and Harlots: Biblical Women in Jewish and Christian Traditions. 4 Units.**

Miraculous births, wandering in the wilderness, encounters with angels: stories of Hagar, Sarah, Hannah, and Mary, and how their tales are read and re-told by later Jews and Christians. Sources include the Hebrew Bible and New Testament, Jewish and Christian commentary, and religious iconography.

**RELIGST 113B. Japanese Religion Through Film. 4 Units.**

Themes in premodern and modern Japanese religion through animations, movies and documentaries.

**RELIGST 114. Caste, Religion, and Dalit Liberation in India. 2-4 Units.**

'Caste' points to systems of social hierarchy based on birth, long prevalent in India, associated with Hinduism but also practiced by non-Hindu groups. 'Dalit' is a modern, politically positive name for the most oppressed caste groups, the so-called 'untouchables.' Though specific to India, the study of caste touches themes relevant to social inequality everywhere. A series of lectures and films by distinguished scholars and directors, illuminating the nature and history of caste and modern movements to end untouchability, Same as: ANTHRO 114A.

**RELIGST 114B. Religions of Korea. 1-4 Units.**

Religious traditions in Korea from antiquity to the present. An examination of texts including Buddha tales, official histories, spatial representations, popular literature, modern media reports and other primary sources. The impact of imperialism, modernity, and nationalism on the contemporary practice of religion.

**RELIGST 115. Hope and Prophetic Politics: Abraham Joshua Heschel and Martin Luther King, Jr.. 4 Units.**

The biblically informed prophetic tradition that has long shaped the history of American religious and political thought and that has often clashed with an impulse towards empire and the desire to accumulate power. Focus is on Abraham Joshua Heschel and Martin Luther King, Jr., 20th-century religious intellectuals whose lives and works draw on this tradition to raise and address questions basic to the role of religion in public life.

**RELIGST 117. Christianity in 21st Century America. 4 Units.**

As the largest religion practiced in the United States, Christianity not only shapes the lives of a large number of its citizens but also impinges on public discourse, policies, and debates. This course investigates the ways in which Christianity in America is changing and what these changes bode for its role in the public and private spheres. Issues include shifting demographics lead to declining numbers in 'mainline' denominations; the polarization of Christian conservatives and religious 'nones'; interfaith toleration and cooperation alongside interreligious conflict; the rise of 'spiritual, not religious' young adults; the effects of immigration; religion and science.

**RELIGST 119. Gandhi and His Legacy: Violence and Nonviolence. 4-5 Units.**

Gandhi, the pioneer of nonviolent political struggle in the first half of the 20th century, is used as a springboard to study violence more broadly; what it is, what it does to individuals and societies, how it can be addressed and transformed. Special attention to connections between (non)violence on an individual/personal level and in the larger world. New format includes both academic study and experiential workshops.

**RELIGST 123. Islam Today. 4 Units.**

Case studies from the Muslim world to explore contemporary developments that affect Muslims in maintaining religious identity and continuity.

**RELIGST 124. Sufi Islam. 4 Units.**

The complex of Islamic intellectual and social perspectives subsumed under the term Sufism. Sufi mystical philosophies and historical and social evolution. Major examples include: Qushayrî, Râbi'a, Junayd, Hallâj, Sulamî, Ibn al-'Arabî, Rûmî, Nizâm al-Dîn Awliyâ'. Social and political roles of Sufi saints and communities. Readings include original prose and poetry in translation, secondary discussions, and ethnography.

**RELIGST 125. Authority of the Past in Islamic Thought. 4 Units.**

How have Muslims thought about the past as a source for contextualizing the present and generating prescriptions for right conduct? What imaginations of time undergird major Islamic intellectual perspectives? A wide-ranging exploration based on readings from the Quran, lives of prophets, chronicles, philosophy of history, hagiography, epic and mythology, and ethnography. Same as: RELIGST 331.

**RELIGST 126. Protestant Reformation. 4 Units.**

16th-century evangelical reformers (Luther, Calvin, Zwingli) and reform movements (Lutheran, Reformed, Anabaptist) in their medieval context.

**RELIGST 127A. Kabbalah: The Mystical Teachings of Judaism. 2 Units.**

Jewish mystical literature, especially the Zohar. Mystical concepts of the divine: masculine and feminine aspects of the Godhead, divine sonship; eroticism and sexuality; cosmogony and apocalypse; mystical secrecy and popularization, including the contemporary Kabbalah movement in the U.S. and figures such as Madonna and Roseanne. Guest lectures by scholars of Kabbalah including Moshe Idel from Jerusalem and Daniel Matt, the American translator of the Zohar.

**RELIGST 128. The Five Books of Moses. 4 Units.**

A survey of the first five books of the Hebrew Bible/Old Testament-- Genesis, Exodus, Leviticus, Numbers and Deuteronomy; that will explore their authorship, form and meaning. Same as: JEWISHST 128.

**RELIGST 129. Modern Jewish Thought. 4 Units.**

From the early Enlightenment to the present. Universalism, subjectivity, and redemption within Judaism's encounter with modernity as reflected on by Jewish intellectuals within the Western philosophical tradition; how modern Jewish intellectuals have shaped and been shaped by current debates. Challenges to religious identity by secularism, capitalism, and the nation state. Messianism, mysticism, reactionary romanticism, critical theory, post-Holocaust philosophy, spirituality, and feminism. Thinkers include Spinoza, Marx, Freud, Buber, Strauss, the Frankfurt school, Benjamin, Arendt, and Levinas.

**RELIGST 130. Genesis and Gender: Male and Female in Judaism, Christianity, and Islam. 4 Units.**

What does it mean to be a man or a woman? And what role have classical and religious traditions played in shaping understandings of gender differences? Investigation of the construction of gender identities, roles, and differences in Greek and Roman sources and three monotheistic faiths. Interpretation and retellings of the story of Adam and Eve in the Bible and the Qu'ran, commentaries, lives and practices of religious communities, religious iconography down to the present. Same as: JEWISHST 120.

**RELIGST 132. Jesus the Christ. 4 Units.**

How did Jesus of Nazareth, who never claimed to be Christ or divine, become the son of God after his death? Sources include the history of first-century Judaism and Christianity.

**RELIGST 132B. Early Christianity, Early Judaism, and Gender. 4 Units.**

An exploration of gender in Early Christianity and Early Judaism. Possible topics include: an examination of Pre-Christian writings which are indicative of the foundational social contexts in which early Christian and Jewish writers operated; how women's preaching was portrayed in Paul's letters and the implications for what was actually going on in the community in Corinth; later interpretations of Paul's attitudes towards women and marriage, which diverge between a pro-marriage and further restrictive understanding of women's involvement in the Church in the pastorals (1 and 2 Timothy and Titus) and a pro-ascetic, cross-dressing, understanding of greater women's freedom in the Acts of Paul and Thecla; female Christian martyrs who had visions of themselves as men entering battle and male Rabbis who understood themselves as female virgins and who hid in warehouses to avoid martyrdom; and a survey of early Rabbinic laws pertaining to men and women and what they reveal about early Jewish conceptions of gender.

Same as: CLASSGEN 134, JEWISHST 122B.

**RELIGST 132C. How Jesus the Jew became God. 4 Units.**

Contemporary historical-critical methods in investigating how one might study Jewish and Christian texts of the 1st century CE. Social contexts including economic realities and elite ideological views. What can be known historically about 1st-century Judaism and Jesus' part in it. How Jewish apocalyptic messianism shaped the birth of Christianity and its trajectory through the 1st century.

**RELIGST 132D. Early Christian Gospels. 4 Units.**

An exploration of Christian gospels of the first and second century. Emphasis on the variety of images and interpretations of Jesus and the good news, the broader Hellenistic and Jewish contexts of the gospels, the processes of developing and transmitting gospels, and the creation of the canon. Readings include the Gospel of John, the Gospel of Mark, the Gospel of Thomas, the Gospel of Mary and other canonical and non-canonical gospels.

Same as: CLASSGEN 132.

**RELIGST 133. Inventing Christianity in Late Antiquity. 4 Units.**

The transformation of an apocalyptic sect into an imperial religion from 200 to 600 C.E. Shifts in structures of authority, worship, and belief mapped against shifts in politics, economics and religion in the larger Roman empire. Cultural visions of this history including Edward Gibbon's *Decline and Fall of the Roman Empire*, Dan Brown's conspiracy theory in *The Da Vinci Code*, and Elaine Pagels' *The Secret Gospel of Thomas*.

**RELIGST 134. Sacred Space. 4 Units.**

Religions throughout history have marked certain spaces as out-of-the-ordinary, as places where the gods reveal themselves, where special events have taken place, where one can see and experience things not possible in ordinary space. Individuals and groups who enter and create these sacred spaces create the opportunity to transcend the everyday world. Some of these spaces are natural--mountains, rivers, deserts. Others are constructed--temples, churches, tombs. This course will explore such sacred spaces: how they come to be, what distinguishes them from ordinary space, what happens in them. Part of the course will be theoretical, looking at different approaches to sacred spaces developed by recent scholars of religion; part of it will be focused on specific sacred spaces, especially in Israel and America, and the course will conclude with a chance for students to explore the variety of sacred spaces found in our own community.

**RELIGST 136. Buddhist Yoga. 4 Units.**

Buddhist models of spiritual practice emphasizing issues in the interpretation of the contemplative path.

**RELIGST 139. Nihilism. 3-5 Units.**

The history of a religious specter. Examine the challenges and promises of "nihilistic thinking" in the wide context of European moral thought, focusing on the role it played in major 19th/20th century critiques of modernity (notably with the so-called "end of metaphysics"). Particular emphasis will be on the role of "nothing" as category of thought, and why so many religious thinkers and philosophers have tried to make something out of it. Readings to include Pascal, Jacobi, Kierkegaard, Nietzsche, Barth, Heidegger, Benjamin, Nishitani, Arendt, and the "return to religion" in late postmodern thought. Examples from literature/art and culture (Doestoevsky, Dada, contemporary culture critique) to enrich and ground the discussions.

**RELIGST 140. RELIGION AND ETHICS: The Limits of Dialogue. 3 Units.**

How do religious traditions address ethical problems? Although the good seems like a universal goal, religious traditions force us to consider non-universal ways of defining it. From marriage to genetic engineering, from abortion to organ donation, issues of community, faith, and practice continue to complicate our ethical thinking. Exploration of case-studies and concepts, with readings from Kant, Foucault, Butler and others, as well as Jewish and Christian interpretations of the Bible.

**RELIGST 144. John Calvin and Christian Faith. 4 Units.**

Close reading and analysis of Calvin's *Institutes of the Christian Religion* as a classic expression of Christian belief.

**RELIGST 146. Religious Mystery and Rational Reflection. 4 Units.**

Explores the boundaries of rational knowledge about Christian faith through a careful reading of the transcendental project of Jesuit theologian Karl Rahner. Rahner's thought, informed by various sources (e.g., the mystics, Aquinas, Kant, Hegel and Ignatius Loyola), results in an interpretation of Christian faith that strives for intellectual honesty in the face of challenges from science, atheism and post-modern culture. Yet it leaves room for a fundamental human openness to the source and goal of self-transcendence, what Rahner calls Holy Mystery. Weekly short position papers will be required to stir both reflection and discussion.

**RELIGST 148. From Jesus to Paul. 4 Units.**

Jesus considered himself God's definitive prophet, but he did not think he was God, and had no intention of founding a new religion. How did this Jewish prophet become the gentile God and the founder of Christianity? The role of Paul.

**RELIGST 148A. St. Paul and the Politics of Religion. 4 Units.**

The major letters written by Paul, the Apostle, and his biography, Acts of the Apostles. Historical context in first century Jewish cultural politics. Origins of Christianity, and the split into Judaism and Christianity. The relationship between Jews and non-Jews. The juxtaposition of law and faith. Origins of cultural universalism. Paul as Jewish radical versus Paul, the first Christian thinker and theologian. Recent philosophical readings of Paul (Taubes, Badiou, and Agamben).

**RELIGST 150. The Lotus Sutra: Story of a Buddhist Book. 4 Units.**

The Lotus school of Mahayana, and its Indian sources, Chinese formulation, and Japanese developments.

**RELIGST 151. Religious Poetry of India. 4 Units.**

India has a rich literature of devotional and mystical poetry composed by "poet-saints" in common vernacular languages. This passionate and contemplative poetry flourished between the 6th and 18th centuries, inspiring religious and social movements that are still vibrant today. It also lives as music, remaining popular and powerful in the form of songs in many styles. We will study this material through the lenses of poetry, religion, performance, and politics

Same as: RELIGST 251B.

**RELIGST 151A. Buddhist Art in a Cosmopolitan Environment. 4 Units.**

The Buddhist art of Gandhara, historical Northwest India, was the product of a complex interplay of different cultures, religions and societies in the region. Gandharan art from the historic circumstances that led to its development in the first century AD to its gradual disappearance in its homeland around 500 AD.

**RELIGST 154. Buddhism Today: Responses to New Global Challenges. 4 Units.**

How do the traditions of Buddhism cope with new social, ethical, and global challenges? Case studies from Sri Lanka, Japan, and the West. The historical position of Buddhist social thought. Buddhism's ascetic and meditative legacy: friend or foe of social engagement?.

**RELIGST 156. Goddesses and Gender in Hinduism. 4 Units.**

India's tradition of worshiping female forms of the divine, including Kali, Durga, Lakshmi, Saraswati, Radha, Sita, and local deities. The stories, histories, iconographies, theologies, arts, and practices associated with these goddesses. How the worship of goddesses impacts the lives of women. Readings include *Is the Goddess a Feminist?*.

**RELIGST 159. Religion and Music in South Asia. 4-5 Units.**

How music and other arts in South Asia are intertwined with religion. Classical, devotional, folk, and popular examples introduce Gods as musicians, sound as God, music as yoga, singing as devotion, music as *ecstasy*-inducing, music as site for doctrinal argument, music and religion as vehicles for nationalism. Co-taught by professors of Music and Religious Studies, focusing Hinduism and Islam in India, Pakistan, and the diaspora. Music practice along with academic study; guest artists and films; no background required.

Same as: MUSIC 186, MUSIC 286.

**RELIGST 159A. Religion and Performance. 4 Units.**

What happens when religion is viewed through the lens of performance? Texts become dramas, songs, recitations, oral commentaries, dances, movies, and political appropriations. Beliefs become embodied enactments; doctrine puts on a costume and indulges in role play. Approaches to performance theory through religious enactments such as ritual, prayer, festival, drama, music, and film. Most examples from S. Asian religions; students may undertake research projects into other cultures and traditions. Same as: RELIGST 359A.

**RELIGST 161. Modern Religious Thought: From Galileo to Freud. 4-5 Units.**

The three centuries following the Protestant Reformation led to a gradual clarification of the notions of the religious and secular and gave rise to a new genre of religious thought, ideally freed from theology, church or synagogue-a secular philosophy of religion, or in some cases a religiously-imbued philosophy. We will examine some of the foundations of religious thought in modernity, including Galileo, Spinoza, Diderot, Kant, Hegel, Schleiermacher, Kierkegaard, Feuerbach, Marx, Nietzsche and Freud.

**RELIGST 167. Medieval Religious Philosophy. 4 Units.**

(Same as PHIL 101A.) Survey of medieval philosophy, focusing on God, world and words. A pervasive assumption about the structure of the world, that it reflected the categories of God's mind and emerged from an act of divine speech, gave impetus to the interest in the nature of language and its relation to the world. Scripture served as one kind of divine communication to human beings, and "The Book of the World" as another. The problem of universals, the question of how words relate to God, epistemology, theories of reference, semiotics, are some of the topics discussed. Readings from Augustine, Anselm, Aquinas, Scotus, and Ockham, etc. Same as: PHIL 101A.

**RELIGST 168. Philosophy of Religion. 3 Units.**

Course traces efforts within the Western tradition from Boethius through Anselm, Aquinas, Descartes, Hume, Kant, and Kierkegaard to Camus to establish a rational foundation for theist belief and its consistency or coherence with everyday experience. We will deal extensively with the criticisms that that effort has cast up and then turn to investigate issues that extraordinary or mystical experience raises. We will incorporate a look at Buddhist traditions as well as those in the west to gain insight into these questions. And finally, we will look at the ethics of belief, at our responsibility toward our commitments, and some of the varying positions available to us.

**RELIGST 170A. Biblical Hebrew, First Quarter. 1 Unitss.**

Establish a basic familiarity with the grammar and vocabulary of Biblical Hebrew and will begin developing a facility with the language. Students that are enrolled in this course must also enroll in Beginning Hebrew. This course requires no prior knowledge of Hebrew and will begin with learning the alphabet. By the end of the year, students will be able to translate basic biblical texts, will be familiar with common lexica and reference grammars, and will have sufficient foundational knowledge to enable them to continue expanding their knowledge either in a subsequent course or own their own. Same as: AMELANG 170A, JEWISHST 107A.

**RELIGST 170C. Reading in Biblical Hebrew. 4 Units.**

Third of a three quarter sequence. Readings and translation of biblical narratives emphasizing grammar and literary techniques. Prerequisite: AMELANG 170B.

**RELIGST 172. Sex, Body, and Gender in Medieval Religion. 4 Units.**

Medieval conceptions of sex, body and of gender were both like and very unlike our own. Religious doctrines of the Incarnation and Eucharist, Virgin Birth and Immaculate Conception, as well as Christ's Passion, the martyrdom of saints, clerical celibacy, ideals of chastity and of ascetic self denial, put all sex, body and gender at the center of salvation and damnation. A variety of literary, monastic, and mystical texts as well as art will provide the context for exploring this cultural and religious intersection.

**RELIGST 173. What is Enlightenment? Religion in the Age of Reason. 4 Units.**

Many contemporary attitudes towards religion were forged in 17th- and 18th-century Europe in the midst of heated debates over the meaning and value of Christianity in a world 'come of age': Liberal calls for justice, toleration, and pluralism in matters religious; secular suspicions about religious superstition, fanaticism, and ideology; skepticism regarding the solubility of ultimate questions of meaning and metaphysics. Seminal readings on religion from Descartes, Pascal, Leibniz, Voltaire, Hume, Mendelssohn and Kant.

**RELIGST 174E. Kierkegaard: Existentialism and Religion. 4 Units.**

Kierkegaard is rightly called one of the founders of existentialism. Like Socrates, the one philosopher in the western tradition to whom he felt consciously in debt, Kierkegaard sought to return philosophy to the work of thinking through the human condition in all its uncertainty and finitude. Although 20th century existentialists like Sartre and Camus were self-consciously atheist, Kierkegaard's existentialism has religious origins. Through readings of Kierkegaard's philosophical and religious texts, explore the possibility of an existentialist interpretation of the human condition that is religious in nature. Kierkegaard's development of a 'philosophy of existence' as a response to major trends in modern European thought, particularly in response to the philosophies of German idealism (Kant, Hegel) and romanticism. Same as: RELIGST 374E.

**RELIGST 176. Religious Diversity: Theoretical and Practical Issues. 4 Units.**

What does it mean for a religion to be true? If one religion is true, what about the truth of other religious possibilities? How, and why, should religious traditions be compared? Readings address tolerance and pluralism, relativism, comparative theory, and new religious virtues.

**RELIGST 183. The Death of God: Between Hegel and Marx. 4 Units.**

The radical transformations in Western notions of God between the death of Hegel and the birth of historical materialism, arguing that questions about theism and atheism, humanism, and history formulated in the period 1831-50 are still pertinent today. Texts from Hegel, the young Hegelians, Feuerbach, and Marx on issues of God, history, and the social dimensions of human nature.

**RELIGST 185. Prophetic Voices of Social Critique. 4 Units.**

Judges, Samuel, Amos, and Isaiah depict and question power, strong leaders who inevitably fail, the societal inequities and corruption inevitable in prosperity, and the interplay between prophet as representative of God and the human king. How these texts succeed in their scrutiny of human power and societal arrangements through attention to narrative artistry and poetic force, and condemnation of injustice. Includes service-learning component in conjunction with the Haas Center.

**RELIGST 188A. Issues in Liberation: El Salvador. 4 Units.**

Within the context of US intervention in Central America the course investigates the history of liberation movements in El Salvador (including liberation theology), as well as ethical questions relating economic, social, and political issues in that country. This class will likely include immersion travel to El Salvador over spring break and consequently the size of this course is limited. Students will be given an application by email. All applications will be reviewed to determine final class enrollment.

**RELIGST 199. Individual Work. 1-15 Units.**

Prerequisite: consent of instructor and department. May be repeated for credit.

**RELIGST 201. Classical Islamic Law. 3-5 Units.**

Emphasis is on methods of textual interpretation. History of premodern Islamic law, including origins, formation of schools of law, and social and political contexts. Laws of sale, marriage, divorce, and the obligation to forbid wrong.

Same as: RELIGST 301.

**RELIGST 201A. Gender in Classical Islamic Law. 3-5 Units.**

The course examines classical Islamic society and law. It covers historical development, the unity and diversity of Muslim legal traditions, and the relationship between laws and values. Constructions of gender in law are examined through rituals, marriage, divorce, birth control, child custody, and sexuality.

Same as: RELIGST 301A.

**RELIGST 202A. Monsters, Ghosts and Other Fantastic Beings: The Supernatural and the Mysterious in Japanese Culture. 4 Units.**

Examine the development of strange and fantastic creatures in Japan. Mysterious creatures in folklore, literature, art, manga and movies. Through them see how the concept of the strange or mysterious have evolved and how they inform Japanese modernity.

**RELIGST 203. Myth, Place, and Ritual in the Study of Religion. 3-5 Units.**

Sources include: ethnographic texts and theoretical writings; the approaches of Charles Long, Jonathan Z. Smith, Victor Turner, Michael D. Jackson, and Wendy Doniger; and lived experiences as recounted in Judith Sherman's *Say the Name: A Survivor's Tale in Prose and Poetry*, Jackson's *At Home in the World*, Marie Cardinal's *The Words to Say It*, and John Phillip Santos's *Places Left Unfinished at the Time of Creation*.

Same as: RELIGST 303.

**RELIGST 204. Paleography of Medieval and Early Modern Manuscripts. 3-5 Units.**

Introductory course in the history of writing and of the book, from the late antique period until the advent of printing. Opportunity to learn to read and interpret medieval manuscripts through hands-on examination of original materials in Special Collections of Stanford Libraries as well as through digital images. Offers critical training in the reading of manuscripts for students from departments as diverse as Classics, History, Philosophy, Religious Studies, English, and the Division of Languages Cultures and Literatures.

Same as: CLASSGEN 311, DLCL 209, ENGLISH 209, HISTORY 309G.

**RELIGST 205. Religious Poetry. 4 Units.**

Religious poetry drawn from the Islamic, Christian, Confucian and Daoist traditions. Limited enrollment or consent of the instructor required.

**RELIGST 207A. Modern African Islam through Literature. 4 Units.**

Read the works of Modern Muslim Literature in Africa. Explore the expressions and modes by which Islam and its contemporary condition are represented in African contexts.

Same as: RELIGST 307A.

**RELIGST 207B. Islam in Central Asia. 4 Units.**

The history and current status of Islam in Central Asia, addressing problems in prevailing approaches to the subject in light of historical patterns and critical analysis; it will consider how the study of religion in Central Asia before the region's incorporation into the Russian/Soviet and Chinese states can help us understand developments in Muslim religious life through the 20th century and today. Issues to be addressed include Islamization and communal identity; religion and national cultures; scales of religiosity and framing Muslim status; religious knowledge and practice in social context; the dichotomies of Sovietology; Sufism, shrines, and popular religion; and Islam and political discourse and practice.

Same as: RELIGST 307B.

**RELIGST 208A. Ex Oriente Lux: Orientalism and the Study of Religion. 3-5 Units.**

This seminar is designed to expose students to issues relating to discourse and subjectivity within the textual constructions of Oriental religions in the colonial era. We will begin with Edward W. Said's provocative work on notions of representation and power embedded in the discourse on the Orient that established, produced, and, ultimately, perpetuated western knowledge about the Other. We will then discuss the impact of the Oriental Renaissance and the vital role that Eastern wisdom played in constructing the field of Comparative Religious Studies. In addition, students will also read ethnographies, fables, and travelogues that both support and undermine Said's thesis of an active West constructing a largely passive East.

Same as: RELIGST 308A.

**RELIGST 209. Priests, Prophets, and Kings: Religion and Society in Late Antique Iran. 4-5 Units.**

From India to the Levant and from the Caspian Sea to the Arabian Peninsula, the Sasanian Empire (224-651 CE) was the dominant power in the Middle East till the advent of Islam. Diverse religious institutions and social practices of the Zoroastrians, Manicheans, Jews, and Christians in late antique Iran. Complex relationships between the Zoroastrian priesthood, the Sasanian monarchs, and these minority religions within the context of imperial rule. Profound religious and social changes that occurred with the Islamic conquests of Iran as well as examine the rich cultural continuities that survived from the Pre-Islamic past.

Same as: CLASSGEN 106, CLASSGEN 206, RELIGST 309.

**RELIGST 209A. Sugar in the Milk: Modern Zoroastrianism as Race, Religion, and Ethnicity. 4-5 Units.**

Modern Zoroastrian experience as race, religion, and ethnic identity. Some 60,000 Zoroastrians now live in India and have resided there for a millennium. In the 19th century, these peoples from Persia/Parsis became colonial elites yet were acutely aware that they were not quite Indian, British, or Persian. Diverse ways this experience of dislocation has served as a defining characteristic in Parsi communal identity and contrast these South Asian experiences with the minority socio-politics of those who remained in Iran. Survey the colonial and post-colonial communities in England, East Africa, Hong Kong, Australia, and North America and examine the expression of these global diasporic experiences in literature and the arts.

Same as: RELIGST 309A.

**RELIGST 209C. Religious Thought in Modern Iran. 4 Units.**

Examine a number of outstanding intellectuals and religious reformers/thinkers who have had an enduring impact on culture formation in the modern Iran. The Constitutional revolution and its eminent supporter cleric, Ayatollah Naeeni; Ahmad Kasravi, Jalal Ale, Ahmad, Bazargan, Shariati, Motahari, Khomeini, Fardid and eventually Soroush. Trends like Tudeh Parti, Hojjatyeh and Fedayeeane Eslam may also be briefly discussed. Familiarity with Persian language is strongly recommended. Taught by Hossein Dabbagh (aka ABDULKARIM SOROUSH).

Same as: RELIGST 309C.



**RELIGST 209D. 'Crow Eaters' & 'Fire Worshippers': Exploring Contemporary Zoroastrianism Thru Reading Parsi Lit. 3-5 Units.**

In the past three decades Parsi fiction has rapidly emerged as a unique and creative voice in modern Anglophone literature from South Asia. From Bapsi Sidhwa to Thrity Umrigar to Rohinton Mistry, Parsi novelists address the most poignant concerns of Zoroastrians living in an era of rapid social, political, and religious transformation. The erosion of tradition; the breakdown of the Parsi family; the demise of religion among the young; and the cultural losses and gains of living in diaspora are common themes in their works. The unique vantage point of the Parsis; neither Hindu nor Muslim, neither quite Indian nor quite British; will serve as a lens for examining the inherent tensions in multicultural societies both East and West.

Same as: RELIGST 309D.

**RELIGST 209E. Imperishable Heroes and Unblemished Goddesses: Myth, Ritual, and Epic in Ancient Iran. 3-5 Units.**

Designed as a broad introduction to the world of ancient Iran, students will be introduced to the Indo-European inheritance in ancient Iranian culture; the shared world of ritual, religion, and mythology between Zoroastrianism in Iran and Vedic Hinduism in India; and to the contours of early Zoroastrian religious thought. We will also survey mythoepic literature in translation from the archaic Avesta through the late antique Zoroastrian Middle Persian corpus to the early medieval national epic of Iran, the Book of Kings of Ferdowsi.

Same as: CLASSGEN 189, CLASSGEN 289, RELIGST 309E.

**RELIGST 210. Translating the Daode Jing. 4 Units.**

One of the most frequently translated works in world literature. Challenges faced by translators, support from commentaries and related sources, and assumptions underlying translations into Western languages. Recommended: classical Chinese.

**RELIGST 212. Chuang Tzu. 5 Units.**

The *Chuang Tzu* (Zhuangzi) in its original setting and as understood by its spiritual progeny. Limited enrollment.

**RELIGST 215A. Chinese Buddhism. 4 Units.**

This course provides an overview of the major themes and historical developments in 2000 years of Buddhist history in China, from its early transmission from India to contemporary developments in the PRC, Taiwan and Hong Kong. Themes include monasticism, doctrine, popular devotion, state policy and the encounter with modernity.

Same as: RELIGST 315A.

**RELIGST 216. Japanese Buddhism. 4 Units.**

Focus on the religious lives of lay people in medieval Japan, as evidenced in collections of Buddhist stories (setsuwashu), narrative picture scrolls (emaki), and related historical materials. All readings are in English, but the instructor will also work with students interested in reading the original Japanese.

**RELIGST 217. Japanese Studies of Religion in China. 3 Units.**

(Graduate students register for 317.) Readings in Japanese secondary sources on Chinese religions.

Same as: RELIGST 317.

**RELIGST 219. Buddhism and Death. 4 Units.**

The role of pre and post mortem practices in ancient and modern Buddhist traditions; examples from India, China, and Japan. How the clergy and laity conceived of the process of dying, and how those beliefs were transformed into rituals.

**RELIGST 219A. Death and the Afterlife in Buddhism. 2-5 Units.**

This course examines the beliefs and practices related to death and the afterlife found in Buddhism. It explores the complexity of Buddhist understandings of death and the afterlife by studying the various representations of death and the afterlife in various Buddhist traditions through canonical and non-canonical sources.

**RELIGST 220. Modern Islamic Thought: Philosophy, Politics, Society. 5 Units.**

Focus is on major challenges of the modern period. Historicity and plurality. Questions concerning governance, law, development, and political and social order in majority and minority Muslim contexts. Readings include original works in English and in translation.

**RELIGST 220A. Great Books of Islamic World. 3-5 Units.**

This course is a historical and literary journey in the Islamic world. It is an examination of the most well known and widely read texts produced in the pre-modern Islamic world. We will read the major books, which have shaped cultures and values in the Islamic societies, such as the Qur'an, the Arabian Nights: Tales of 1001 Nights, Rumi's Mathnawi, and Attar's The Language of The Birds (Mantiq al-Tayr). All readings will be in English. No prior knowledge of Islam required.

**RELIGST 220B. Crypto-Muslim Culture in Early Modern Spain. 3-5 Units.**

What is known about the secret religious practice and culture of the Moriscos, Spain's large minority community of Muslim converts to Christianity (1500-1609)? What role did their handwritten literature (largely Islamic texts written in Castilian but copied out in Arabic script) play in the formation and maintenance of their culture? What can these Crypto-Muslim communities teach us regarding the place of Muslim culture in Western Europe today? The course will be taught in English; knowledge of Spanish and/or Arabic script is useful but not necessary.

Same as: ILAC 214.

**RELIGST 220C. Islamic Manuscript Illumination: History, Theory, and Practice. 4 Units.**

Comprehensive introduction to the history, theory, and practice of Islamic manuscript illumination (tazhip). The class will begin with a review of this art in general and its relationship with other Islamic book arts, such as binding, miniature painting, and calligraphy, and then move on to study the symbolic language, classical motifs, symbols, and patterns in Islamic manuscript illumination. However, the emphasis will be on actual drawing and painting, employing traditional techniques used in Islamic manuscript illumination. No prerequisite.

**RELIGST 221. The Talmud. 4 Units.**

Strategies of interpretation, debate, and law making. Historical contexts. Prerequisite: Hebrew.

Same as: RELIGST 321.

**RELIGST 221A. Philology of Rabbinic Literature. 3-5 Units.**

The genesis of rabbinic texts as texts. Evolution from oral stage to manuscript to printed text. Questions of redaction versus edition. Focus on Palestinian and Babylonian Talmud, with excursions into midrashic texts. Prerequisite: strong background in Hebrew. Knowledge of Aramaic preferred.

Same as: RELIGST 321A.

**RELIGST 221B. What is Talmud?. 5 Units.**

In what sense can Talmud be studied as literature? Which voices can be identified? Concepts of author, editor, or redactor. The basic textual units of Talmud: sugya, chapter, and tractate. The sugya as literary genre. The aesthetic of talmudic dialectics. Prerequisite: reading Hebrew with some understanding of biblical Hebrew

Same as: RELIGST 321B.

**RELIGST 221C. Aramaic Jewish texts. 2-5 Units.**

Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud and Geonic materials and attempt to follow the development of the language through time. The course is intended for students with substantial knowledge of Hebrew.

Same as: JEWISHST 221C, JEWISHST 321C, RELIGST 321C.

**RELIGST 222. Literature and Society in Medieval Islam. 4 Units.**

The development of literary traditions, 600-1500. Major poetic and prose topoi through examples from Arabic, Persian, and Turkish literature in translation. Literature's place in Islamic societies and biographies of significant authors. The religious value of literary forms. Literary canons as unifying agents in different parts of the medieval Muslim world. Comparison between high and folk literatures. The role of aesthetic paradigms in the formation of Islamic religious and cultural identities.

**RELIGST 222B. Sufism Seminar. 3-5 Units.**

Sufism through original texts and specialized scholarship. Prerequisite: ability to read at least one major language of Islamic religious literature (Arabic, Persian, Turkish, Urdu).

Same as: RELIGST 322B.

**RELIGST 222C. Debauchery and asceticism. 3-5 Units.**

Arabic texts written by and about early Muslim figures famous either for their limitless self-indulgence or their rigorous self-denial. Language and style of these texts, their implied or explicit dialogue with religious values, and their possible relation to each other. Questions of representation, self-representation, and biographical fallacy. Intended for students with reading knowledge of Arabic.

Same as: RELIGST 322C.

**RELIGST 222D. The Naqshbandi Sufi Tradition. 4 Units.**

History of the Naqshbandi Sufi tradition, from its origins in Central Asia and its spread to other parts of the Muslim world to its contemporary profile, with attention to aspects of Sufi doctrine and practice, modes of organization and succession, patterns of economic and political activity, and issues of continuity and coherence in an international Sufi order. Social and religious context for the emergence of the Naqshbandiyya and its development in its native region; students will read a shared body of basic works on Naqshbandi history and will pursue individual projects focused on Naqshbandi groups in particular regions or periods.

Same as: RELIGST 322D.

**RELIGST 223. Studying Islam: History, Methods, Debates. 4 Units.**

Islam as a subject of academic inquiry since the 19th century. Origins and critiques of major methodological perspectives in Islamic studies such as philology, religious studies, history, art history, and anthropology. Landmarks in the development of the field and the work of major scholars. Academic debates regarding unity versus diversity, orientalism, fundamentalism and Islamism, Sufism, and gender. Current trends in scholarship on medieval and modern Muslim societies. Prerequisite: course work in Islamic studies or methodology in religious studies.

**RELIGST 223A. The Arabic Qur'an. 3-5 Units.**

Early history, language, structure, style, chronology, motifs, themes, and interpretation. Knowledge of Arabic required.

Same as: RELIGST 323A.

**RELIGST 224. Classical Islamic Texts. 3 Units.**

Readings in key genres of pre-modern Islamic scholarship. Genre-specific historical research methods. The Arabic literature, tafsir, biographical dictionaries, fiqh, ta'rikh, and geographical works. Reading knowledge of Arabic is required.

Same as: RELIGST 324.

**RELIGST 224B. Unveiling the Sacred: Explorations in Islamic Religious Imagination. 3-5 Units.**

Poetry and prose in translation as well as historical studies. Islamic movements invested in the idea that the sensory world has a hidden or esoteric counterpart that can be understood or experienced through following particular religious programs. Various forms of Shi'ism and Sufism, millenarian and apocalyptic movements, the Nation of Islam and its offshoots. Philosophical propositions, historical contexts, and the role of ritual in the construction of religious systems.

Same as: RELIGST 324B.

**RELIGST 226. Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period. 5 Units.**

Characteristics of religious philosophy from Saadia Gaon to Maimonides, Jewish opposition to and support of philosophy in the medieval Christian and Muslim world, texts from the early development of Kabbalah, the relationship between philosophy and Kabbalah, and conflicting views of Kabbalah from the 16th through 18th centuries.

Same as: RELIGST 326.

**RELIGST 226A. Judaism and Hellenism. 3-5 Units.**

interactions and conflicts between Jews and Greeks in the centuries following the conquests of Alexander the Great and the cultural/religious repercussions of their encounter. In what ways were Jews influenced by Greek culture? In what ways, and for what reasons, did they resist it? And how the interaction of these cultures shape the subsequent development of Judaism and Christianity? Jewish texts in the Greco-Roman period, including Jewish-Greek writers like Philo of Alexandria, the Apocrypha, the Dead Sea Scrolls, selected writings from the New Testament, and the Passover Haggadah.

Same as: RELIGST 326A.

**RELIGST 226B. Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict. 5 Units.**

Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the Adversus Iudaeos tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.

Same as: CLASSGEN 126, CLASSGEN 226, JEWISHST 226B, JEWISHST 326B, RELIGST 326B.

**RELIGST 226C. Mystics and Merrymakers: Innovations in Modern Judaism. 3-4 Units.**

How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revisioned, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival.

Same as: JEWISHST 226C, JEWISHST 326C, RELIGST 326C.

**RELIGST 226D. Jewish-Christian Relations in Antiquity. 1-2 Units.**

Constructions of identity, community, ethnicity: these considerations frame the investigation of ancient Christian rhetoric and theology contra Iudaeos. This historical project will be set within the larger intellectual and cultural context of a) learned Graeco-Roman traditions of ethnic stereotyping; b) forensic rhetoric; and c) philosophical paideia; and these traditions will be considered within their larger social context of the Mediterranean city (I-III). Specifically, various Christian, and especially Latin traditions contra Iudaeos (IV-VI) will be studied.

Same as: CLASSGEN 126B, JEWISHST 226D.

**RELIGST 227. The Qur'an. 5 Units.**

Early history, themes, structure, chronology, and premodern interpretation. Relative chronology of passages.

Same as: RELIGST 327.

**RELIGST 229. Winged Bulls and Sun Disks: Religion and Politics in the Persian Empire. 3-5 Units.**

Since Herodotus in the 5th century BCE, the Persian Empire has been represented as the exemplar of oriental despotism and imperial arrogance, a looming presence and worthy foil for the West and Greek democracy. History of the Achaemenid Empire, beginning with the rise of the Medes in the 7th century BCE to the fall of the Achaemenids to Alexander the Great's armies in 331 BCE. Focus on the intimate relationship between religion and empire and will also survey the diverse cultural institutions and religious practices found within the Empire. Evaluate contemporary representations of the Persians in politics and popular culture, such as the recent film "300" and the graphic novel on which it is based, in an attempt to better appreciate the enduring cultural legacy of the Greco-Persian wars. Same as: CLASSGEN 159, CLASSGEN 259, RELIGST 329.

**RELIGST 230B. Zen Studies. 4 Units.**

Readings in recent English-language scholarship on Chan and Zen Buddhism  
Same as: RELIGST 330B.

**RELIGST 231X. Knowing God: Learning Religion in Popular Culture. 4 Units.**

This course will examine how people learn religion outside of school, and in conversation with popular cultural texts and practices. Taking a broad social-constructivist approach to the variety of ways people learn, this course will explore how people assemble ideas about faith, identity, community, and practice, and how those ideas inform individual, communal and global notions of religion. Much of this work takes place in formal educational environments including missionary and parochial schools, Muslim madrasas or Jewish yeshivot. However, even more takes place outside of school, as people develop skills and strategies in conversation with broader social trends. This course takes an interdisciplinary approach to questions that lie at the intersection of religion, popular culture, and education.

Same as: EDUC 231X, JEWISHST 291X.

**RELIGST 237. Jewish and Christian Rome, 1st to 6th Centuries. 5 Units.**

To what extent are Judaism and Christianity products of the Roman Empire, and shaped by its politics? Literature concerning Jewish and Christian perceptions of power, and archaeological and artistic traces of both religions in the imperial city of Rome. What roles did strategies of resistance and accommodation play in the formation of these religious communities, emerging identities? Possible optional field trip to Rome over Spring break.

**RELIGST 238. Christian Neo-Platonism, East and West. 3-5 Units.**

Christianity's shift to neo-Platonic Greek philosophical categories and its significance for contemporary spirituality. Readings from Plotinus, Proclus, Greek fathers such as Pseudo-Dionysus, and from Ambrose and Augustine. Same as: RELIGST 338.

**RELIGST 239. Luther and the Reform of Western Christianity. 3-5 Units.**

Luther's theology, ethics, biblical interpretation, and social reforms and their significance for the remaking of Western Christianity. Readings include Luther's own writings and secondary sources about Luther and his world.

Same as: RELIGST 339.

**RELIGST 241B. Mystics and Mysticism. 3-5 Units.**

Explore the varieties of meaning and significance the term "mysticism" takes on in religious studies through an exploration of accounts of "mystical experiences": visions, bodily sensations, sense of the sacred, along with practices engaged in and texts written by those claiming such experiences for themselves or others. Focus will be on Medieval/Renaissance Christians but students are invited to explore examples from other times, traditions and places.

Same as: RELIGST 341B.

**RELIGST 245. Religion, Reason, and Romanticism. 5 Units.**

The late 18th-century European cultural shift from rationalist to romantic modes of thought and sensibility. Debates about religion as catalysts for the new *Zeitgeist*. Readings include: the Jewish metaphysician, Mendelssohn; the dramatist, Lessing; the philosopher of language and history, Herder; the critical idealist, Kant; and the transcendental idealist, Fichte.

**RELIGST 246. Constructing Race and Religion in America. 4 Units.**

This seminar focuses on the interrelationships between social constructions of race, and social interpretations of religion in America. How have assumptions about race shaped religious worldviews? How have religious beliefs shaped racial attitudes? How have ideas about religion and race contributed to notions of what it means to be "American"? We will look at primary and secondary sources, and at the historical development of ideas and practices over time.

Same as: HISTORY 256G, HISTORY 356G, RELIGST 346.

**RELIGST 247. Chinese Buddhist Texts. 3-5 Units.**

Chinese Buddhist texts from the Han Dynasty onwards, including sutra translations, prefaces, colophons, story collections and biographies.

Prerequisite: reading competence in Chinese.

Same as: RELIGST 347.

**RELIGST 247B. Readings in Chinese Religious Texts: The Lingbao Scriptures. 4 Units.**

A survey of the original Lingbao scriptures. Composed in the late-4th / early 5th century, these texts radically revised Daoist practice, incorporated elements of Buddhist thought and practice, and created liturgies that are still used in Daoist communities today. (Reading knowledge of Literary Chinese *cc* required).

Same as: RELIGST 347B.

**RELIGST 248. Chinese Buddhism in World Historical Perspective. 3-5 Units.**

Shared cosmologies, trade routes, and political systems. Prerequisite: background in Chinese or Japanese.

Same as: RELIGST 348.

**RELIGST 248A. Chinese Buddhism Beyond the Great Wall. 3-5 Units.**

The thought, practice, and cultural resonance of the sorts of originally Chinese Buddhism that flourished to the north and northwest of China proper during the two to three centuries following the fall of the Tang - i.e., under the Khitan Liao (907-1125) and the Tangut Xixia (1032-1227) dynasties - with special emphasis on the later fortunes of the Huayan, Chan, and Mijiao (Esoteric) traditions. Prerequisite: reading knowledge of Chinese.

Same as: RELIGST 348A.

**RELIGST 248B. Buddhist Narratives and the Shaping of Medieval Chinese Religiosity. 3-5 Units.**

**RELIGST 248C. Buddhist Commentary Tradition in 4th Century China. 3-5 Units.**

By focusing on several commentaries Chinese Buddhist exegetes wrote from the 4-8th centuries, one being the commentary on the Weimo Jing (Vimalakirtinirdesa) jointly composed by Kumarajiva (344-413), a translator of the sutra, and two of his most important disciples (Sengzhao [384-414] and Daosheng [360?-434]). This seminar aims at analyzing key characteristics and functions of Chinese Buddhist commentaries and the roles they played in the formation of Chinese Buddhist traditions in early Medieval China.

**RELIGST 249B. Psychology and Religion. 3-5 Units.**

Introductory exploration of the encounter between modern scientific psychologies and religious traditions. The course does not attempt to privilege one explanation over another, but considers theory-driven or empirically supported understandings of religious phenomena (experience, ritual, spirituality), and the social and interpersonal dimensions of religious life. We will also consider the various ways in which religious communities appropriate or distance themselves from secular psychology. Given time limitations, we will explore only a sampling of theories and polemics, speculations and apologetics on both sides of the encounter. Same as: RELIGST 349B.

**RELIGST 250. Classics of Indian Buddhism. 4 Units.**

Texts in English translation including discourses (sutras), philosophical treatises, commentaries, didactic epistles, hymns, biographies, and narratives.

**RELIGST 250B. Depictions of the Buddha. 3-5 Units.**

The image of the Buddha changes relatively little from its earliest conceptions. The role of the image and the notion of the Buddha do change fundamentally with time and place. South Asian depictions of the Buddha from the earliest symbolic representations to the wrathful and peaceful forms found in the esoteric Buddhism of India and the Himalayas, as well as the changing conceptions of the Buddha to which these depictions are related.

Same as: RELIGST 350B.

**RELIGST 251. Readings in Indian Buddhist Texts. 3-5 Units.**

(Graduate students register for 351.) Introduction to Buddhist literature through reading original texts in Sanskrit. Prerequisite: Sanskrit. Same as: RELIGST 351.

**RELIGST 251A. Buddhist Visions of Paradise. 3-5 Units.**

Textual and art-historical evidence for the early development in the greater Indian cultural area of the cult of the Buddhas of the present and their paradise worlds ("Pure Land Buddhism").

Same as: RELIGST 351A.

**RELIGST 251B. Religious Poetry of India. 4 Units.**

India has a rich literature of devotional and mystical poetry composed by "poet-saints" in common vernacular languages. This passionate and contemplative poetry flourished between the 6th and 18th centuries, inspiring religious and social movements that are still vibrant today. It also lives as music, remaining popular and powerful in the form of songs in many styles. We will study this material through the lenses of poetry, religion, performance, and politics

Same as: RELIGST 151.

**RELIGST 252. Hearts and Diamonds: The Lives of Buddhist Sacred Texts. 4 Units.**

An exploration of two key Mahayana Buddhist scriptures (the Heart & Diamond Sutras) and their histories, looking at what they say and how they have been used, from the first millennium to the present day.

**RELIGST 253. Mountains, Buddhist Practice, and Religious Studies. 3-5 Units.**

The notion of the sacred mountain. Readings from ethnographic and theoretical works, and primary sources.

Same as: RELIGST 353.

**RELIGST 254. Recent Contributions to Buddhist Studies. 4 Units.**

May be repeated for credit.

**RELIGST 257. Readings in Daoist Texts. 4 Units.**

Readings from primary sources. Prerequisite: classical Chinese.

Same as: RELIGST 357.

**RELIGST 258. Japanese Buddhist Texts. 3-5 Units.**

Readings in medieval Japanese Buddhist materials. May be repeated for credit. Prerequisite: background in Japanese or Chinese.

Same as: RELIGST 358.

**RELIGST 261A. Belief. 5 Units.**

The post-Christian (or post-modern) age has given rise to new forms of faith, ranging from secular humanism and cultural atheism to rediscovery of the transcendent in the cosmos and quantum mechanics. However, unlike the era of "Christendom," belief is no longer necessarily hinged to faith. This course explores the origins of this phenomenon in Thomas Aquinas, and then newer philosophical approaches to understanding belief, ranging from Charles Taylor and Talal Asad and their theories of the secular, to Catherine Bell and the role of practice in believing. Finally, we turn to the work of three contemporary theorists of religious belief: Gianni Vattimo, Jean-Luc Marion, and Richard Kearney, who endeavor to cast believing outside established theological categories, yet still speak of "god." Same as: in a post-Christian Age.

**RELIGST 263. Judaism and the Body. 4 Units.**

Representations and discourses of the body in Jewish culture; theories of body and ritual. Case studies of circumcision, menstrual impurity, and intersexuality. Readings include classical texts in Jewish tradition and current discussions of these textual traditions.

**RELIGST 265. Research Methods and Resources in Jewish Studies. 1-3 Units.**

Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription). Same as: JEWISHST 225, JEWISHST 325, RELIGST 365.

**RELIGST 271A. Dante's Spiritual Vision. 4-5 Units.**

Poetry, ethics, and theology in Dante's Divine Comedy. Supplementary readings from classical authors such as St. Thomas Aquinas, and from modern writers, such as Jorge Borges. Fulfills capstone seminar requirement for the Philosophy and Literature tracks. Students may take 271A without taking 271B. Consent of the instructor required.

**RELIGST 271B. Dante's Spiritual Vision. 4-5 Units.**

Poetry, ethics, and theology in Dante's Divine Comedy. Supplementary readings from classical authors such as St. Thomas, and from modern writers, such as Jorge Borges. Fulfills capstone seminar requirement for the Philosophy and Literature tracks. Prerequisite: 271A.

**RELIGST 272. Kant on Religion. 3-5 Units.**

Critical examination of Kant's principle writings on religion against the background of his general theoretical and practical philosophy and guided by the hypothesis that his philosophy of religion continues to offer significant insights and resources to contemporary theories of religion. Recent reassessments of Kant on religion in the secondary literature will also be read and discussed  
Same as: RELIGST 372.

**RELIGST 273. Historicism and Its Problems. 3-5 Units.**

The emergence, varieties, and crises of historicism as a world view and approach to the study of religion in the 19th and 20th centuries. The implications of historical reason and historical consciousness for the philosophy of religion, ethics, and theology.  
Same as: RELIGST 373.

**RELIGST 274. From Kant to Kierkegaard. 3-5 Units.**

(Graduate students register for 374.) The main currents of religious thought in Germany from Kant's critical philosophy to Kierkegaard's revolt against Hegelianism. Emphasis is on the theories of religion, the epistemological status of religious discourse, the role of history (especially the figure of Jesus), and the problem of alienation/reconciliation in seminal modern thinkers: Kant, Schleiermacher, Hegel, and Kierkegaard.  
Same as: RELIGST 374.

**RELIGST 275. Kierkegaard and Religious Existentialism. 3-5 Units.**

(Graduate students register for 375.) Close reading of Kierkegaard's magnum opus, *Concluding Unscientific Postscript to Philosophical Fragments*, in its early 19th-century context.  
Same as: RELIGST 375.

**RELIGST 277. The Later Heidegger: Art, Poetry, Language. 3 Units.**

Lectures and seminar discussions of the problematic of the later Heidegger (1930 - 1976) in the light of his entire project. Readings from "On the Origin of the Work of Art" and Elucidations of Holderlin's Poetry.  
Same as: PHIL 234B, RELIGST 377.

**RELIGST 278. Heidegger: Confronting the Ultimate. 3-5 Units.**

Heidegger's work on meaning, the self, and the sacred. Texts include *Being and Time*, courses and opuscula up to 1933, the *Letter on Humanism*, and *Contributions of Philosophy*.  
Same as: RELIGST 378.

**RELIGST 279. Heidegger and the Holy. 4 Units.**

Heidegger's philosophy as opening a new door onto the possibility of experiencing the sacred after the collapse of traditional metaphysical theology. A close reading of *Being and Time* as an introduction to the question of the holy.  
Same as: RELIGST 379.

**RELIGST 279A. Heidegger on human being and God. 4 Units.**

This lecture-seminar first raises the question of essential characteristics of human being, such as temporality, mortality, hermeneutics and the relation to meaning, and then, via readings from Karl Rahner, asks whether human being is open to a possible relation to a supernatural divinity.  
Same as: RELIGST 379A.

**RELIGST 280. Schleiermacher: Reconstructing Religion. 3-5 Units.**

Idealist philosopher, Moravian pietist, early German Romantic, co-founder of the University of Berlin, head preacher at Trinity Church, translator of Plato's works, Hegel's opponent, pioneer in modern hermeneutics, father of modern theology. Schleiermacher's controversial reconception of religion and theology in its philosophical context.  
Same as: RELIGST 380.

**RELIGST 282. King Solomon and the Search for Wisdom. 4 Units.**

What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.  
Same as: JEWISHST 228, JEWISHST 328, RELIGST 382.

**RELIGST 283A. Heidegger, Hölderlin, and the Gods. 3-5 Units.**

The radical transformations in Western notions of God between the death of Hegel and the birth of historical materialism, arguing that questions about theism and atheism, humanism, and history formulated in the period 1831-50 are still pertinent. Texts from Hegel, the young Hegelians, Feuerbach, and Marx on issues of God, history, and the social dimensions of human nature.  
Same as: RELIGST 383A.

**RELIGST 290. Majors Seminar. 5 Units.**

Required of all majors and joint majors. The study of religion reflects upon itself. Representative modern and contemporary attempts to "theorize," and thereby understand, the phenomena of religion in anthropology, psychology, sociology, cultural studies, and philosophy. WIM.

**RELIGST 293X. Religion and Education. 4 Units.**

This course will examine interactions between religion and education, focusing on both formal and experiential sites in which people and communities explore, articulate, encounter, and perform religious ideologies and identities. The class will focus on different religious traditions and their encounters the institutions and structures of education in American culture, both in the United States and as it manifests in American culture transnationally.  
Same as: EDUC 293X, JEWISHST 293X.

**RELIGST 297. Senior Essay/Honors Essay Research. 3-5 Units.**

Guided by faculty adviser. May be repeated for credit. Prerequisite: consent of instructor and department.

**RELIGST 298. Senior Colloquium. 5 Units.**

For Religious Studies majors writing the senior essay or honors thesis. Students present work in progress, and read and respond to others. Approaches to research and writing in the humanities.

**RELIGST 301. Classical Islamic Law. 3-5 Units.**

Emphasis is on methods of textual interpretation. History of premodern Islamic law, including origins, formation of schools of law, and social and political contexts. Laws of sale, marriage, divorce, and the obligation to forbid wrong.  
Same as: RELIGST 201.

**RELIGST 301A. Gender in Classical Islamic Law. 3-5 Units.**

The course examines classical Islamic society and law. It covers historical development, the unity and diversity of Muslim legal traditions, and the relationship between laws and values. Constructions of gender in law are examined through rituals, marriage, divorce, birth control, child custody, and sexuality.  
Same as: RELIGST 201A.

**RELIGST 302. Islamic Studies Proseminar. 1-5 Units.**

Research methods and materials for the study of Islam. May be repeated for credit.

**RELIGST 303. Myth, Place, and Ritual in the Study of Religion. 3-5 Units.**

Sources include: ethnographic texts and theoretical writings; the approaches of Charles Long, Jonathan Z. Smith, Victor Turner, Michael D. Jackson, and Wendy Doniger; and lived experiences as recounted in Judith Sherman's *Say the Name: A Survivor's Tale in Prose and Poetry*, Jackson's *At Home in the World*, Marie Cardinal's *The Words to Say It*, and John Phillip Santos's *Places Left Unfinished at the Time of Creation*. Same as: RELIGST 203.

**RELIGST 304A. Theories and Methods. 4 Units.**

Required of graduate students in Religious Studies. Approaches to the study of religion. Prerequisite: consent of instructor.

**RELIGST 304B. Theories and Methods. 4 Units.**

Required of graduate students in Religious Studies. Approaches to the study of religion. Prerequisite: consent of instructor.

**RELIGST 307A. Modern African Islam through Literature. 4 Units.**

Read the works of Modern Muslim Literature in Africa. Explore the expressions and modes by which Islam and its contemporary condition are represented in African contexts. Same as: RELIGST 207A.

**RELIGST 307B. Islam in Central Asia. 4 Units.**

The history and current status of Islam in Central Asia, addressing problems in prevailing approaches to the subject in light of historical patterns and critical analysis; it will consider how the study of religion in Central Asia before the region's incorporation into the Russian/Soviet and Chinese states can help us understand developments in Muslim religious life through the 20th century and today. Issues to be addressed include Islamization and communal identity; religion and national cultures; scales of religiosity and framing Muslim status; religious knowledge and practice in social context; the dichotomies of Sovietology; Sufism, shrines, and popular religion; and Islam and political discourse and practice. Same as: RELIGST 207B.

**RELIGST 308. Medieval Japanese Buddhism. 3-5 Units.**

Japanese religion and culture, including Buddhism, Shinto, popular religion, and new religions, through the medium of film.

**RELIGST 308A. Ex Oriente Lux: Orientalism and the Study of Religion. 3-5 Units.**

This seminar is designed to expose students to issues relating to discourse and subjectivity within the textual constructions of Oriental religions in the colonial era. We will begin with Edward W. Said's provocative work on notions of representation and power embedded in the discourse on the Orient that established, produced, and, ultimately, perpetuated western knowledge about the Other. We will then discuss the impact of the Oriental Renaissance and the vital role that Eastern wisdom played in constructing the field of Comparative Religious Studies. In addition, students will also read ethnographies, fables, and travelogues that both support and undermine Said's thesis of an active West constructing a largely passive East. Same as: RELIGST 208A.

**RELIGST 309. Priests, Prophets, and Kings: Religion and Society in Late Antique Iran. 4-5 Units.**

From India to the Levant and from the Caspian Sea to the Arabian Peninsula, the Sasanian Empire (224-651 CE) was the dominant power in the Middle East till the advent of Islam. Diverse religious institutions and social practices of the Zoroastrians, Manicheans, Jews, and Christians in late antique Iran. Complex relationships between the Zoroastrian priesthood, the Sasanian monarchs, and these minority religions within the context of imperial rule. Profound religious and social changes that occurred with the Islamic conquests of Iran as well as examine the rich cultural continuities that survived from the Pre-Islamic past. Same as: CLASSGEN 106, CLASSGEN 206, RELIGST 209.

**RELIGST 309A. Sugar in the Milk: Modern Zoroastrianism as Race, Religion, and Ethnicity. 4-5 Units.**

Modern Zoroastrian experience as race, religion, and ethnic identity. Some 60,000 Zoroastrians now live in India and have resided there for a millennium. In the 19th century, these peoples from Persia became colonial elites yet were acutely aware that they were not quite Indian, British, or Persian. Diverse ways this experience of dislocation has served as a defining characteristic in Parsi communal identity and contrast these South Asian experiences with the minority socio-politics of those who remained in Iran. Survey the colonial and post-colonial communities in England, East Africa, Hong Kong, Australia, and North America and examine the expression of these global diasporic experiences in literature and the arts. Same as: RELIGST 209A.

**RELIGST 309C. Religious Thought in Modern Iran. 4 Units.**

Examine a number of outstanding intellectuals and religious reformers/thinkers who have had an enduring impact on culture formation in the modern Iran. The Constitutional revolution and its eminent supporter cleric, Ayatollah Naeeni; Ahmad Kasravi, Jalal Ale, Ahmad, Bazargan, Shariati, Motahhari, Khomeini, Fardid and eventually Soroush. Trends like Tudeh Parti, Hojjatyeh and Fedayeeane Eslam may also be briefly discussed. Familiarity with Persian language is strongly recommended. Taught by Hossein Dabbagh (aka ABDULKARIM SORUSH). Same as: RELIGST 209C.

**RELIGST 309D. 'Crow Eaters' & 'Fire Worshippers': Exploring Contemporary Zoroastrianism Thru Reading Parsi Lit. 3-5 Units.**

In the past three decades Parsi fiction has rapidly emerged as a unique and creative voice in modern Anglophone literature from South Asia. From Bapsi Sidhwa to Thrity Umrigar to Rohinton Mistry, Parsi novelists address the most poignant concerns of Zoroastrians living in an era of rapid social, political, and religious transformation. The erosion of tradition; the breakdown of the Parsi family; the demise of religion among the young; and the cultural losses and gains of living in diaspora are common themes in their works. The unique vantage point of the Parsis; neither Hindu nor Muslim, neither quite Indian nor quite British; will serve as a lens for examining the inherent tensions in multicultural societies both East and West. Same as: RELIGST 209D.

**RELIGST 309E. Imperishable Heroes and Unblemished Goddesses: Myth, Ritual, and Epic in Ancient Iran. 3-5 Units.**

Designed as a broad introduction to the world of ancient Iran, students will be introduced to the Indo-European inheritance in ancient Iranian culture; the shared world of ritual, religion, and mythology between Zoroastrianism in Iran and Vedic Hinduism in India; and to the contours of early Zoroastrian religious thought. We will also survey mythoepic literature in translation from the archaic Avesta through the late antique Zoroastrian Middle Persian corpus to the early medieval national epic of Iran, the Book of Kings of Ferdowsi. Same as: CLASSGEN 189, CLASSGEN 289, RELIGST 209E.

**RELIGST 310. Islam, Art, Modernity. 3-5 Units.**

Taught in conjunction with a major exhibition of modern Islamic art at the Cantor Museum. We will consider theoretical discussions regarding art and modern Muslim identities and examine the use of Islamic motifs in art and architecture in detail. Same as: RELIGST 110.

**RELIGST 312. Buddhist Studies Proseminar. 1-5 Units.**

Research methods and materials for the study of Buddhism. May be repeated for credit. Prerequisite: reading knowledge of Chinese or Japanese.

**RELIGST 313X. The Education of American Jews. 4 Units.**

This course will take an interdisciplinary approach to the question of how American Jews negotiate the desire to retain a unique ethnic sensibility without excluding themselves from American culture more broadly. Students will examine the various ways in which people debate, deliberate, and determine what it means to be an "American Jew". This includes an investigation of how American Jewish relationships to formal and informal educational encounters through school, popular culture, religious ritual, and politics.

Same as: EDUC 313X, JEWISHST 393X.

**RELIGST 315. Third Bhavanakrama & the Writings of Héshang Moheyán: Scripture in Buddhist Scholastic Polemics. 3-5 Units.**

Readings in the original languages (Sanskrit, Tibetan and Chinese) of materials from the debates of late 8th Century Tibet (so-called debate at Bsam-yas). The course focuses on the use of scriptural quotations in those passages where the arguments of Kamalasila, the leading Indian representative at the debates, best map on to the arguments of his Chinese rival, Héshang Moheyán.

**RELIGST 315A. Chinese Buddhism. 4 Units.**

This course provides an overview of the major themes and historical developments in 2000 years of Buddhist history in China, from its early transmission from India to contemporary developments in the PRC, Taiwan and Hong Kong. Themes include monasticism, doctrine, popular devotion, state policy and the encounter with modernity.

Same as: RELIGST 215A.

**RELIGST 317. Japanese Studies of Religion in China. 3 Units.**

(Graduate students register for 317.) Readings in Japanese secondary sources on Chinese religions.

Same as: RELIGST 217.

**RELIGST 321. The Talmud. 4 Units.**

Strategies of interpretation, debate, and law making. Historical contexts. Prerequisite: Hebrew.

Same as: RELIGST 221.

**RELIGST 321A. Philology of Rabbinic Literature. 3-5 Units.**

The genesis of rabbinic texts as texts. Evolution from oral stage to manuscript to printed text. Questions of redaction versus edition. Focus on Palestinian and Babylonian Talmud, with excursions into midrashic texts. Prerequisite: strong background in Hebrew. Knowledge of Aramaic preferred.

Same as: RELIGST 221A.

**RELIGST 321B. What is Talmud?. 5 Units.**

In what sense can Talmud be studied as literature? Which voices can be identified? Concepts of author, editor, or redactor. The basic textual units of Talmud: sugya, chapter, and tractate. The sugya as literary genre. The aesthetic of talmudic dialectics. Prerequisite: reading Hebrew with some understanding of biblical Hebrew

Same as: RELIGST 221B.

**RELIGST 321C. Aramaic Jewish texts. 2-5 Units.**

Reading of Aramaic Jewish texts with special focus on grammar and syntax. Foundations of classical Aramaic, the two major dialects of rabbinic Aramaic, the Palestinian (Galilean) and the Babylonian. Readings from Midrash, Piyyut, Talmud and Geonic materials and attempt to follow the development of the language through time. The course is intended for students with substantial knowledge of Hebrew.

Same as: JEWISHST 221C, JEWISHST 321C, RELIGST 221C.

**RELIGST 322B. Sufism Seminar. 3-5 Units.**

Sufism through original texts and specialized scholarship. Prerequisite: ability to read at least one major language of Islamic religious literature (Arabic, Persian, Turkish, Urdu).

Same as: RELIGST 222B.

**RELIGST 322C. Debauchery and asceticism. 3-5 Units.**

Arabic texts written by and about early Muslim figures famous either for their limitless self-indulgence or their rigorous self-denial. Language and style of these texts, their implied or explicit dialogue with religious values, and their possible relation to each other. Questions of representation, self-representation, and biographical fallacy. Intended for students with reading knowledge of Arabic.

Same as: RELIGST 222C.

**RELIGST 322D. The Naqshbandi Sufi Tradition. 4 Units.**

History of the Naqshbandi Sufi tradition, from its origins in Central Asia and its spread to other parts of the Muslim world to its contemporary profile, with attention to aspects of Sufi doctrine and practice, modes of organization and succession, patterns of economic and political activity, and issues of continuity and coherence in an international Sufi order. Social and religious context for the emergence of the Naqshbandiyya and its development in its native region; students will read a shared body of basic works on Naqshbandi history and will pursue individual projects focused on Naqshbandi groups in particular regions or periods.

Same as: RELIGST 222D.

**RELIGST 323A. The Arabic Qur'an. 3-5 Units.**

Early history, language, structure, style, chronology, motifs, themes, and interpretation. Knowledge of Arabic required.

Same as: RELIGST 223A.

**RELIGST 324. Classical Islamic Texts. 3 Units.**

Readings in key genres of pre-modern Islamic scholarship. Genre-specific historical research methods. The *ʿaḍḥ* literature, *tafṣīr*, biographical dictionaries, *fiqh*, *taʿrīkh*, and geographical works. Reading knowledge of Arabic is required.

Same as: RELIGST 224.

**RELIGST 324B. Unveiling the Sacred: Explorations in Islamic Religious Imagination. 3-5 Units.**

Poetry and prose in translation as well as historical studies. Islamic movements invested in the idea that the sensory world has a hidden or esoteric counterpart that can be understood or experienced through following particular religious programs. Various forms of Shi'ism and Sufism, millenarian and apocalyptic movements, the Nation of Islam and its offshoots. Philosophical propositions, historical contexts, and the role of ritual in the construction of religious systems.

Same as: RELIGST 224B.

**RELIGST 326. Philosophy and Kabbalah in Jewish Society: Middle Ages and Early Modern Period. 5 Units.**

Characteristics of religious philosophy from Saadia Gaon to Maimonides, Jewish opposition to and support of philosophy in the medieval Christian and Muslim world, texts from the early development of Kabbalah, the relationship between philosophy and Kabbalah, and conflicting views of Kabbalah from the 16th through 18th centuries.

Same as: RELIGST 226.

**RELIGST 326A. Judaism and Hellenism. 3-5 Units.**

interactions and conflicts between Jews and Greeks in the centuries following the conquests of Alexander the Great and the cultural/religious repercussions of their encounter. In what ways were Jews influenced by Greek culture? In what ways, and for what reasons, did they resist it? And how the interaction of these cultures shape the subsequent development of Judaism and Christianity? Jewish texts in the Greco-Roman period, including Jewish-Greek writers like Philo of Alexandria, the Apocrypha, the Dead Sea Scrolls, selected writings from the New Testament, and the Passover Haggadah.

Same as: RELIGST 226A.

**RELIGST 326B. Judaism and Christianity in the Mediterranean World: Contact, Competition, and Conflict. 5 Units.**

Jewish beginnings of Christianity in the first century C.E.; process of differentiation between various Jewish and Christian groups; effect of Roman-Jewish wars on Jewish and Christian identity formation; Jewish Christians, Christian Jews, and other heretics; rise of the discourse of orthodoxy and heresy; the emergence of the *Adversus Judaeos* tradition; theology as a realm of mutual attraction and conflict. Readings include Epistles of Paul in the New Testament, Christian authors from Justin through Augustine, excerpts from Rabbinic Texts (Mishnah, Midrash and Talmud), along with current literature on religion, ethnicity, and identity in the Roman world.

Same as: CLASSGEN 126, CLASSGEN 226, JEWISHST 226B, JEWISHST 326B, RELIGST 226B.

**RELIGST 326C. Mystics and Merrymakers: Innovations in Modern Judaism. 3-4 Units.**

How does a tradition many thousands of years old make a space for itself in the dynamic landscape of contemporary America? Judaism has continually adapted to its surroundings, and in the twentieth century new movements have reconstructed, revised, and renewed Jewish practice. A space within has been claimed by a series of previously disenfranchised Jews including women, queer Jews, and Jews of color. Examine some of the most innovative of these changes from Jewish feminism to the Chabad Hasidic revival.

Same as: JEWISHST 226C, JEWISHST 326C, RELIGST 226C.

**RELIGST 327. The Qur'an. 5 Units.**

Early history, themes, structure, chronology, and premodern interpretation. Relative chronology of passages.

Same as: RELIGST 227.

**RELIGST 328S. The Study of the Midrash. 1-2 Units.**

Two-week block seminar; four sessions. Talmudic philology; development and transmission of the Talmudic text and manuscripts. Relationship between Midrash and Mishnah and between Mishnah and Tosefta; development of talmudic sugiot; relationship between the Babylonian and Palestinian Talmud.

**RELIGST 329. Winged Bulls and Sun Disks: Religion and Politics in the Persian Empire. 3-5 Units.**

Since Herodotus in the 5th century BCE, the Persian Empire has been represented as the exemplar of oriental despotism and imperial arrogance, a looming presence and worthy foil for the West and Greek democracy. History of the Achaemenid Empire, beginning with the rise of the Medes in the 7th century BCE to the fall of the Achaemenids to Alexander the Great's armies in 331 BCE. Focus on the intimate relationship between religion and empire and will also survey the diverse cultural institutions and religious practices found within the Empire. Evaluate contemporary representations of the Persians in politics and popular culture, such as the recent film "300" and the graphic novel on which it is based, in an attempt to better appreciate the enduring cultural legacy of the Greco-Persian wars.

Same as: CLASSGEN 159, CLASSGEN 259, RELIGST 229.

**RELIGST 330B. Zen Studies. 4 Units.**

Readings in recent English-language scholarship on Chan and Zen Buddhism

Same as: RELIGST 230B.

**RELIGST 331. Authority of the Past in Islamic Thought. 4 Units.**

How have Muslims thought about the past as a source for contextualizing the present and generating prescriptions for right conduct? What imaginations of time undergird major Islamic intellectual perspectives? A wide-ranging exploration based on readings from the Quran, lives of prophets, chronicles, philosophy of history, hagiography, epic and mythology, and ethnography.

Same as: RELIGST 125.

**RELIGST 338. Christian Neo-Platonism, East and West. 3-5 Units.**

Christianity's shift to neo-Platonic Greek philosophical categories and its significance for contemporary spirituality. Readings from Plotinus, Proclus, Greek fathers such as Pseudo-Dionysus, and from Ambrose and Augustine. Same as: RELIGST 238.

**RELIGST 339. Luther and the Reform of Western Christianity. 3-5 Units.**

Luther's theology, ethics, biblical interpretation, and social reforms and their significance for the remaking of Western Christianity. Readings include Luther's own writings and secondary sources about Luther and his world.

Same as: RELIGST 239.

**RELIGST 340. Contemporary Religious Reflection. 3-5 Units.**

Focus is on normative and prescriptive proposals by recent and contemporary philosophers and theologians, as opposed to the domination of Religious Studies by textual, historical, cultural, and other largely descriptive and interpretive approaches. Do such normative and prescriptive proposals belong in the academy? Has Religious Studies exorcised its theological nimbus only to find contemporary religious reflection reappearing elsewhere in the university?

Same as: RELIGST 240.

**RELIGST 341. Comparative Perspective on Confucian Texts. 4-5 Units.**

Classical Confucian texts, in prose and poetry, interpreted through comparative perspectives drawn from both inside and outside China. Consent of the instructor required.

**RELIGST 341A. Comparative Perspectives on Classical Chinese Texts. 4-5 Units.**

Classical Chinese texts, in prose and poetry, interpreted through comparative perspectives drawn from both inside and outside China. Consent of the instructor required.

**RELIGST 341B. Mystics and Mysticism. 3-5 Units.**

Explore the varieties of meaning and significance the term "mysticism" takes on in religious studies through an exploration of accounts of "mystical experiences": visions, bodily sensations, sense of the sacred, along with practices engaged in and texts written by those claiming such experiences for themselves or others. Focus will be on Medieval/Renaissance Christians but students are invited to explore examples from other times, traditions and places.

Same as: RELIGST 241B.

**RELIGST 346. Constructing Race and Religion in America. 4 Units.**

This seminar focuses on the interrelationships between social constructions of race, and social interpretations of religion in America. How have assumptions about race shaped religious worldviews? How have religious beliefs shaped racial attitudes? How have ideas about religion and race contributed to notions of what it means to be "American"? We will look at primary and secondary sources, and at the historical development of ideas and practices over time.

Same as: HISTORY 256G, HISTORY 356G, RELIGST 246.

**RELIGST 347. Chinese Buddhist Texts. 3-5 Units.**

Chinese Buddhist texts from the Han Dynasty onwards, including sutra translations, prefaces, colophons, story collections and biographies.

Prerequisite: reading competence in Chinese.

Same as: RELIGST 247.



**RELIGST 347B. Readings in Chinese Religious Texts: The Lingbao Scriptures. 4 Units.**

A survey of the original Lingbao scriptures. Composed in the late-4th / early 5th century, these texts radically revised Daoist practice, incorporated elements of Buddhist thought and practice, and created liturgies that are still used in Daoist communities today. (Reading knowledge of Literary Chinese  $\zeta\zeta$  required).

Same as: RELIGST 247B.

**RELIGST 348. Chinese Buddhism in World Historical Perspective. 3-5 Units.**

Shared cosmologies, trade routes, and political systems. Prerequisite: background in Chinese or Japanese.

Same as: RELIGST 248.

**RELIGST 348A. Chinese Buddhism Beyond the Great Wall. 3-5 Units.**

The thought, practice, and cultural resonance of the sorts of originally Chinese Buddhism that flourished to the north and northwest of China proper during the two to three centuries following the fall of the Tang - i.e., under the Khitan Liao (907-1125) and the Tangut Xixia (1032-1227) dynasties - with special emphasis on the later fortunes of the Huayan, Chan, and Mijiao (Esoteric) traditions. Prerequisite: reading knowledge of Chinese.

Same as: RELIGST 248A.

**RELIGST 349. Meditation and Mythology in Chinese Buddhism. 3-5 Units.**

Readings in Chinese texts and English scholarly literature on issues such as specific techniques and hagiographical imagery in Chinese Buddhist traditions of self-cultivation. Prerequisite: background in Chinese or Japanese.

**RELIGST 349B. Psychology and Religion. 3-5 Units.**

Introductory exploration of the encounter between modern scientific psychologies and religious traditions. The course does not attempt to privilege one explanation over another, but considers theory-driven or empirically supported  $\zeta$ scientific $\zeta$  understandings of religious phenomena (experience, ritual, spirituality), and the social and interpersonal dimensions of religious life. We will also consider the various ways in which religious communities appropriate or distance themselves from secular psychology. Given time limitations, we will explore only a sampling of theories and polemics, speculations and apologetics  $\zeta$ on both sides of the encounter.

Same as: RELIGST 249B.

**RELIGST 350. Modern Western Religious Thought Proseminar. 1-5 Units.**

Selected topics in recent and contemporary religious thought. May be repeated for credit.

**RELIGST 350B. Depictions of the Buddha. 3-5 Units.**

The image of the Buddha changes relatively little from its earliest conceptions. The role of the image and the notion of the Buddha do change fundamentally with time and place. South Asian depictions of the Buddha from the earliest symbolic representations to the wrathful and peaceful forms found in the esoteric Buddhism of India and the Himalayas, as well as the changing conceptions of the Buddha to which these depictions are related.

Same as: RELIGST 250B.

**RELIGST 351. Readings in Indian Buddhist Texts. 3-5 Units.**

(Graduate students register for 351.) Introduction to Buddhist literature through reading original texts in Sanskrit. Prerequisite: Sanskrit.

Same as: RELIGST 251.

**RELIGST 351A. Buddhist Visions of Paradise. 3-5 Units.**

Textual and art-historical evidence for the early development in the greater Indian cultural area of the cult of the Buddhas of the present and their paradise worlds ("Pure Land Buddhism").

Same as: RELIGST 251A.

**RELIGST 353. Mountains, Buddhist Practice, and Religious Studies. 3-5 Units.**

The notion of the sacred mountain. Readings from ethnographic and theoretical works, and primary sources.

Same as: RELIGST 253.

**RELIGST 357. Readings in Daoist Texts. 4 Units.**

Readings from primary sources. Prerequisite: classical Chinese.

Same as: RELIGST 257.

**RELIGST 358. Japanese Buddhist Texts. 3-5 Units.**

Readings in medieval Japanese Buddhist materials. May be repeated for credit. Prerequisite: background in Japanese or Chinese.

Same as: RELIGST 258.

**RELIGST 359A. Religion and Performance. 4 Units.**

What happens when religion is viewed through the lens of performance?

Texts become dramas, songs, recitations, oral commentaries, dances, movies, and political appropriations. Beliefs become embodied enactments; doctrine puts on a costume and indulges in role play. Approaches to performance theory through religious enactments such as ritual, prayer, festival, drama, music, and film. Most examples from S. Asian religions; students may undertake research projects into other cultures and traditions.

Same as: RELIGST 159A.

**RELIGST 365. Research Methods and Resources in Jewish Studies. 1-3 Units.**

Enhance students' research skills in the interdisciplinary field of Jewish Studies, emphasizing electronic reference sources, but also archival resources and print publications. Coverage includes: Basic reference sources in Jewish Studies, History and bibliography of the Hebrew book, Hebrew Bible, Talmud, Religious studies (post-Talmudic), Jewish philosophy, Jewish history (by period; by region), Jewish languages, Hebrew literature, Yiddish literature, Zionism and Israel, Sephardic Jewry, women, Holocaust, miscellaneous topics (art, music, folklore and ethnography, sociology, genealogy, geography, pseudonyms, honorifics, abbreviations). Class sessions will also include special workshops on Hebrew / Yiddish / Ladino romanization (transliteration/transcription).

Same as: JEWISHST 225, JEWISHST 325, RELIGST 265.

**RELIGST 370. Comparative Religious Ethics. 4 Units.**

The difference that the word religious makes in religious ethics and how it affects issues of genre. Theoretical analyses with examples from W. and E. Asia. Prerequisite: consent of instructor.

**RELIGST 372. Kant on Religion. 3-5 Units.**

Critical examination of Kant's principle writings on religion against the background of his general theoretical and practical philosophy and guided by the hypothesis that his philosophy of religion continues to offer significant insights and resources to contemporary theories of religion.

Recent reassessments of Kant on religion in the secondary literature will also be read and discussed

Same as: RELIGST 272.

**RELIGST 373. Historicism and Its Problems. 3-5 Units.**

The emergence, varieties, and crises of historicism as a world view and approach to the study of religion in the 19th and 20th centuries. The implications of historical reason and historical consciousness for the philosophy of religion, ethics, and theology.

Same as: RELIGST 273.

**RELIGST 374. From Kant to Kierkegaard. 3-5 Units.**

(Graduate students register for 374.) The main currents of religious thought in Germany from Kant's critical philosophy to Kierkegaard's revolt against Hegelianism. Emphasis is on the theories of religion, the epistemological status of religious discourse, the role of history (especially the figure of Jesus), and the problem of alienation/reconciliation in seminal modern thinkers: Kant, Schleiermacher, Hegel, and Kierkegaard.

Same as: RELIGST 274.

**RELIGST 374E. Kierkegaard: Existentialism and Religion. 4 Units.**  
Kierkegaard is rightly called one of the founders of existentialism. Like Socrates, the one philosopher in the western tradition to whom he felt consciously in debt, Kierkegaard sought to return philosophy to the work of thinking through the human condition in all its uncertainty and finitude. Although 20th century existentialists like Sartre and Camus were self-consciously atheist, Kierkegaard's existentialism has religious origins. Through readings of Kierkegaard's philosophical and religious texts, explore the possibility of an existentialist interpretation of the human condition that is religious in nature. Kierkegaard's development of a 'philosophy of existence' as a response to major trends in modern European thought, particularly in response to the philosophies of German idealism (Kant, Hegel) and romanticism.  
Same as: RELIGST 174E.

**RELIGST 375. Kierkegaard and Religious Existentialism. 3-5 Units.**  
(Graduate students register for 375.) Close reading of Kierkegaard's magnum opus, *Concluding Unscientific Postscript to Philosophical Fragments*, in its early 19th-century context.  
Same as: RELIGST 275.

**RELIGST 377. The Later Heidegger: Art, Poetry, Language. 3 Units.**  
Lectures and seminar discussions of the problematic of the later Heidegger (1930 - 1976) in the light of his entire project. Readings from "On the Origin of the Work of Art" and Elucidations of Holderlin's Poetry.  
Same as: PHIL 234B, RELIGST 277.

**RELIGST 378. Heidegger: Confronting the Ultimate. 3-5 Units.**  
Heidegger's work on meaning, the self, and the sacred. Texts include *Being and Time*, courses and opuscula up to 1933, the *Letter on Humanism*, and *Contributions of Philosophy*.  
Same as: RELIGST 278.

**RELIGST 379. Heidegger and the Holy. 4 Units.**  
Heidegger's philosophy as opening a new door onto the possibility of experiencing the sacred after the collapse of traditional metaphysical theology. A close reading of *Being and Time* as an introduction to the question of the holy.  
Same as: RELIGST 279.

**RELIGST 379A. Heidegger on human being and God. 4 Units.**  
This lecture-seminar first raises the question of essential characteristics of human being, such as temporality, mortality, hermeneutics and the relation to meaning, and then, via readings from Karl Rahner, asks whether human being is open to a possible relation to a supernatural divinity.  
Same as: RELIGST 279A.

**RELIGST 380. Schleiermacher: Reconstructing Religion. 3-5 Units.**  
Idealist philosopher, Moravian pietist, early German Romantic, co-founder of the University of Berlin, head preacher at Trinity Church, translator of Plato's works, Hegel's opponent, pioneer in modern hermeneutics, father of modern theology. Schleiermacher's controversial reconception of religion and theology in its philosophical context.  
Same as: RELIGST 280.

**RELIGST 382. King Solomon and the Search for Wisdom. 4 Units.**  
What is wisdom according to the Bible? The course addresses this question by surveying various biblical and post-biblical texts associated with King Solomon. Other topics include the on-going debate over the historical existence of a Solomonic kingdom, the origins and history of the Jerusalem Temple, and Solomon's role in Jewish, Christian and Islamic tradition.  
Same as: JEWISHST 228, JEWISHST 328, RELIGST 282.

**RELIGST 383A. Heidegger, Hölderlin, and the Gods. 3-5 Units.**  
The radical transformations in Western notions of God between the death of Hegel and the birth of historical materialism, arguing that questions about theism and atheism, humanism, and history formulated in the period 1831-50 are still pertinent. Texts from Hegel, the young Hegelians, Feuerbach, and Marx on issues of God, history, and the social dimensions of human nature.  
Same as: RELIGST 283A.

**RELIGST 385. Research in Buddhist Studies. 1-15 Units.**  
Independent study in Buddhism. May be repeated for credit. Prerequisite: consent of instructor.

**RELIGST 386. Research in Islamic Studies. 1-15 Units.**  
Independent study in Islamic Studies. May be repeated for credit. Prerequisite: consent of instructor.

**RELIGST 387. Research in Jewish Studies. 1-15 Units.**  
Independent study in Jewish Studies. May be repeated for credit. Prerequisite: consent of instructor.

**RELIGST 388. Research in Modern Religious Thought, Ethics, and Philosophy. 1-15 Units.**  
Independent study in Modern Religious Thought, Ethics, and Philosophy. May be repeated for credit. Prerequisite: consent of instructor.

**RELIGST 389. Individual Work for Graduate Students. 1-15 Units.**  
May be repeated for credit. Prerequisite: consent of instructor.

**RELIGST 390. Teaching Internship. 3-5 Units.**  
Required supervised internship for PhDs.

**RELIGST 391. Teaching Religious Studies. 3 Units.**  
Workshop/seminar for doctoral students in Religious Studies and adjacent fields designed to cultivate methods for teaching Religious Studies in an academic setting.

**RELIGST 392. Paper in the Field. 1-15 Units.**  
Prerequisite: consent of graduate director. May be repeated for credit.

**RELIGST 395. Master of Arts Thesis. 2-9 Units.**

**RELIGST 399. Recent Works in Religious Studies. 1-2 Units.**  
Readings in secondary literature for Religious Studies doctoral students. May be repeated for credit.

**RELIGST 801. TGR Project. 0 Unit.**  
(Staff).

**RELIGST 802. TGR Dissertation. 0 Unit.**

## Russian, East European, Eurasian Studies Courses

**REES 18. Understanding the Jews of Russia and Poland. 1 Units.**  
A preparatory course, for field trip to Moscow and Warsaw, that would cover Russian and Polish History, former Soviet Jewry, international relations, and current social realities.

**REES 23. Issues in Global Health: Russia and Eastern Europe. 1-2 Units.**  
Activity course features Stanford faculty and researchers who lecture weekly on their experiences working international health issues. Focus this year will be on the global region including Russia, and East Europe.

**REES 35. Films of Central Asia. 1-2 Units.**  
Films with English subtitles from Tajikistan, Uzbekistan, Kazakhstan, Kyrgyzstan, and Turkmenistan. May be repeated once for credit. (AU).

**REES 100. Current Issues in Russian, East European, and Eurasian Studies. 1 Unitss.**

Enrollment limited to REEES students. Scholars present analyses of methodologies, challenges, and current issues in the study of Russia, E. Europe, and Eurasia.

**REES 105. Central and East European Politics. 5 Units.**

Focus is on how the states of Central and East Europe, including the Baltic states, have moved from communism and the Soviet Bloc to democracy, NATO and the EU. Topics include the communist legacy, transitions and their legacies, ethnic issues, and the evolution of economic and social policies, and the comparison of democratization processes in these countries to democracies in other regions, such as Latin America and southern Europe.

Same as: REES 205.

**REES 119. The Russian Economy. 4-5 Units.**

Brief introduction to the economic history of Russia, general overview of the modern Russian economy with analysis of its macroeconomic features and dynamics, industrial structure, and the major institutional features that are important for understanding Russian economic development. The period of transition from Soviet-type planned economy to a market economy and market reforms (1991-1998), the period of economic growth (1999-2007), and the economic development of Russia during the current global crisis of 2008-2010. Analysis of Russia's social structure and social policy, labor markets, the regional structure of the economy, the role of the state, and major Russian industries (oil, metals, machinery). Emphasis on the specific institutional aspects that have shaped Russia's economic development.

Same as: ECON 119, REES 219.

**REES 130. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries. 4-5 Units.**

The experience of religion, particularly Orthodoxy, under tsars and commissars. Religion as a lived experience; practice and belief in the provinces and villages, intertwining of religion and folk customs (the so-called double faith); condition of the Church before and after the Revolutions of 1917; religion under Soviet control; and liberation of the Church since the collapse of the Soviet Union.

Same as: REES 330.

**REES 200. Current Issues in Russian, East European, and Eurasian Studies. 1 Unitss.**

Enrollment limited to REEES students. Scholars present analyses of methodologies, challenges, and current issues in the study of Russia, E. Europe, and Eurasia.

**REES 205. Central and East European Politics. 5 Units.**

Focus is on how the states of Central and East Europe, including the Baltic states, have moved from communism and the Soviet Bloc to democracy, NATO and the EU. Topics include the communist legacy, transitions and their legacies, ethnic issues, and the evolution of economic and social policies, and the comparison of democratization processes in these countries to democracies in other regions, such as Latin America and southern Europe.

Same as: REES 105.

**REES 219. The Russian Economy. 4-5 Units.**

Brief introduction to the economic history of Russia, general overview of the modern Russian economy with analysis of its macroeconomic features and dynamics, industrial structure, and the major institutional features that are important for understanding Russian economic development. The period of transition from Soviet-type planned economy to a market economy and market reforms (1991-1998), the period of economic growth (1999-2007), and the economic development of Russia during the current global crisis of 2008-2010. Analysis of Russia's social structure and social policy, labor markets, the regional structure of the economy, the role of the state, and major Russian industries (oil, metals, machinery). Emphasis on the specific institutional aspects that have shaped Russia's economic development.

Same as: ECON 119, REES 119.

**REES 244A. Practice of Everyday Life in Kazakhstan: From Nomadism to Modernity. 3-5 Units.**

An interdisciplinary introduction to the historically nomadic land of Kazakhstan, its peoples and their lifestyles, the practice of everyday life. Ranked as the ninth largest country in the world, Kazakhstan is also the world's largest landlocked country; its territory is greater than Western Europe: it stretches from the fringes of Europe to the borders of Mongolia and China. The seminar surveys language and society, traditional economics and customary law, rituals and folk customs, local dwelling, craft and art, the cultural panorama, the historical relationship between sedentary and nomadic peoples as well as new approaches to the study of nomads in modernity. Speaking of the present time, we will follow the changing nomads in a changing world. The instructor is going to base, to the extent possible, on the extremely rich fieldwork data recently discovered in Kazakhstan -- the data is yet little known in the West. The seminar will make extensive use of audio-visual materials and films.

Same as: ANTHRO 144A.

**REES 247A. Folklore, Mythology, and Islam in Central Asia. 3-5 Units.**

Central Asian cults, myths, and beliefs from ancient time to modernity. Life crisis rites, magic ceremonies, songs, tales, narratives, taboos associated with childbirth, marriage, folk medicine, and calendrical transitions. The nature and the place of the shaman in the region. Sources include music from the fieldwork of the instructor and the Kyrgyz epoch *Manas*. The cultural universe of Central Asian peoples as a symbol of their modern outlook.

Same as: ANTHRO 147A.

**REES 299. Directed Reading. 1-12 Units.****REES 301. An Introduction to Russian, East European and Eurasian Studies. 5 Units.**

This seminar investigates the origins and evolution of the field and exposes students to major debates about the history, geography, politics, societies, economies, cultures, and languages of the region.

**REES 320. State and Nation Building in Central Asia. 5 Units.**

Issues of identity, development, and security following the dissolution of the Soviet Union and the emergence of independent states in Central Asia and the Southern Caucasus. Topics include the impact of 9/11, the spread of radical Islamist movements in the region, its growing role as a transit route for drugs, weapons, and possibly nuclear materials, the impact of the Soviet legacy, the nature of political and economic transformations, relations with neighboring countries, security challenges, and options facing U.S. policy makers.

**REES 330. With God in Russia: Orthodox Christianity in the 19th and 20th Centuries. 4-5 Units.**

The experience of religion, particularly Orthodoxy, under tsars and commissars. Religion as a lived experience; practice and belief in the provinces and villages, intertwining of religion and folk customs (the so-called double faith); condition of the Church before and after the Revolutions of 1917; religion under Soviet control; and liberation of the Church since the collapse of the Soviet Union.

Same as: REES 130.

## Science, Technology, Society Courses

**STS 1. The Public Life of Science and Technology. 5 Units.**

Focus on key social, cultural, and values issues raised by contemporary scientific and technological developments through STS interdisciplinary lens that encompasses historical dimensions (e.g., legacy of scientific revolution); technological impact (e.g., affordances of new tools and media); economic and management aspects (e.g., business models, design and engineering strategies); legal and ethical elements (e.g., intellectual property, social justice); and societal response and participation (e.g., media coverage, forms of activism).

**STS 50SI. Story Society. 1 Units.**

This course is an investigation of the methodological, ethical, and cultural challenges associated with working with young women in developed and developing regions through online and in-person storytelling forums.

Constructed mainly as pre-field preparation for a summer project entitled "Story Society," this course will explore the intersection of cross-cultural education, public service, and Participatory Action Research.

**STS 101. Science, Technology, and Contemporary Society. 4-5 Units.**

Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as sociotechnical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology.

Same as: ENGR 130, STS 201.

**STS 110. Ethics and Public Policy. 5 Units.**

Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations.

Same as: MSE 197, PUBLPOL 103B.

**STS 112. Ten Things: An Archaeology of Design. 3-5 Units.**

Connections among science, technology, society and culture by examining the design of a prehistoric hand axe, Egyptian pyramid, ancient Greek perfume jar, medieval castle, Wedgwood teapot, Edison's electric light bulb, computer mouse, Sony Walkman, supersonic aircraft, and BMW Mini. Interdisciplinary perspectives include archaeology, cultural anthropology, science studies, history and sociology of technology, cognitive science, and evolutionary psychology.

Same as: CLASSART 113, CLASSART 213.

**STS 115. Ethical Issues in Engineering. 4 Units.**

Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies, guest practitioners, and field research. Limited enrollment.

Same as: ENGR 131.

**STS 140. Science, Technology and Politics. 4 Units.**

This course will critically interrogate the relationship between science and technology and politics. Politics plays a significant role in the production of scientific knowledge and technological artifacts. Science and technology in turn constitute crucial elements of politics and governance in modern democracy. This course will explore these interactions through key STS texts and case studies of such issues as climate change, race science, urban planning, voting machines, and information technology in social movements.

**STS 152. Nuclear Weapons, Risk and Hope. 1 Units.**

Recent research indicates that depending on nuclear weapons for our security is thousands of times riskier than society will tolerate with respect to nuclear power plants. This seminar explores methods for estimating the risk, why society ignores the danger, and what can be done to correct that imbalance. No prerequisites, and at a level understandable to non-majors, including in the humanities.

**STS 190. Issues in Technology and the Environment. 4 Units.**

Humans have long shaped and reshaped the natural world with technologies. Once a menacing presence to conquer or an infinite reserve for resources, nature is now understood to require constant protection from damage and loss. This course will examine humanity's varied relationship with the environment, with a focus on the role of technology. Topics include: industrialization, modernism, nuclear technology, and biotechnology. Students will explore theoretical and methodological approaches in STS and conduct original research that addresses this human-nature-technology nexus. Preference to STS juniors.

**STS 199. Individual Work. 1-5 Units.****STS 199J. Editing a Science Technology and Society Journal. 1-2 Units.**

The Science Technology and Society (STS) Program has a student journal, *Intersect*, that has been publishing STS student papers for a number of years. This course involves learning about how to serve as an editor of a peer-reviewed journal, while serving as one of the listed editors of *Intersect*. Entirely operated online, the journal uses a work-flow management to help with the submission process, peer-review, editing, and publication. Student editors learn by being involved in the publishing process, from soliciting manuscripts to publishing the journal's annual issue, while working in consultation with the instructor. Students will also learn about current practices and institutional frameworks around open access and digital publishing.

**STS 200A. STS Senior Capstone. 5 Units.**

**Food and Society: Politics and Technology:** This course will examine how politics, culture, and technology intersect in our food practices. Through a survey of academic, journalistic, and artistic works on food and eating, the course will explore a set of key analytical frameworks and conceptual tools in STS. The topics covered include: the industrialization of agriculture; technology and the modes of eating (e.g., the rise of restaurants); food taboos; globalization and local foodways; food and environmentalism; and new technologies in production (e.g., genetically modified food).

**STS 200B. STS Senior Capstone. 5 Units.**

Car Culture. Since at least the 50s, the U.S. has been notorious as a nation in love with the car. An examination of this premise, analyzing new methods of production brought by automobile manufacture, how automobiles shaped urban growth, debates about pollution and environmental degradation, and debates around auto safety. How the car has influenced American practices including courting, eating out, and suburban living.

Same as: ANTHRO 146.

**STS 200C. STS Senior Capstone. 5 Units.**

Genetics, Ethics and Society. This course will explore three socially transforming components of genetics research that hold simultaneously liberating and constraining possibilities for populations and publics, both locally and globally. Typically the course will be divided into three sections. First, we will examine past and present issues dealing with the study of human subjects, as well as recent proposals to eventually bring full genome scans to every individual (personal genomics). Next we will learn of large-scale projects that aim to map the presence of environmental pathogens by their genetic signatures on a planetary scale and how different global populations may be affected. The last section of the course will focus on still other projects and policies that aim to expand the scope and capacity of state and international law enforcement through DNA-based forensics (the FBI CODIS database and the UK's Human Provenance Pilot Project). Projects like the latter also overlap with theories about community, families, and citizens who may or may not be linked through DNA. New concepts, such as the forensic "genetic informant" within a family unit, human DNA and isotope  $\delta$ country matches, in cases of state asylum, and DNA based kinship rules for family reunification in many Western countries, will be explored. In all three sections we will also examine scientific ethics when subject populations are minorities, or somehow structurally disadvantaged globally. This capstone course will provide students with tools to explore and critically assess the various technical, social, and ethical positions of researchers, as well as the role of the state and certain publics in shaping scientific research agendas that promise to reorganize critical aspects of human life. Students will be encouraged to explore these dynamics within such important societal domains as health, law, markets of bio-surveillance, and the growing industry of disease and heritage DNA identity testing among others. We will read works from social scientists of science practice, ethicists, medial humanists and scientists. This course will equip students with tools to write about the intersection of science and society and to engage in a research project that relates to the topical foci of the course, broadly conceived.

Same as: ANTHRO 200C.

**STS 201. Science, Technology, and Contemporary Society. 4-5 Units.**

Key social, cultural, and values issues raised by contemporary scientific and technological developments; distinctive features of science and engineering as sociotechnical activities; major influences of scientific and technological developments on 20th-century society, including transformations and problems of work, leisure, human values, the fine arts, and international relations; ethical conflicts in scientific and engineering practice; and the social shaping and management of contemporary science and technology. Same as: ENGR 130, STS 101.

**STS 299. Advanced Individual Work. 1-5 Units.**

May be repeated for credit.

## Scientific Computing Comput' Math Courses

**SCCM 398. Curricular Practical Training. 1 Unitss.**

Provides students with on-the-job training under the guidance of experienced, on-site supervisors. Students must register the quarter after their training. Students receive credit and a grade after submitting a concise report detailing work activities, problems worked on, and key results.

Prerequisite: written consent of adviser. (Staff).

**SCCM 499. Advanced Reading and Research. 1-15 Units.**

Prerequisites: majoring in SC/CM; consent of adviser. (Staff).

## Slavic General Courses

### Slavic Language Courses

**SLAVLANG 1. First-Year Russian, First Quarter. 5 Units.**

Functionally-based communicative approach, including essential Russian grammar. Discussions of Russian culture and the Russian view of reality.

**SLAVLANG 2. First-Year Russian, Second Quarter. 5 Units.**

Continuation of SLAVLANG 1. Functionally-based communicative approach, including essential Russian grammar. Discussions of Russian culture and the Russian view of reality. Prerequisite: Placement Test, SLAVLANG 1 or consent of instructor.

**SLAVLANG 3. First-Year Russian, Third Quarter. 5 Units.**

Continuation of SLAVLANG 2. Functionally-based communicative approach, including essential Russian grammar. Discussions of Russian culture and the Russian view of reality. Prerequisite: Placement Test, SLAVLANG 2 or consent of instructor.

**SLAVLANG 6. Russian for Native Speakers, Second Quarter. 2 Units.**

Self-paced. Reading and writing skills and communicating in formal and informal settings. Does not fulfill the University foreign language requirement. Prerequisite: SLAVLANG 5 or consent of instructor.

**SLAVLANG 7. Russian for Native Speakers, Third Quarter. 2 Units.**

Continuation of SLAVLANG 6. Self-paced. Reading and writing skills and communicating in formal and informal settings. Does not fulfill the University foreign language requirement. Prerequisite: SLAVLANG 6 or consent of instructor.

**SLAVLANG 51. Second-Year Russian, First Quarter. 5 Units.**

Proficiency development at the intermediate level, including more difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. Prerequisite: Placement Test, SLAVLANG 3 or consent of instructor.

**SLAVLANG 52. Second-Year Russian, Second Quarter. 5 Units.**

Continuation of 51. Proficiency development at the intermediate level, including more difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. Prerequisite: placement test, 51 or consent of instructor.

**SLAVLANG 53. Second-Year Russian, Third Quarter. 5 Units.**

Continuation of 52. Proficiency development at the intermediate level, including more difficult grammar such as numbers, verb conjugation, and aspect. Vocabulary, speaking skills. Prerequisite: placement test, 52 or consent of instructor.

**SLAVLANG 55. Intermediate Russian Conversation. 2 Units.**

May be repeated for credit. Prerequisite: SLAVLANG 3 or equivalent placement.

**SLAVLANG 60A. Beginning Russian Conversation. 1 Unitss.**

**SLAVLANG 60B. Intermediate Russian Conversation. 1 Unitss.**

**SLAVLANG 60C. Advanced Russian Conversation. 1 Unitss.**

**SLAVLANG 60E. The Sensuality of Slavic Sustenance. 1 Unitss.**

**SLAVLANG 60F. Slavic Films Series. 1 Unitss.**

**SLAVLANG 60H. Tour of Bulgaria. 1 Unitss.**

**SLAVLANG 60M. Songs and Poems of Comrades, Cossacks, Gypsies, and Peasants. 1 Unitss.**

**SLAVLANG 60P. Slav Dom Theme Projects. 1 Unitss.**

**SLAVLANG 60T. Teaching Slavic Conversation. 1 Unitss.**

**SLAVLANG 99. Language Specials. 1-5 Units.**

Prerequisite: consent of instructor.

**SLAVLANG 111. Third-Year Russian, First Quarter. 4 Units.**

Continuation of SLAVLANG 53. A snapshot of Russian life. Reading comprehension, conversational competence, grammatical accuracy, and cultural sophistication. Prerequisite: Placement Test, SLAVLANG 53 or consent of instructor.

**SLAVLANG 112. Third-Year Russian, Second Quarter. 4 Units.**

Continuation of SLAVLANG 111. A snapshot of Russian life. Reading comprehension, conversational competence, grammatical accuracy, and cultural sophistication. Prerequisite: Placement Test, SLAVLANG 111 or consent of instructor.

**SLAVLANG 113. Third-Year Russian, Third Quarter. 4 Units.**

Continuation of SLAVLANG 112. A snapshot of Russian life. Reading comprehension, conversational competence, grammatical accuracy, and cultural sophistication. Prerequisite: Placement Test, SLAVLANG 112 or consent of instructor.

**SLAVLANG 177. Fourth-Year Russian, First Quarter. 3 Units.**

Continuation of SLAVLANG 113. Culture, history, and current events. Films, classical and contemporary writers, newspaper articles, documentaries, radio and TV programs, and music. Review and fine-tuning of grammar and idiomatic usage. Prerequisite: Placement Test, SLAVLANG 113 or consent of instructor.

**SLAVLANG 178. Fourth-Year Russian, Second Quarter. 3 Units.**

Continuation of SLAVLANG 177. Culture, history, and current events. Films, classical and contemporary writers, newspaper articles, documentaries, radio and TV programs, and music. Review and fine-tuning of grammar and idiomatic usage. Prerequisite: Placement Test, SLAVLANG 177 or consent of instructor.

**SLAVLANG 179. Fourth-Year Russian, Third Quarter. 3 Units.**

Continuation of SLAVLANG 178. Culture, history, and current events. Films, classical and contemporary writers, newspaper articles, documentaries, radio and TV programs, and music. Review and fine-tuning of grammar and idiomatic usage. Prerequisite: Placement Test, SLAVLANG 178 or consent of instructor.

**SLAVLANG 181. Fifth-Year Russian, First Quarter. 3 Units.**

Continuation of SLAVLANG 179. Language proficiency maintenance; appropriate for majors and non-majors with significant language experience overseas. Discussions, oral presentations, and writing essays on contemporary Russia. Prerequisite: Placement Test, SLAVLANG 179 or consent of instructor.

**SLAVLANG 181M. Fifth-Year Russian. 5 Units.**

Same as: OSPMOSC 181M.

**SLAVLANG 182. Fifth-Year Russian, Second Quarter. 3 Units.**

Continuation of SLAVLANG 181. Language proficiency maintenance; appropriate for majors and non-majors with significant language experience overseas. Discussions, oral presentations, and writing essays on contemporary Russia. Prerequisite: Placement Test, SLAVLANG 181 or consent of instructor.

**SLAVLANG 183. Fifth-Year Russian, Third Quarter. 3 Units.**

Continuation of SLAVLANG 182. Language proficiency maintenance; appropriate for majors and non-majors with significant language experience overseas. Discussions, oral presentations, and writing essays on contemporary Russia. Prerequisite: Placement Test, SLAVLANG 182 consent of instructor.

**SLAVLANG 184A. Russian Reading Conversation and Composition. 2-3 Units.**

Proficiency in reading, spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.

**SLAVLANG 184B. Russian Advanced Conversation and Composition. 2-3 Units.**

Proficiency in spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.

**SLAVLANG 184C. Russian Advanced Conversation and Composition. 2-3 Units.**

Proficiency in spoken and written Russian through literary and non-literary texts, movies, and contemporary media. Emphasis is on debate, oral presentations, and essay writing.

**SLAVLANG 199. Individual Work. 1-5 Units.**

Prerequisite: consent of instructor.

**SLAVLANG 299. Independent Study. 1-5 Units.**

**SLAVLANG 394. Graduate Studies in Russian Conversation. 1-3 Units.**

**SLAVLANG 395. Graduate Studies in Russian. 2-5 Units.**

Prerequisite: consent of instructor. (Staff).

## Slavic Languages and Literatures Courses

**SLAVIC 77Q. Russia's Weird Classic: Nikolai Gogol. 3-4 Units.**

Preference to sophomores. An investigation of the works and life of Nikolai Gogol, the most eccentric of Russian authors and the founder of what is dubbed Fantastic Realism. Our investigation will be based on close reading of works written in various genres and created in various stages of Gogol's literary career. Taught in English.

**SLAVIC 78N. Poetry to Prose: The Birth of the Great Russian Novel in Alexander Pushkin's Eugene Onegin. 3 Units.**

Devoted to a close reading and detailed discussion of Alexander Pushkin's masterpiece in the context of XIX century Russian and continental literary history. Pushkin (1799-1837) is the founder of modern Russian literature; his place in it is comparable to that of Shakespeare in Britain. Taught in English.

**SLAVIC 145. Age of Experiment: Russian Experiments in Short Fiction (1820-1905). 3-5 Units.**

Russian literature is identified with its great 19th c. novels, "baggy monsters" of 600-1200 pages. In this course we will instead investigate an array of short fictional forms (stories, novellas, tales, plays, and journalistic sketches) by Pushkin, Gogol, Lermontov, Tolstoy, Turgenev, Dostoevsky and Chekhov, in light of their competitive redefinitions of the tasks of art and consciousness, as well as their continuing technical and philosophical impact on modern narrative. No prerequisites. Course conducted in English. Students with Russian competence will have opportunity to read and work with texts in original  
Same as: SLAVIC 345.

**SLAVIC 146. The Great Russian Novel: Theories of Time and Action. 3-5 Units.**

Connections of philosophy and science to literary form in War and Peace, Brothers Karamazov, Chekhov stories: alternative shapes of time, perception, significant action. Taught in English.  
Same as: SLAVIC 346.

**SLAVIC 147. Modern Russian Literature and Culture: The Age of War and Revolution. 3-4 Units.**

Surveys major authors (may include: Mayakovsky, Babel, Kharms, Platonov, Bunin, Nabokov, Bulgakov, and Pasternak) and artistic tendencies in 20th century Russian literature and culture in the context of social and political turmoil in Russia from the 1917 revolution to the demise of Stalinism. An emphasis is placed on close reading and detailed analysis of artistic qualities of the literary works. Taught in English.  
Same as: SLAVIC 347.

**SLAVIC 148. Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin. 3-5 Units.**

Russian culture and society since 1953 through literature (in English translation). Topics: opposition and dissent; generational conflict; modernization; everyday life, gender, ethnicity, class, citizenship, exit from communism. Literature of the "Thaw," state-published and samizdat, "village" and "cosmopolitan," the new emigration, Sots-Art, and the Russian "post-modern." Solzhenitsyn, Shalamov, Trifonov, Siniavsky-Tertz, Erofeev, Dovlatov, Brodsky, Petrushevskaya, Pelevin, Ulitskaya, Sorokin. Requirements: three reaction papers and final exam (UG); research paper for graduate credit (extra section for graduate students; may register for SLAVLIT 399)  
Same as: SLAVIC 348.

**SLAVIC 179. Literature from Old Rus' and Medieval Russia. 2-4 Units.**

From earliest times through the 17th century. The development of literary and historical genres, and links among literature and art, architecture, and religious culture. Readings in English; graduate students read in original.  
Same as: SLAVIC 379.

**SLAVIC 181. Philosophy and Literature. 5 Units.**

Required gateway course for Philosophical and Literary Thought; crosslisted in departments sponsoring the Philosophy and Literature track: majors should register in their home department; non-majors may register in any sponsoring department. Introduction to major problems at the intersection of philosophy and literature. Issues may include authorship, selfhood, truth and fiction, the importance of literary form to philosophical works, and the ethical significance of literary works. Texts include philosophical analyses of literature, works of imaginative literature, and works of both philosophical and literary significance. Authors may include Plato, Montaigne, Nietzsche, Borges, Beckett, Barthes, Foucault, Nussbaum, Walton, Nehamas, Pavel, and Pippin. Taught in English.  
Same as: CLASSGEN 81, COMPLIT 181, ENGLISH 81, FRENCH 181, GERMAN 181, ITALIAN 181, PHIL 81.

**SLAVIC 187. Russian Poetry of the 18th and 19th Centuries. 3-4 Units.**

Required of majors in Russian language and literature; open to undergraduates who have completed three years of Russian, and to graduate students. The major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by Lomonosov, Derzhavin, Zhukovskii, Pushkin, Baratynskii, Lermontov, Tiutchev, Nekrasov, Fet, Soloviev.  
Taught in Russian. Prerequisites: 2nd-year Russian  
Same as: SLAVIC 387.

**SLAVIC 188. 20th century Russian Poetry: From Aleksandr Blok to Joseph Brodsky. 3-5 Units.**

Required of majors in Russian literature. Developments in and 20th-century Russian poetry including symbolism, acmeism, futurism, and literature of the absurd. Emphasis is on close readings of individual poems. Taught in Russian.  
Same as: SLAVIC 388.

**SLAVIC 194. Russia: Literature, Film, Identity, Alterity. 3-5 Units.**

How do Russian literature and film imagine Russian identity *¿* and, in contrast, the ethnic or national Other? Does political and literary theory analyzing national identity and the literary imagination elsewhere hold true in the Russian context? Texts include works by Pushkin, Dostoevsky, Tolstoy, Blok, Mayakovsky, Platonov; Soviet and post-Soviet films; theory and history. Recommended for returnees from Moscow, Slavic majors, and CREEES MA students. Accepted for IR credit. Readings in English and films subtitled; additional section for Russian readers. Taught in English.  
Same as: SLAVIC 394.

**SLAVIC 195. Russian and East European Theater. 3-5 Units.**

Evolution of modernist Russian/EEur. dramaturgy, theatrical practices, landmark productions from Chekhov-Meyerhold-Grotowski to present; re-performance of classics; techniques of embodiment. Taught in English.  
Same as: SLAVIC 395.

**SLAVIC 199. Individual Work for Undergraduates. 1-5 Units.**

Open to Russian majors or students working on special projects. May be repeated for credit. Prerequisite: consent of instructor.

**SLAVIC 200. Proseminar in Literary Theory and Study of Russian Literature. 3-5 Units.**

Introduction to advance study of Russian literature and culture: profession, discipline, theoretical perspectives. Variety of approaches, from semiological to psychoanalytic, phenomenological, historical, and sociological; practical exercises in the analysis of verse, narrative, and visual representation in literature and art. Three short essays (800 words) and a review of a recent monograph on Russian literature and culture. Required for graduate students and honors seniors in Russian; first-year graduate students must enroll during their first quarter. Prerequisites: Knowledge of Russian language and literature.

**SLAVIC 200B. Research Tools and Professionalization Workshop for Slavic Graduate Students. 1 Unit.**

This course introduces graduate students in Slavic Studies to library, archival, and web resources for research, grant opportunities, publication strategies, and professional timelines. Open to PhD students in the Slavic Department and other departments and to MA students in CREEES.

**SLAVIC 225. Readings in Russian Realism. 3-5 Units.**

For graduate students or upper-level undergraduates. What did Realism mean for late imperial Russian writers? What has it meant for twentieth-century literary theory? As we seek to answer these questions, we read Tolstoy, Dostoevsky, Turgenev, and Chekhov, alongside their brilliant but less often taught contemporaries such as Goncharov, Saltykov-Shchedrin, Leskov, Garshin, Korolenko, Gorky, Andreev, and Bunin. Reading in Russian; discussion in English.

**SLAVIC 229. Poetry as System: Introduction to Theory and Practice of Russian Verse. 3-4 Units.**

Detailed analysis and survey of distinctive features of Russian verse culture in its historical development and in contrast with poetic traditions in other European cultures. Taught in Russian. Prerequisites: 2nd-year Russian.

**SLAVIC 236. The Russian Long Take. 3-5 Units.**

"Time flows in a film not by virtue but in defiance of montage-cuts," wrote the great Russian filmmaker Andrei Tarkovsky. An exploration of the phenomenon of long take (a single continuous shot which presents "a vision of time") and its aesthetic and philosophical significance to the art of cinema. Key films by cult Russian/Soviet auteurs such as Andrei Tarkovsky, Sergei Paradzhanov and Aleksandr Sokurov will be used as case studies and read through the prism of film theory (Gilles Deleuze, Andre Bazin and Jean Epstein). Taught in English.

**SLAVIC 270. Pushkin's Golden Age. 3-5 Units.**

Pushkin's poems, prose, and drafts in dialogue with contemporaries and cultural milieu. Emphasis on innovation and controversy in genre, lyrical form and personal idiom, shaping a public discourse. Taught in English.

**SLAVIC 311. Introduction to Old Church Slavic. 2-4 Units.**

The first written language of the Slavic people. Grammar. Primarily a skills course, with attention to the historical context of Old Church Slavic.

**SLAVIC 315. Isaac Babel and His Worlds. 3-4 Units.**

Isaac Babel, his oeuvre, literary, theatrical, and cinematic; his milieu; cultural and historical setting; literary and cultural legacy. Taught in English, knowledge of Russian language and literature strongly recommended.

**SLAVIC 327. Boris Pasternak and the Poetry of the Russian Avant Garde. 4 Units.**

Focus on three major figures of Russian modernism: Boris Pasternak, Vladimir Mayakovsky and Marina Tsvetaeva. An analysis of experimental Futurist poetic language and techniques in the context of the polemics of various modernist movements. Taught in Russian. Prerequisites: 3rd-year Russian.

**SLAVIC 340. Russia's Castaway Classic: Andrei Platonov. 3-5 Units.**

"The power of devastation [Platonov's texts] inflict upon their subject matter exceeds by far any demands of social criticism and should be measured in units that have very little to do with literature as such," wrote Joseph Brodsky. Explores key texts of Andrei Platonov, who is frequently considered the greatest Russian prose writer of the twentieth century, and covers major critical approaches to his "devastating" oeuvre. The texts will be read in Russian, discussion in English.

**SLAVIC 345. Age of Experiment: Russian Experiments in Short Fiction (1820-1905). 3-5 Units.**

Russian literature is identified with its great 19th c. novels, "baggy monsters" of 600-1200 pages. In this course we will instead investigate an array of short fictional forms (stories, novellas, tales, plays, and journalistic sketches) by Pushkin, Gogol, Lermontov, Tolstoy, Turgenev, Dostoevsky and Chekhov, in light of their competitive redefinitions of the tasks of art and consciousness, as well as their continuing technical and philosophical impact on modern narrative. No prerequisites. Course conducted in English. Students with Russian competence will have opportunity to read and work with texts in original. Same as: SLAVIC 145.

**SLAVIC 346. The Great Russian Novel: Theories of Time and Action. 3-5 Units.**

Connections of philosophy and science to literary form in War and Peace, Brothers Karamazov, Chekhov stories: alternative shapes of time, perception, significant action. Taught in English. Same as: SLAVIC 146.

**SLAVIC 347. Modern Russian Literature and Culture: The Age of War and Revolution. 3-4 Units.**

Surveys major authors (may include: Mayakovsky, Babel, Kharms, Platonov, Bunin, Nabokov, Bulgakov, and Pasternak) and artistic tendencies in 20th century Russian literature and culture in the context of social and political turmoil in Russia from the 1917 revolution to the demise of Stalinism. An emphasis is placed on close reading and detailed analysis of artistic qualities of the literary works. Taught in English. Same as: SLAVIC 147.

**SLAVIC 348. Dissent and Disenchantment: Russian Literature and Culture since the Death of Stalin. 3-5 Units.**

Russian culture and society since 1953 through literature (in English translation). Topics: opposition and dissent; generational conflict; modernization; everyday life, gender, ethnicity, class, citizenship, exit from communism. Literature of the "Thaw," state-published and samizdat, "village" and "cosmopolitan," the new emigration, Sots-Art, and the Russian "post-modern." Solzhenistyn, Shalamov, Trifonov, Siniavsky-Tertz, Erofeev, Dovlatov, Brodsky, Petrushevskaya, Pelevin, Ulitskaya, Sorokin. Requirements: three reaction papers and final exam (UG); research paper for graduate credit (extra section for graduate students; may register for SLAVLIT 399) Same as: SLAVIC 148.

**SLAVIC 379. Literature from Old Rus' and Medieval Russia. 2-4 Units.**

From earliest times through the 17th century. The development of literary and historical genres, and links among literature and art, architecture, and religious culture. Readings in English; graduate students read in original. Same as: SLAVIC 179.

**SLAVIC 387. Russian Poetry of the 18th and 19th Centuries. 3-4 Units.**

Required of majors in Russian language and literature; open to undergraduates who have completed three years of Russian, and to graduate students. The major poetic styles of the 19th century as they intersected with late classicism, the romantic movement, and the realist and post-realist traditions. Representative poems by Lomonosov, Derzhavin, Zhukovskii, Pushkin, Baratynskii, Lermontov, Tiutchev, Nekrasov, Fet, Soloviev. Taught in Russian. Prerequisites: 2nd-year Russian Same as: SLAVIC 187.

**SLAVIC 388. 20th century Russian Poetry: From Aleksandr Blok to Joseph Brodsky. 3-5 Units.**

Required of majors in Russian literature. Developments in and 20th-century Russian poetry including symbolism, acmeism, futurism, and literature of the absurd. Emphasis is on close readings of individual poems. Taught in Russian. Same as: SLAVIC 188.

**SLAVIC 394. Russia: Literature, Film, Identity, Alterity. 3-5 Units.**

How do Russian literature and film imagine Russian identity and, in contrast, the ethnic or national Other? Does political and literary theory analyzing national identity and the literary imagination elsewhere hold true in the Russian context? Texts include works by Pushkin, Dostoevsky, Tolstoy, Blok, Mayakovsky, Platonov; Soviet and post-Soviet films; theory and history. Recommended for returnees from Moscow, Slavic majors, and CREES MA students. Accepted for IR credit. Readings in English and films subtitled; additional section for Russian readers. Taught in English. Same as: SLAVIC 194.

**SLAVIC 395. Russian and East European Theater. 3-5 Units.**

Evolution of modernist Russian/EEur. dramaturgy, theatrical practices, landmark productions from Chekhov-Meyerhold-Grotowski to present; re-performance of classics; techniques of embodiment. Taught in English. Same as: SLAVIC 195.



**SLAVIC 399. INDIVIDUAL WORK. 1-15 Units.**

Open to Russian majors or students working on special projects. May be repeated for credit. Prerequisite: consent of instructor.

**SLAVIC 802. TGR Dissertation. 0 Unit.**

## Slavic Literature Courses

## Sociology Courses

**SOC 1. Introduction to Sociology at Stanford. 5 Units.**

The Stanford Sociology department includes some of the best-known and most influential thinkers in the discipline. This class will be an opportunity to meet them and hear about their research and other interests that occupy them as professional sociologists. As you learn about their work, you also will learn about key concepts, methods, and theoretical orientations within sociology.

**SOC 14N. Inequality in American Society. 3 Units.**

An overview of the major forms of inequality in American society, their causes and consequences. Special attention will be devoted to public policy associated with inequality.

**SOC 15N. The Transformation of Socialist Societies. 3 Units.**

Preference to freshmen. The impact of societal organization on the lives of ordinary people in socialist societies and in the new societies arising through the processes of political, economic, and social transformation. Do the concepts of democratization and marketization suffice to characterize ongoing changes? Enrollment limited to 16.

**SOC 16N. African Americans and Social Movements. 3 Units.**

Theory and research on African Americans' roles in post-Civil Rights, US social movements. Topics include women's right, LGBT rights, environmental movement, and contemporary political conservatism. Same as: AFRICAAM 16N, CSRE 16N.

**SOC 45Q. Understanding Race and Ethnicity in American Society. 5 Units.**

Preference to sophomores. Historical overview of race in America, race and violence, race and socioeconomic well-being, and the future of race relations in America. Enrollment limited to 16. Same as: CSRE 45Q.

**SOC 46N. Race, Ethnic, and National Identities: Imagined Communities. 3 Units.**

Preference to freshmen. How new identities are created and legitimated. What does it mean to try on a different identity? National groups and ethnic groups are so large that one individual can know only an infinitesimal fraction of other group members. What explains the seeming coherence of groups? If identities are a product of the imagination, why are people willing to fight and die for them? Enrollment limited to 16.

**SOC 100SI. Student Initiated Course. 1 Unit.**

**SOC 107. China After Mao. 5 Units.**

China's post-1976 recovery from the late Mao era; its reorientation toward an open market-oriented economy; the consequences of this new model and runaway economic growth for standards of living, social life, inequality, and local governance; the political conflicts that have accompanied these changes. Same as: SOC 207.

**SOC 111D. Social-Psychology and Economics: The trouble with how economists think you think. 5 Units.**

This course will compare and contrast explanations for human behavior; specifically, those derived from economic theory with those from social-psychological research. Rationality, decision-making, happiness, motivation, the persistence of inequality, and evaluation of outputs will be examined. It will also investigate the shortcomings of estimating individual preferences without taking into account macro-level phenomenon, such as hierarchy and justice. For students who lack familiarity with economics, the course will also cover basic economic theory as necessary. The use of economic versus social-psychological theory in determining appropriate public policy will also be explored.

**SOC 113. Comparative Corruption. 5 Units.**

Causes, effects, and solutions to various forms of corruption in business and politics in both developing regions (e.g. Asia, E. Europe) and developed ones (the US and the EU).

Same as: POLISCI 143S.

**SOC 113D. Sociology of Sport. 5 Units.**

This course is designed to examine sports from a sociological perspective and to develop a greater understanding of the impact of sports on societies and individuals. We will analyze sports and sporting cultures using several theoretical frameworks such as functionalism, conflict theory, critical theory, feminist theory, and an internationalist perspective. This course will address questions such as: What role do sports have in society? How can we understand the importance societies place on sports? How are social inequalities replicated or challenged through sports? How do sports influence individuals and the construction of a social reality?.

**SOC 114. Economic Sociology. 5 Units.**

(Graduate students register for 214.) The sociological approach to production, distribution, consumption, and markets, emphasizing the impact of norms, power, social structure, and institutions on the economy. Comparison of classic and contemporary approaches to the economy among the social science disciplines. Topics: consumption, labor markets, organization of professions such as law and medicine, the economic role of informal networks, industrial organization, including the structure and history of the computer and popular music industries, business alliances, capitalism in non-Western societies, and the transition from state socialism in E. Europe and China.

Same as: SOC 214.

**SOC 114D. Sociology of the Great Recession. 5 Units.**

The Great Recession (2007-2009), one of the most socially significant events of our time. This course will cover the economic, social, cultural, and political consequences of the recession. We will address its impact on: inequality; job prospects for college graduates; trust in the government; the 2012 presidential election; marriage; child birth; and immigration. We examine the rise of protest movements during the recession period, such as Occupy Wall Street and the Tea Party, and explore the idea of "class warfare". Class will feature several guest speakers and will focus on developing a general understanding of trends emerging in these events.

**SOC 115. Topics in Economic Sociology. 5 Units.**

(Graduate students register for 315.) Discussion of topics initially explored in 114/214, with emphasis on countries and cultures outside N. America. Possible topics: families and ethnic groups in the economy, corporate governance and control, corporate strategy, relations among firms in industrial districts and business groups, the impact of national institutions and cultures on economic outcomes, transitions from state socialism and the role of the state in economic development. Possible case studies: the U.S., Germany, Italy, Britain, France, Brazil, Korea, India, Japan, and China. Prerequisite: 114/214 or 314.

Same as: SOC 315.

**SOC 118. Social Movements and Collective Action. 5 Units.**

Why social movements arise, who participates in them, the obstacles they face, the tactics they choose, and how to gauge movement success or failure. Theory and empirical research. Application of concepts and methods to social movements such as civil rights, environmental justice, antiglobalization, and anti-war.  
Same as: SOC 218.

**SOC 119. Understanding Large-Scale Societal Change: The Case of the 1960s. 5 Units.**

The demographic, economic, political, and cultural roots of social change in the 60s; its legacy in the present U.S.  
Same as: SOC 219.

**SOC 120. Interpersonal Relations. 5 Units.**

(Graduate students register for 220.) Forming ties, developing norms, status, conformity, deviance, social exchange, power, and coalition formation; important traditions of research have developed from the basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups.  
Same as: SOC 220.

**SOC 121. The Individual in Social Structure: Foundations in Sociological Social Psychology. 5 Units.**

Dynamics of the relationship between the individual and social structure, the relationship between the individual and immediate social context, and relationships between individuals. Focus is on the dominant theoretical perspectives in sociological social psychology: social structure and personality, structural social psychology, and symbolic interactionism.

**SOC 123. Sex and Love in Modern Society. 5 Units.**

Social influences on private intimate relations involving romantic love and sexuality. Topics include the sexual revolution, contraception, dating, hook-ups, cohabitation, sexual orientation, and changing cultural meanings of marriage, gender, and romantic love.  
Same as: SOC 223.

**SOC 125. Sociology of Religion. 5 Units.**

The social patterns of religious belief and practice, and the classical and contemporary theoretical approaches to understanding these patterns. Topics: churches, sects and cults, sources of religious pluralism, relationships between religion and aspects of social structures including the economy, class structure, ethnicity, social networks, and the state.

**SOC 126. Introduction to Social Networks. 5 Units.**

(Graduate students register for 226.) Theory, methods, and research. Concepts such as density, homogeneity, and centrality; applications to substantive areas. The impact of social network structure on individuals and groups in areas such as communities, neighborhoods, families, work life, and innovations.  
Same as: SOC 226.

**SOC 127. Bargaining, Power, and Influence in Social Interaction. 5 Units.**

(Graduate students register for 227.) Research and theoretical work on bargaining, social influence, and issues of power and justice in social settings such as teams, work groups, and organizations. Theoretical approaches to the exercise of power and influence in social groups and related issues in social interaction such as the promotion of cooperation, effects of competition and conflict, negotiation, and intergroup relations. Enrollment limited to 40.  
Same as: SOC 227.

**SOC 128. Introduction to Social Network Analysis. 5 Units.**

(Graduate students register for SOC 228.) Theory and methods of network analysis in sociology (with an emphasis on social movements), anthropology, history, social psychology, economics, political science, and public health. Prerequisite: basic mathematics.  
Same as: SOC 228.

**SOC 129X. Urban Education. 3-4 Units.**

(Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education.  
Same as: AFRICAAM 112, EDUC 112X, EDUC 212X, SOC 229X.

**SOC 130. Education and Society. 4-5 Units.**

The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.  
Same as: EDUC 120C, EDUC 220C, SOC 230.

**SOC 132. Sociology of Education: The Social Organization of Schools. 4 Units.**

Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy.  
Same as: EDUC 110, EDUC 310, SOC 332.

**SOC 133. Law and Wikinomics: The Economic and Social Organization of the Legal Profession. 1-5 Units.**

(Graduate and Law students enroll in 333.) Seminar. Emphasis is on the labor market for large-firm lawyers, including the market for entry-level lawyers, attorney retention and promotion practices, lateral hiring of partners, and increased use of forms of employment such as the non-equity form of partnership. Race and gender discrimination and occupational segregation; market-based pressure tactics for organizational reform. Students groups collect and analyze data about the profession and its markets. Multimedia tools for analysis and for producing workplace reforms. May be repeated for credit. Prerequisite: consent of instructor.  
Same as: SOC 333.

**SOC 134. Education, Gender, and Development. 4 Units.**

Theories and perspectives from the social sciences relevant to the role of education in changing, modifying, or reproducing structures of gender differentiation and hierarchy. Cross-national research on the status of girls and women and the role of development organizations and processes.  
Same as: EDUC 197.

**SOC 135. Poverty, Inequality, and Social Policy in the United States. 5 Units.**

Causes and consequences. Effects of antipoverty policies, and debates over effective social policies. Focus is on how poverty and inequality are experienced by families, children, and communities. Topics include welfare reform and labor market policies, education, and community-based antipoverty strategies.  
Same as: SOC 235.

**SOC 136. Sociology of Law. 5 Units.**

(Graduate students register for 236) Major issues and debates. Topics include: historical perspectives on the origins of law; rationality and legal sanctions; normative decision making and morality; cognitive decision making; crime and deviance; the law in action versus the law on the books; organizational responses to law in the context of labor and employment; the roles of lawyers, judges, and juries; and law and social change emphasizing the American civil rights movement.

Same as: SOC 236.

**SOC 136A. Law and Society. 5 Units.**

Law and social inequality. Major sociological perspectives on where the law comes from, what law and justice systems do, and how they work.

Same as: SOC 236A.

**SOC 136B. Advanced Topics in Sociology of Law. 5 Units.**

(Same as LAW 538.) Historical perspectives on the origins of law, rationality and legal sanctions, law on the books versus the law in action, crime and deviance, school desegregation, privatization of prisons, American civil rights, file sharing, jury decision making, the role of lawyers and judges, and cynicism about the American legal system.

Same as: SOC 236B.

**SOC 138. American Indians in Comparative Historical Perspective. 5 Units.**

(Graduate students register for 238.) Demographic, political, and economic processes and events that shaped relations between Euro-Americans and American Indians, 1600-1890. How the intersection of these processes affected the outcome of conflicts between these two groups, and how this conflict was decisive in determining the social position of American Indians in the late 19th century and the evolution of the doctrine of tribal sovereignty.

Same as: NATIVEAM 138, SOC 238.

**SOC 139. American Indians in Contemporary Society. 5 Units.**

(Graduate students register for 239.) The social position of American Indians in contemporary American society, 1890 to the present. The demographic resurgence of American Indians, changes in social and economic status, ethnic identification and political mobilization, and institutions such as tribal governments and the Bureau of Indian Affairs.

Recommended: 138 or a course in American history.

Same as: NATIVEAM 139, SOC 239.

**SOC 140. Introduction to Social Stratification. 5 Units.**

(Graduate students register for 240.) The main classical and modern explanations of the causes of social, economic, and political inequality. Issues include: power; processes that create and maintain inequality; the central axes of inequality in contemporary societies (race, ethnicity, class, and gender); the consequences of inequality for individuals and groups; and how social policy can mitigate and exacerbate inequality. Cases include technologically simple groups, the Indian caste system, and the modern U.S.

Same as: SOC 240.

**SOC 141. Controversies about Inequality. 5 Units.**

(Graduate students register for 241.) Debate format involving Stanford and guest faculty. Forms of inequality including racial, ethnic, and gender stratification; possible policy interventions. Topics such as welfare reform, immigration policy, affirmative action, discrimination in labor markets, sources of income inequality, the duty of rich nations to help poor nations, and causes of gender inequality.

Same as: SOC 241.

**SOC 142. Sociology of Gender. 5 Units.**

(Graduate students register for 242.) Gender inequality in contemporary American society and how it is maintained. The social and relative nature of knowledge and the problems this poses for understanding sex differences and gendered behavior in society. Analytical levels of explanation for gender inequalities: socialization, interaction processes, and socioeconomic processes; arguments and evidence for each approach. The social consequences of gender inequality such as the feminization of poverty, and problems of interpersonal relations.

Same as: SOC 242.

**SOC 144. Inequality and the Workplace. 5 Units.**

How characteristics of workplaces, such as hiring practices, workforce diversity, organizational policies and legal mandates, produce variation in inequality. Examines the sources, extent, and consequences of workplace inequality across gender, racial and ethnic lines. Topics include earnings, social status, geographical location, and opportunities for people in the workforce.

Same as: SOC 244.

**SOC 145. Race and Ethnic Relations in the USA. 5 Units.**

(Graduate students register for 245.) Race and ethnic relations in the U.S. and elsewhere. The processes that render ethnic and racial boundary markers, such as skin color, language, and culture, salient in interaction situations. Why only some groups become targets of ethnic attacks. The social dynamics of ethnic hostility and ethnic/racial protest movements.

Same as: CSRE 145, SOC 245.

**SOC 146. Introduction to Comparative Studies in Race and Ethnicity. 5 Units.**

How different disciplines approach topics and issues central to the study of ethnic and race relations in the U.S. and elsewhere. Lectures by senior faculty affiliated with CSRE. Discussions led by CSRE teaching fellows.

Same as: ANTHRO 33, CSRE 196C, ENGLISH 172D, PSYCH 155.

**SOC 148. Comparative Ethnic Conflict. 5 Units.**

Causes and consequences of racial and ethnic conflict, including nationalist movements, ethnic genocide, civil war, ethnic separatism, politics, indigenous peoples' movements, and minority rights movements around the world.

Same as: CSRE 148, SOC 248.

**SOC 149. The Urban Underclass. 5 Units.**

(Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor.

Same as: SOC 249, URBANST 112.

**SOC 151. From the Cradle to the Grave: How Demographic Processes Shape the Social World. 5 Units.**

Comparative analysis of historical, contemporary, and anticipated demographic change. Emphasis on demographic transitions between and within developed and underdeveloped countries."

**SOC 155. The Changing American Family. 5 Units.**

Family change from historical, social, demographic, and legal perspectives. Extramarital cohabitation, divorce, later marriage, interracial marriage, and same-sex cohabitation. The emergence of same-sex marriage as a political issue. Are recent changes in the American family really as dramatic as they seem? Theories about what causes family systems to change.

Same as: SOC 255.

**SOC 161. The Social Science of Entrepreneurship. 5 Units.**

(Graduate students register for 261.) Who is likely to become an entrepreneur and where is entrepreneurship likely to occur? Classic and contemporary theory and research. Interaction with expert practitioners in creating entrepreneurial opportunities including venture and corporate capitalists. The role of culture, markets, hierarchies, and networks. Market creation and change, and factors that affect success of new organizations. Field projects on entrepreneurial environments such as technology licensing offices, entrepreneurial development organizations, venture capital firms, and corporate venturing groups.  
Same as: SOC 261.

**SOC 162. Markets and Governance. 5 Units.**

Social and political forces that shape market outcomes. The emergence and creation of markets, how markets go wrong, and the roles of government and society in structuring market exchange. Applied topics include development, inequality, globalization, and economic meltdown.  
Same as: SOC 262.

**SOC 163. Foundations of Organizational Theory. 5 Units.**

Foundational material in organizational theory literature.  
Same as: SOC 263.

**SOC 165. Seminar on the Everyday Lives of Immigrants. 5 Units.**

Everyday experience of immigrants and the immigrant second generation through the ethnographic lens. Ethnographies that focus on the immigrant experience. Limited enrollment.  
Same as: SOC 265.

**SOC 166. Mexicans, Mexican Americans, and Chicanos in American Society. 5 Units.**

Contemporary sociological issues affecting Mexican-origin people in the U.S. Topics include: the immigrant experience, immigration policy, identity, socioeconomic integration, internal diversity, and theories of incorporation.  
Same as: CHILATST 166, SOC 266.

**SOC 167A. Asia-Pacific Transformation. 5 Units.**

Post-WW II transformation in the Asia-Pacific region, with focus on the ascent of Japan, the development of newly industrialized capitalist countries (S. Korea and Taiwan), the emergence of socialist states (China and N. Korea), and the changing relationship between the U.S. and these countries.  
Same as: SOC 267A.

**SOC 168. Global Organizations: Managing Diversity. 5 Units.**

Analytical tools derived from the social sciences to analyze global organizations and projects, and applied to the tradeoffs between different designs of teams and organizations. Focus is on tribal mentality and how to design effective organizations and projects for policy implementation within and across institutional settings. Recommended: PUBLPOL 102, MS&E 180, or SOC 160.  
Same as: PUBLPOL 168, SOC 268.

**SOC 170. Classics of Modern Social Theory. 5 Units.**

(Graduate students register for 270). Preference to Sociology majors. Contributions of Marx, Weber, and Durkheim to contemporary sociology. Topics: the problem of social order and the nature of social conflict; capitalism and bureaucracy; the relationship between social structure and politics; the social sources of religion and political ideology; and the evolution of modern societies. Examples from contemporary research illustrate the impact of these traditions. Limited enrollment.  
Same as: SOC 270.

**SOC 173. Gender and Higher Education: National and International Perspectives. 4 Units.**

This course examines the ways in which higher education structures and policies affect females, males, and students in relation to each other and how changes in those structures and policies improve experiences for females and males similarly or differently. Students are expected to gain an understanding of theories and perspectives from the social sciences relevant to an understanding of the role of higher education in relation to structures of gender differentiation and hierarchy. Topics include undergraduate and graduate education; identity and sexuality; gender and science; gender and faculty; and the development of feminist scholarship and pedagogy. Attention is paid to how these issues are experienced by women and men in the United States, including people of color, and by academics throughout the world, and how these have changed over time.  
Same as: EDUC 173, EDUC 273, SOC 273.

**SOC 180A. Foundations of Social Research. 5 Units.**

Formulating a research question, developing hypotheses, probability and non-probability sampling, developing valid and reliable measures, qualitative and quantitative data, choosing research design and data collection methods, challenges of making causal inference, and criteria for evaluating the quality of social research. Emphasis is on how social research is done, rather than application of different methods. Limited enrollment; preference to Sociology and Urban Studies majors, and Sociology coterms.  
Same as: SOC 280A.

**SOC 180B. Introduction to Data Analysis. 5 Units.**

Methods for analyzing and evaluating quantitative data in sociological research. Students will be taught how to run and interpret multivariate regressions, how to test hypotheses, and how to read and critique published data analyses. Limited enrollment; preference to Sociology majors.  
Same as: SOC 280B.

**SOC 181B. Sociological Methods: Statistics. 5 Units.**

(Graduate students register for 281B.) Statistical methods of relevance to sociology: contingency tables, correlation, and regression.  
Same as: SOC 281B.

**SOC 190. Undergraduate Individual Study. 1-5 Units.**

Prior arrangement required.

**SOC 191. Undergraduate Directed Research. 1-5 Units.**

Work on a project of student's choice under supervision of a faculty member. Prior arrangement required.

**SOC 192. Undergraduate Research Apprenticeship. 1-5 Units.**

Work in an apprentice-like relationship with faculty on an on-going research project. Prior arrangement required.

**SOC 193. Undergraduate Teaching Apprenticeship. 1-5 Units.**

Prior arrangement required.

**SOC 196. Senior Thesis. 1-15 Units.**

Work on an honors thesis project under faculty supervision (see description of honors program). Must be arranged early in the year of graduation or before.

**SOC 200. Junior/Senior Seminar for Majors. 5 Units.**

For Sociology majors. Capstone course in which sociological problems are framed, linked to theories, and answers pursued through research designs. Independent research. How to formulate a research question; how to integrate theory and methods. Prerequisites: SOC 170, 180B.

**SOC 201. Preparation for Senior Project. 5 Units.**

First part of capstone experience for Urban Studies majors pursuing an internship-based research project or honors thesis. Assignments culminate in a research proposal, which may be submitted for funding. Students also identify and prepare for a related internship, normally to begin in Spring Quarter in URBANST 201B or in Summer. Research proposed in the final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Service Learning Course (certified by Haas Center).

Same as: URBANST 201.

**SOC 202. Preparation for Senior Research. 5 Units.**

Required of all juniors in Urban Studies and those juniors in Sociology planning on writing an honors thesis. Students write a research prospectus and grant proposal, which may be submitted for funding. Research proposal in final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research.

Same as: URBANST 202.

**SOC 207. China After Mao. 5 Units.**

China's post-1976 recovery from the late Mao era; its reorientation toward an open market-oriented economy; the consequences of this new model and runaway economic growth for standards of living, social life, inequality, and local governance; the political conflicts that have accompanied these changes.

Same as: SOC 107.

**SOC 214. Economic Sociology. 5 Units.**

(Graduate students register for 214.) The sociological approach to production, distribution, consumption, and markets, emphasizing the impact of norms, power, social structure, and institutions on the economy. Comparison of classic and contemporary approaches to the economy among the social science disciplines. Topics: consumption, labor markets, organization of professions such as law and medicine, the economic role of informal networks, industrial organization, including the structure and history of the computer and popular music industries, business alliances, capitalism in non-Western societies, and the transition from state socialism in E. Europe and China.

Same as: SOC 114.

**SOC 218. Social Movements and Collective Action. 5 Units.**

Why social movements arise, who participates in them, the obstacles they face, the tactics they choose, and how to gauge movement success or failure. Theory and empirical research. Application of concepts and methods to social movements such as civil rights, environmental justice, antiglobalization, and anti-war.

Same as: SOC 118.

**SOC 219. Understanding Large-Scale Societal Change: The Case of the 1960s. 5 Units.**

The demographic, economic, political, and cultural roots of social change in the 60s; its legacy in the present U.S.

Same as: SOC 119.

**SOC 220. Interpersonal Relations. 5 Units.**

(Graduate students register for 220.) Forming ties, developing norms, status, conformity, deviance, social exchange, power, and coalition formation; important traditions of research have developed from the basic theories of these processes. Emphasis is on understanding basic theories and drawing out their implications for change in a broad range of situations, families, work groups, and friendship groups.

Same as: SOC 120.

**SOC 223. Sex and Love in Modern Society. 5 Units.**

Social influences on private intimate relations involving romantic love and sexuality. Topics include the sexual revolution, contraception, dating, hook-ups, cohabitation, sexual orientation, and changing cultural meanings of marriage, gender, and romantic love.

Same as: SOC 123.

**SOC 224B. Microsociology: Social Structure and Interaction. 4 Units.**

How to interpret interpersonal situations using microsociological theories. Focuses on the role of intention, identity, routines, scripts, rituals, conceptual frameworks, talk and emotions in social interaction. Processes by which interactions reverberate outward to transform groups and social structures. Special consideration will be placed on organizational contexts like schools, workplaces and policy decision arenas.

Same as: EDUC 312B.

**SOC 226. Introduction to Social Networks. 5 Units.**

(Graduate students register for 226.) Theory, methods, and research. Concepts such as density, homogeneity, and centrality; applications to substantive areas. The impact of social network structure on individuals and groups in areas such as communities, neighborhoods, families, work life, and innovations.

Same as: SOC 126.

**SOC 227. Bargaining, Power, and Influence in Social Interaction. 5 Units.**

(Graduate students register for 227.) Research and theoretical work on bargaining, social influence, and issues of power and justice in social settings such as teams, work groups, and organizations. Theoretical approaches to the exercise of power and influence in social groups and related issues in social interaction such as the promotion of cooperation, effects of competition and conflict, negotiation, and intergroup relations. Enrollment limited to 40.

Same as: SOC 127.

**SOC 228. Introduction to Social Network Analysis. 5 Units.**

(Graduate students register for SOC 228.) Theory and methods of network analysis in sociology (with an emphasis on social movements), anthropology, history, social psychology, economics, political science, and public health. Prerequisite: basic mathematics.

Same as: SOC 128.

**SOC 229X. Urban Education. 3-4 Units.**

(Graduate students register for EDUC 212X or SOC 229X). Combination of social science and historical perspectives trace the major developments, contexts, tensions, challenges, and policy issues of urban education.

Same as: AFRICAAM 112, EDUC 112X, EDUC 212X, SOC 129X.

**SOC 230. Education and Society. 4-5 Units.**

The effects of schools and schooling on individuals, the stratification system, and society. Education as socializing individuals and as legitimizing social institutions. The social and individual factors affecting the expansion of schooling, individual educational attainment, and the organizational structure of schooling.

Same as: EDUC 120C, EDUC 220C, SOC 130.

**SOC 231. World, Societal, and Educational Change: Comparative Perspectives. 4-5 Units.**

Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture.

Same as: EDUC 136, EDUC 306D.

**SOC 234. Research Seminar on Access to Justice. 1-5 Units.**

The functions and dysfunctions of modern legal systems. Topics include: official statements of the U.S. and the EU about the rights of parties to civil disputes; the roles of lawyers as gatekeepers and facilitators; the filtering process by which injuries and experiences become the basis for legal claims; access to and use of courts; the balance of power and advantage between individual persons and organizations in disputes. Prerequisite: advanced undergraduate or graduate standing, or consent of instructor. Same as: SOC 334.

**SOC 235. Poverty, Inequality, and Social Policy in the United States. 5 Units.**

Causes and consequences. Effects of antipoverty policies, and debates over effective social policies. Focus is on how poverty and inequality are experienced by families, children, and communities. Topics include welfare reform and labor market policies, education, and community-based antipoverty strategies.

Same as: SOC 135.

**SOC 236. Sociology of Law. 5 Units.**

(Graduate students register for 236) Major issues and debates. Topics include: historical perspectives on the origins of law; rationality and legal sanctions; normative decision making and morality; cognitive decision making; crime and deviance; the law in action versus the law on the books; organizational responses to law in the context of labor and employment; the roles of lawyers, judges, and juries; and law and social change emphasizing the American civil rights movement.

Same as: SOC 136.

**SOC 236A. Law and Society. 5 Units.**

Law and social inequality. Major sociological perspectives on where the law comes from, what law and justice systems do, and how they work.

Same as: SOC 136A.

**SOC 236B. Advanced Topics in Sociology of Law. 5 Units.**

(Same as LAW 538.) Historical perspectives on the origins of law, rationality and legal sanctions, law on the books versus the law in action, crime and deviance, school desegregation, privatization of prisons, American civil rights, file sharing, jury decision making, the role of lawyers and judges, and cynicism about the American legal system.

Same as: SOC 136B.

**SOC 238. American Indians in Comparative Historical Perspective. 5 Units.**

(Graduate students register for 238.) Demographic, political, and economic processes and events that shaped relations between Euro-Americans and American Indians, 1600-1890. How the intersection of these processes affected the outcome of conflicts between these two groups, and how this conflict was decisive in determining the social position of American Indians in the late 19th century and the evolution of the doctrine of tribal sovereignty.

Same as: NATIVEAM 138, SOC 138.

**SOC 239. American Indians in Contemporary Society. 5 Units.**

(Graduate students register for 239.) The social position of American Indians in contemporary American society, 1890 to the present. The demographic resurgence of American Indians, changes in social and economic status, ethnic identification and political mobilization, and institutions such as tribal governments and the Bureau of Indian Affairs. Recommended: 138 or a course in American history.

Same as: NATIVEAM 139, SOC 139.

**SOC 240. Introduction to Social Stratification. 5 Units.**

(Graduate students register for 240.) The main classical and modern explanations of the causes of social, economic, and political inequality. Issues include: power; processes that create and maintain inequality; the central axes of inequality in contemporary societies (race, ethnicity, class, and gender); the consequences of inequality for individuals and groups; and how social policy can mitigate and exacerbate inequality. Cases include technologically simple groups, the Indian caste system, and the modern U.S.

Same as: SOC 140.

**SOC 241. Controversies about Inequality. 5 Units.**

(Graduate students register for 241.) Debate format involving Stanford and guest faculty. Forms of inequality including racial, ethnic, and gender stratification; possible policy interventions. Topics such as welfare reform, immigration policy, affirmative action, discrimination in labor markets, sources of income inequality, the duty of rich nations to help poor nations, and causes of gender inequality.

Same as: SOC 141.

**SOC 242. Sociology of Gender. 5 Units.**

(Graduate students register for 242.) Gender inequality in contemporary American society and how it is maintained. The social and relative nature of knowledge and the problems this poses for understanding sex differences and gendered behavior in society. Analytical levels of explanation for gender inequalities: socialization, interaction processes, and socioeconomic processes; arguments and evidence for each approach. The social consequences of gender inequality such as the feminization of poverty, and problems of interpersonal relations.

Same as: SOC 142.

**SOC 244. Inequality and the Workplace. 5 Units.**

How characteristics of workplaces, such as hiring practices, workforce diversity, organizational policies and legal mandates, produce variation in inequality. Examines the sources, extent, and consequences of workplace inequality across gender, racial and ethnic lines. Topics include earnings, social status, geographical location, and opportunities for people in the workforce.

Same as: SOC 144.

**SOC 245. Race and Ethnic Relations in the USA. 5 Units.**

(Graduate students register for 245.) Race and ethnic relations in the U.S. and elsewhere. The processes that render ethnic and racial boundary markers, such as skin color, language, and culture, salient in interaction situations. Why only some groups become targets of ethnic attacks. The social dynamics of ethnic hostility and ethnic/racial protest movements.

Same as: CSRE 145, SOC 145.

**SOC 248. Comparative Ethnic Conflict. 5 Units.**

Causes and consequences of racial and ethnic conflict, including nationalist movements, ethnic genocide, civil war, ethnic separatism, politics, indigenous peoples' movements, and minority rights movements around the world.

Same as: CSRE 148, SOC 148.

**SOC 249. The Urban Underclass. 5 Units.**

(Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor.

Same as: SOC 149, URBANST 112.

**SOC 255. The Changing American Family. 5 Units.**

Family change from historical, social, demographic, and legal perspectives. Extramarital cohabitation, divorce, later marriage, interracial marriage, and same-sex cohabitation. The emergence of same-sex marriage as a political issue. Are recent changes in the American family really as dramatic as they seem? Theories about what causes family systems to change. Same as: SOC 155.

**SOC 257. Causal Inference in Quantitative Educational and Social Science Research. 3-5 Units.**

Quantitative methods to make causal inferences in the absence of randomized experiment including the use of natural and quasi-experiments, instrumental variables, regression discontinuity, matching estimators, longitudinal methods, fixed effects estimators, and selection modeling. Assumptions implicit in these approaches, and appropriateness in research situations. Students develop research proposals relying on these methods. Prerequisites: exposure to quantitative research methods; multivariate regression. Same as: EDUC 255B.

**SOC 258. Applied Quasi-Experimental Research in Education. 3-5 Units.**

Course will provide hands-on practice in analysis of data from experimental and quasi-experimental research designs, including a) instrumental variables estimators; b) regression discontinuity estimators; c) difference-in-difference estimators; d) matching estimators; e) fixed effects estimators; and f) panel data methods (including individual fixed effects models, lagged covariate adjustment models, growth models, etc.). Prerequisites: satisfactory completion of EDUC 255B, EDUC 257C or SOC 257. Same as: EDUC 255C.

**SOC 261. The Social Science of Entrepreneurship. 5 Units.**

(Graduate students register for 261.) Who is likely to become an entrepreneur and where is entrepreneurship likely to occur? Classic and contemporary theory and research. Interaction with expert practitioners in creating entrepreneurial opportunities including venture and corporate capitalists. The role of culture, markets, hierarchies, and networks. Market creation and change, and factors that affect success of new organizations. Field projects on entrepreneurial environments such as technology licensing offices, entrepreneurial development organizations, venture capital firms, and corporate venturing groups. Same as: SOC 161.

**SOC 262. Markets and Governance. 5 Units.**

Social and political forces that shape market outcomes. The emergence and creation of markets, how markets go wrong, and the roles of government and society in structuring market exchange. Applied topics include development, inequality, globalization, and economic meltdown. Same as: SOC 162.

**SOC 263. Foundations of Organizational Theory. 5 Units.**

Foundational material in organizational theory literature. Same as: SOC 163.

**SOC 265. Seminar on the Everyday Lives of Immigrants. 5 Units.**

Everyday experience of immigrants and the immigrant second generation through the ethnographic lens. Ethnographies that focus on the immigrant experience. Limited enrollment. Same as: SOC 165.

**SOC 266. Mexicans, Mexican Americans, and Chicanos in American Society. 5 Units.**

Contemporary sociological issues affecting Mexican-origin people in the U.S. Topics include: the immigrant experience, immigration policy, identity, socioeconomic integration, internal diversity, and theories of incorporation. Same as: CHILATST 166, SOC 166.

**SOC 267A. Asia-Pacific Transformation. 5 Units.**

Post-WW II transformation in the Asia-Pacific region, with focus on the ascent of Japan, the development of newly industrialized capitalist countries (S. Korea and Taiwan), the emergence of socialist states (China and N. Korea), and the changing relationship between the U.S. and these countries. Same as: SOC 167A.

**SOC 268. Global Organizations: Managing Diversity. 5 Units.**

Analytical tools derived from the social sciences to analyze global organizations and projects, and applied to the tradeoffs between different designs of teams and organizations. Focus is on tribal mentality and how to design effective organizations and projects for policy implementation within and across institutional settings. Recommended: PUBLPOL 102, MS&E 180, or SOC 160. Same as: PUBLPOL 168, SOC 168.

**SOC 270. Classics of Modern Social Theory. 5 Units.**

(Graduate students register for 270). Preference to Sociology majors. Contributions of Marx, Weber, and Durkheim to contemporary sociology. Topics: the problem of social order and the nature of social conflict; capitalism and bureaucracy; the relationship between social structure and politics; the social sources of religion and political ideology; and the evolution of modern societies. Examples from contemporary research illustrate the impact of these traditions. Limited enrollment. Same as: SOC 170.

**SOC 273. Gender and Higher Education: National and International Perspectives. 4 Units.**

This course examines the ways in which higher education structures and policies affect females, males, and students in relation to each other and how changes in those structures and policies improve experiences for females and males similarly or differently. Students are expected to gain an understanding of theories and perspectives from the social sciences relevant to an understanding of the role of higher education in relation to structures of gender differentiation and hierarchy. Topics include undergraduate and graduate education; identity and sexuality; gender and science; gender and faculty; and the development of feminist scholarship and pedagogy. Attention is paid to how these issues are experienced by women and men in the United States, including people of color, and by academics throughout the world, and how these have changed over time. Same as: EDUC 173, EDUC 273, SOC 173.

**SOC 280A. Foundations of Social Research. 5 Units.**

Formulating a research question, developing hypotheses, probability and non-probability sampling, developing valid and reliable measures, qualitative and quantitative data, choosing research design and data collection methods, challenges of making causal inference, and criteria for evaluating the quality of social research. Emphasis is on how social research is done, rather than application of different methods. Limited enrollment; preference to Sociology and Urban Studies majors, and Sociology coterms. Same as: SOC 180A.

**SOC 280B. Introduction to Data Analysis. 5 Units.**

Methods for analyzing and evaluating quantitative data in sociological research. Students will be taught how to run and interpret multivariate regressions, how to test hypotheses, and how to read and critique published data analyses. Limited enrollment; preference to Sociology majors. Same as: SOC 180B.

**SOC 281B. Sociological Methods: Statistics. 5 Units.**

(Graduate students register for 281B.) Statistical methods of relevance to sociology: contingency tables, correlation, and regression. Same as: SOC 181B.

**SOC 305. Graduate Proseminar. 1 Units.**

For first-year Sociology doctoral students only. Introduction and orientation to the field of Sociology.

**SOC 308. Social Demography. 4-5 Units.**

For graduate students and advanced undergraduates. Topics: models of fertility behavior, migration models, stable population theory, life table analysis, data sources, and measurement problems. How population behavior affects social processes, and how social processes influence population dynamics. Recommended: sociological research methods; basic regression analysis and log linear models.

**SOC 309. Nations and Nationalism. 4-5 Units.**

The nation as a form of collective identity in the modern era. Major works in the study of nations and nationalism from comparative perspectives with focus on Europe and E. Asia.

**SOC 310. Political Sociology. 4-5 Units.**

Theory and research on the relationship between social structure and politics. Social foundations of political order, the generation and transformation of ideologies and political identities, social origins of revolutionary movements, and social consequences of political revolution. Prerequisite: doctoral student.

**SOC 311A. Workshop: Comparative Studies of Educational and Political Systems. 1-5 Units.**

Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. Same as: EDUC 387A.

**SOC 311B. Workshop: Comparative Systems of Educational and Political Systems. 1-5 Units.**

Analysis of quantitative and longitudinal data on national educational systems and political structures. May be repeated for credit. Prerequisite: consent of instructor. Same as: EDUC 387B.

**SOC 311C. Workshop: Comparative Studies of Educational and Political Systems. 1-5 Units.**

Analysis of quantitative and longitudinal data on national educational systems and political structures. Prerequisite: consent of instructor. May be repeated for credit. Same as: EDUC 387C.

**SOC 312W. Workshop: Political Sociology, Social Movements, and Collective Action. 1-2 Units.**

Faculty and student presentations of ongoing research on topics including: social movement and organizations, and the relationship between them; democracy movements; legislative and policy outcomes; and collective action tactics, strategies, and trajectories. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.

**SOC 314. Economic Sociology. 4-5 Units.**

Classical and contemporary literature covering the sociological approach to markets and the economy, and comparing it to other disciplines. Topics: consumption, labor, professions, industrial organization, and the varieties of capitalism; historical and comparative perspectives on market and non-market provision of goods and services, and on transitions among economic systems. The relative impact of culture, institutions, norms, social networks, technology, and material conditions. Prerequisite: doctoral student status or consent of instructor.

**SOC 315. Topics in Economic Sociology. 5 Units.**

(Graduate students register for 315.) Discussion of topics initially explored in 114/214, with emphasis on countries and cultures outside N. America. Possible topics: families and ethnic groups in the economy, corporate governance and control, corporate strategy, relations among firms in industrial districts and business groups, the impact of national institutions and cultures on economic outcomes, transitions from state socialism and the role of the state in economic development. Possible case studies: the U.S., Germany, Italy, Britain, France, Brazil, Korea, India, Japan, and China. Prerequisite: 114/214 or 314. Same as: SOC 115.

**SOC 315W. Workshop: Economic Sociology and Organizations. 1-2 Units.**

Theory, methods, and research in the sociology of the economy and of formal organizations, through presentations of ongoing work by students, faculty, and guest speakers, and discussion of recent literature and controversies. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.

**SOC 316. Historical and Comparative Sociology. 4-5 Units.**

Theory and research on macro-historical changes of sociological significance such as the rise of capitalism, the causes and consequences of revolutions, and the formation of the modern nation state and global world system. Methodological issues in historical and comparative sociology.

**SOC 317W. Workshop: Networks, Histories, and Theories of Action. 1-2 Units.**

Yearlong workshop where doctoral students are encouraged to collaborate with peers and faculty who share an interest in researching the network dynamics, histories and theories of action that help explain particular social phenomena. Students present their own research and provide helpful feedback on others' work. Presentations may concern dissertation proposals, grants, article submissions, book proposals, datasets, methodologies and other texts. Repeatable for credit. Same as: EDUC 317X.

**SOC 318. Social Movements and Collective Action. 4-5 Units.**

Topics: causes, dynamics, and outcomes of social movements; organizational dimensions of collective action; and causes and consequences of individual activism.

**SOC 320. Foundations of Social Psychology. 4-5 Units.**

Major theoretical perspectives, and their assumptions and problems, in interpersonal processes and social psychology. Techniques of investigation and methodological issues. Perspectives: symbolic interaction, social structure and personality, and cognitive and group processes.

**SOC 321W. Workshop: Social Psychology and Social Structure. 1-2 Units.**

Advanced graduate student workshop in social psychology. Current theories and research agendas, recent publications, and presentations of ongoing research by faculty and students. May be repeated for credit. Prerequisite: consent of instructor.

**SOC 324. Social Networks. 3-5 Units.**

How the study of social networks contributes to sociological research. Application of core concepts to patterns of relations among actors, including connectivity and clusters, duality of categories and networks, centrality and power, balance and transitivity, structural equivalence, and blockmodels. Friendship and kinship networks, diffusion of ideas and infectious diseases, brokerage in markets and organizations, and patronage and political influence in historical contexts.

**SOC 327. Frontiers of Social Psychology. 1-5 Units.**

Advanced topics, current developments, theory, and empirical research. Possible topics include social identity processes, status beliefs and processes, social exchange, affect and social cohesion, legitimacy, social difference and inequality, norms, and social dilemmas.



**SOC 331. The Conduct of Qualitative Inquiry. 3-4 Units.**

Two quarter sequence for doctoral students to engage in research that anticipates, is a pilot study for, or feeds into their dissertations. Prior approval for dissertation study not required. Students engage in common research processes including: developing interview questions; interviewing; coding, analyzing, and interpreting data; theorizing; and writing up results. Participant observation as needed. Preference to students who intend to enroll in 327C.

Same as: EDUC 327A.

**SOC 332. Sociology of Education: The Social Organization of Schools. 4 Units.**

Seminar. Key sociological theories and empirical studies of the links between education and its role in modern society, focusing on frameworks that deal with sources of educational change, the organizational context of schooling, the impact of schooling on social stratification, and the relationships between the educational system and other social institutions such as families, neighborhoods, and the economy.

Same as: EDUC 110, EDUC 310, SOC 132.

**SOC 333. Law and Wikinomics: The Economic and Social Organization of the Legal Profession. 1-5 Units.**

(Graduate and Law students enroll in 333.) Seminar. Emphasis is on the labor market for large-firm lawyers, including the market for entry-level lawyers, attorney retention and promotion practices, lateral hiring of partners, and increased use of forms of employment such as the non-equity form of partnership. Race and gender discrimination and occupational segregation; market-based pressure tactics for organizational reform. Students groups collect and analyze data about the profession and its markets. Multimedia tools for analysis and for producing workplace reforms. May be repeated for credit. Prerequisite: consent of instructor.

Same as: SOC 133.

**SOC 334. Research Seminar on Access to Justice. 1-5 Units.**

The functions and dysfunctions of modern legal systems. Topics include: official statements of the U.S. and the EU about the rights of parties to civil disputes; the roles of lawyers as gatekeepers and facilitators; the filtering process by which injuries and experiences become the basis for legal claims; access to and use of courts; the balance of power and advantage between individual persons and organizations in disputes. Prerequisite: advanced undergraduate or graduate standing, or consent of instructor.

Same as: SOC 234.

**SOC 336. Sociology of Law. 3-5 Units.**

Sociological examination of law as a mechanism of social regulation and as a field of knowledge. Explores classical and contemporary theoretical and empirical contributions to the sociology of law. Law and social control, law and social change, social reality of the law, the profession and practice of law, legal mobilization, and the influence of race, gender, and social status in legal decisions and processes.

**SOC 338W. Workshop: Sociology of Law. 1-5 Units.**

(Same as LAW 581.) Required for joint degree J.D./Ph.D. students in Sociology in the first three years of program; open to Ph.D. students in Sociology and related disciplines. Empirical, sociological study of law and legal institutions. Topics such as the relation of law to inequality and stratification, social movements, organizations and institutions, political sociology and state development, and the social construction of disputes and dispute resolution processes. Research presentations. Career development issues. May be repeated for credit.

**SOC 339. Gender Meanings and Processes. 1-5 Units.**

Current theories and research on the social processes, such as socialization, status processes, stereotyping, and cognition, that produce gender difference and inequality. Intersections of gender with race, class, and bodies.

Applications to workplaces, schools, families, and intimate relationships.

Prerequisite: Sociology doctoral student or consent of instructor.

**SOC 341W. Workshop: Inequality. 1-2 Units.**

Causes, consequences, and structure of inequality; how inequality results from and shapes social classes, occupations, professions, and other aspects of the economy. Research presentations by students, faculty, and guest speakers. Discussion of controversies, theories, and recent writings. May be repeated for credit. Restricted to Sociology doctoral students; others by consent of instructor.

**SOC 342B. Gender and Social Structure. 4-5 Units.**

The role of gender in structuring contemporary life. Social forces affecting gender at the psychological, interactional, and structural levels. Gender inequality in labor markets, education, the household, and other institutions. Theories and research literature.

**SOC 346. Workshop: Ethnography. 1-2 Units.**

Restricted to doctoral students. Student research employing ethnographic methods. May be repeated for credit. Prerequisite: consent of instructor.

**SOC 347. Race and Ethnicity in Society and Institutions. 1-5 Units.**

Primarily for doctoral students. Major theories and empirical research. Emphasis is on schooling and race, racial identity, urban issues, and the impact of immigration on race relations.

Same as: EDUC 315X.

**SOC 350. Sociology of Race. 3-5 Units.**

Emphasis on cultural approaches that focus on meaning and meaning-making in the realm of race and race relations. Issues and complications in conceptualizing and theorizing race. Differentiation, organization, and stratification by race across a range of domains. Identity, political and economic participation, group solidarity. Prerequisite: Sociology doctoral student or consent of instructor.

**SOC 350W. Workshop: Migration, Race, Ethnicity and Nation. 1-3 Units.**

Current theories and research, recent publications, and presentations of ongoing research by faculty and students. May be repeated for credit. Prerequisite: consent of instructor.

**SOC 357. Immigration and Assimilation. 3-5 Units.**

Major theoretical debates and empirical applications in the study of immigrant assimilation. Topics include racial and ethnic identity, socioeconomic integration, political participation, and national identity. Companion to SOC 358.

**SOC 358. Sociology of Immigration. 1-5 Units.**

Topics include: the process of migration; historical perspectives; immigrant integration; transnationalism; immigration policy; labor; nations and nationalism.

**SOC 361. Social Psychology of Organizations. 4 Units.**

Seminar. Social psychological theories and research relevant to organizational behavior. Current research topics; theories in micro-organizational behavior. Topics include models of attribution, choice and decision making, intergroup behavior, stereotyping, and social influence. Prerequisites: Ph.D student; graduate-level social psychology course.

**SOC 362. Organization and Environment. 3 Units.**

This seminar considers the leading sociological approaches to analyzing relations of organizations and environments, with a special emphasis on dynamics. Attention is given to theoretical formulations, research designs, and results of empirical studies. Prerequisite: Enrollment in a PhD program.

**SOC 363. Social and Political Process in Organizations. 4 Units.**

Social psychological and sociological research at the meso, or intermediate between micro and macro, level of analysis. Topics vary from year to year, but usually include organizational routines and learning; mobility and and attainment processes; gender and race inequality and discrimination; social networks; cultural perspectives on organizations, and related topics. Prerequisite: Ph.D student.

**SOC 363A. Seminar on Organizational Theory. 5 Units.**

The social science literature on organizations assessed through consideration of the major theoretical traditions and lines of research predominant in the field.

Same as: EDUC 375A, MSE 389.

**SOC 363B. Seminar on Organizations: Institutional Analysis. 3-5 Units.**

Seminar. Key lines of inquiry on organizational change, emphasizing network, institutional, and evolutionary arguments.

Same as: EDUC 375B.

**SOC 366. Organizational Analysis. 4-5 Units.**

Principles of organizational behavior and analysis; theories of group and individual behavior; organizational culture; and applications to school organization and design. Case studies.

Same as: EDUC 288.

**SOC 366A. Organizational Ecology. 4 Units.**

This seminar examines theoretical and methodological issues in the study of the ecology of organizations. Particular attention is given to the dynamics that characterize the interface between organizational populations and their audiences.

Same as: OB 601.

**SOC 367. Institutional Analysis of Organizations. 3-5 Units.**

Reading and research on the nature, origins, and effects of the modern institutional system. Emphasis is on the effects of institutional systems on organizational structure.

**SOC 368W. Workshop: China Social Science. 1 Unitss.**

For Ph.D. students in the social sciences and history. Research on contemporary society and politics in the People's Republic of China. May be repeated for credit. Prerequisite: consent of instructor.

Same as: POLISCI 448R.

**SOC 370A. Sociological Theory: Social Structure, Inequality, and Conflict. 5 Units.**

Restricted to doctoral students. The traditions of structural analysis derived from the work of Marx, Weber, and related thinkers. Antecedent ideas in foundational works are traced through contemporary theory and research on political conflict, social stratification, formal organization, and the economy.

**SOC 370B. Social Interaction and Group Process. 3-5 Units.**

Theoretical strategies for the study of interaction, group, and network processes, including rational choice and exchange theory, the theory of action, symbolic interactionism, formal sociology, and social phenomenology. Antecedent ideas in foundational works and contemporary programs of theoretical research.

**SOC 372. Theoretical Analysis and Design. 3-5 Units.**

Theoretical analysis and the logical elements of design, including the systematic analysis of the logical structure of arguments, the relationship of arguments to more encompassing theoretical or metatheoretical assumptions, the derivation of logical implications from arguments, assessments of theoretically significant problems or gaps in knowledge.

**SOC 374. Philanthropy and Civil Society. 1-3 Units.**

Associated with the Center for Philanthropy and Civil Society (PACS). Year-long workshop for doctoral students and advanced undergraduates writing senior theses on the nature of civil society or philanthropy. Focus is on pursuit of progressive research and writing contributing to the current scholarly knowledge of the nonprofit sector and philanthropy. Accomplished in a large part through peer review. Readings include recent scholarship in aforementioned fields. May be repeated for credit for a maximum of 9 units.

Same as: EDUC 374, POLISCI 334.

**SOC 376. Perspectives on Organization and Environment: Social Movement Organizations and Environments. 3 Units.**

This course examines the interaction between organizations and their environments. It is given every year by a different faculty member. What follows is the description of the course for the academic year 2012-13: This research seminar explores recent theory and research on social movement organizations and their environments. We'll consider the way in which organizational theories help us to explain social movement phenomena, and the way in which social movement theories help us to explain organizational phenomena.

**SOC 377. Comparing Institutional Forms: Public, Private, and Nonprofit. 4 Units.**

For students interested in the nonprofit sector, those in the joint Business and Education program, and for Public Policy MA students. The focus is on the missions, functions, and capabilities of nonprofit, public, and private organizations, and the managerial challenges inherent in the different sectors. Focus is on sectors with significant competition among institutional forms, including health care, social services, the arts, and education. Sources include scholarly articles, cases, and historical materials.

Same as: EDUC 377, GSBGEN 346, PUBLPOL 317.

**SOC 378. Seminar on Institutional Theory and World Society. 1-5 Units.**

Sociological analyses of the rise and impact of the expanded modern world order, with its internationalized organizations and globalized discourse. Consequences for national and local society: education, political organization, economic structure, the environment, and science. The centrality of the individual and the rationalized organization as legitimated actors.

**SOC 381. Sociological Methodology I: Introduction. 5 Units.**

Enrollment limited to first-year Sociology doctoral students. Basic math and statistics. Types of variables, how to recode and transform variables, and how to manage different types of data sets. How to use and think about weights. Introduction to statistical packages and programming. Introduction to multiple regression, and introduction to the interpretation of regression results.

**SOC 382. Sociological Methodology II: Multivariate Regression. 4-5 Units.**

Preference to Sociology doctoral students. Required for Ph.D. in Sociology. Enrollment limited to first-year Sociology doctoral students. Rigorous treatment of linear regression models, model assumptions, and various remedies for when these assumptions are violated. Introduction to panel data analysis. Enrollment limited to 15. Prerequisites: 381.

**SOC 383. Sociological Methodology III: Models for Discrete Outcomes. 5 Units.**

Required for Ph.D. in Sociology; enrollment limited to first-year Sociology doctoral students. The rationale for and interpretation of static and dynamic models for the analysis of discrete variables. Prerequisites: 381 and 382, or equivalents.

**SOC 384. New Models and Methods in the Social Sciences. 2-5 Units.**

Two-week intensive introduction to new statistical approaches. Emphasis is on applications. Topics may include network models, multilevel models, latent class models, mixed methods, new qualitative methods, growth models, geostatistical tools, survey-based experiments, new methods for estimating causal effects, web-based surveys, advanced discrete choice models, and diffusion models.

**SOC 385B. Research Practicum II. 1 Unitss.**

Continuation of 385A. Workshop on research methods for second year Sociology doctoral students. Ongoing student research, methodological problems, and possible solutions. Required for second year paper.

**SOC 388. Log-Linear Models. 3-5 Units.**

Analysis of categorical data with log-linear and negative binomial models. Measures of fit and hypothesis testing.

**SOC 389. Mixed Method Research Design and Analysis. 3-5 Units.**

Research designs that incorporate qualitative and quantitative analyses in a single project. The tension between thinking case-wise and variable-wise; how the focus on relationships between variables that is the hallmark of the quantitative approach can be brought into qualitative work.

**SOC 390. Graduate Individual Study. 1-5 Units.**

May be repeated for credit.

**SOC 391. Graduate Directed Research. 1-5 Units.**

May be repeated for credit.

**SOC 392. Research Apprenticeship. 1-5 Units.**

May be repeated for credit.

**SOC 393. Teaching Apprenticeship. 1-15 Units.****SOC 635. Social Movements and Organizations. 4 Units.**

This research seminar is intended for students seeking to learn more about how collective action underpins institutional change in organizations and industries, and how the success of collective action, in turn, hinges on organizational structures and processes to recruit and mobilize individuals. The purpose of this course is to provide you a roadmap for you to roam the terrain of movements and organizations, and be prepared to generate original research ideas that extend inquiry in your chosen area of research.

**SOC 670. Designing Social Research. 4 Units.**

This is a course in the design of social research, with a particular emphasis on research field (i.e., non-laboratory) settings. As such, the course is a forum for discussing and developing an understanding of the different strategies social theorists employ to explain social processes, develop theories, and make these theories as believable as possible. In general, these issues will be discussed in the context of sociological research on organizations, but this will not be the exclusive focus of the course. A range of topics will be covered, for example: formulating and motivating research questions; varieties of explanation; experimental and quasi-experimental methods, including natural experiments; counterfactual models; conceptualization and measurement; sampling and case selection; qualitative and quantitative approaches. This course is particularly oriented toward developing an appreciation of the tradeoffs of different approaches. It is well suited to Ph.D. students working on qualifying papers and dissertation proposals.

**SOC 802. TGR Dissertation. 0 Unit.**

## Spanish Language Courses

**SPANLANG 1. First-Year Spanish, First Quarter. 5 Units.**

Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Influences shaping the production of oral and written texts in the Spanish- and English-speaking world.

**SPANLANG 1A. Accelerated First-Year Spanish, Part 1. 5 Units.**

Completes first-year sequence in two rather than three quarters. For students with previous knowledge of Spanish, or those with a strong background in another Romance language. SPANLANG 2A fulfills the University Foreign Language Requirement. Prerequisite: Placement Test or consent of instructor.

**SPANLANG 1G. Accelerated First-Year Business Spanish, Part 1. 4 Units.**

For GSB students only. Limited enrollment.

**SPANLANG 2. First-Year Spanish, Second Quarter. 5 Units.**

Continuation of SPANLANG 1. Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Prerequisite: Placement Test, SPANLANG 1 or consent of instructor.

**SPANLANG 2A. Accelerated First-Year Spanish, Part 2. 5 Units.**

Continuation of SPANLANG 1A. Completes first-year sequence in two rather than three quarters. For students with previous knowledge of Spanish, or those with a strong background in another Romance language. Prerequisite: Placement Test, SPANLANG 1A, or consent of instructor. Fulfills the University language requirement.

**SPANLANG 2G. Accelerated First-Year Business Spanish, Part 2. 4 Units.**

Continuation of 1G. For GSB students only. Limited enrollment.

**SPANLANG 3. First-Year Spanish, Third Quarter. 5 Units.**

Continuation of SPANLANG 2. Emphasis is on developing socially and culturally appropriate proficiency in interpersonal, interpretive, and presentational spheres. Influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Prerequisite: Placement Test, SPANLANG 2 or consent of instructor. Fulfills the University Foreign Language Requirement.

**SPANLANG 3G. Spanish for Business Professionals. 4 Units.**

For GSB students only. Limited enrollment.

**SPANLANG 5A. Intensive First-Year Spanish, Part A. 5 Units.**

Same as SPANLANG 1. Goal is to engage in interactions with Spanish speakers in socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Only Stanford graduate students restricted to 9 units may register for 205A,B,C.

**SPANLANG 5B. Intensive First-Year Spanish, Part B. 5 Units.**

Same as SPANLANG 2. Continuation of 5A. Goal is to engage in interactions with Spanish speakers in socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Only Stanford graduate students restricted to 9 units may register for 205A,B,C. Prerequisite 1 or 5A.

**SPANLANG 5C. Intensive First-Year Spanish, Part C. 5 Units.**

Same as SPANLANG 3. Continuation of 5B. Continuation of 5A. Goal is to engage in interactions with Spanish speakers in socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Only Stanford graduate students restricted to 9 units may register for 205A,B,C. Prerequisite 2 or 5B. Fulfills the University Foreign Language Requirement.

**SPANLANG 10. Beginning Oral Communication. 2 Units.**

Additional pronunciation, vocabulary, and speaking skills. May be repeated once for credit. Prerequisite: one quarter of Spanish, demonstrated oral proficiency above the novice level; may be taken concurrently with SPANLANG 2, SPANLANG 2A 2A, or SPANLANG 3.

**SPANLANG 11C. Second-Year Spanish: Cultural Emphasis, First Quarter. 4-5 Units.**

Continuation of SPANLANG 3 or SPANLANG 2A. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: Placement Test, SPANLANG 3, SPANLANG 2A or consent of instructor.

**SPANLANG 11R. Second-Year Spanish: Emphasis on International Relations, First Quarter. 4-5 Units.**

Sequence integrating geopolitics and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language, international relations, and socioeconomics of the Spanish-speaking world. Prerequisite: SPANLANG 2A, SPANLANG 3, or consent of instructor.

**SPANLANG 12C. Second-Year Spanish: Cultural Emphasis, Second Quarter. 4-5 Units.**

Continuation of SPANLANG 11C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: Placement Test, SPANLANG 11 or consent of instructor.

**SPANLANG 12R. Second-Year Spanish: Emphasis on International Relations, Second Quarter. 4-5 Units.**

Continuation of SPANLANG 11R. Sequence integrating geopolitics and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language, international relations, and socioeconomics of the Spanish-speaking world. Prerequisite: SPANLANG 11R or equivalent or consent of instructor.

**SPANLANG 13C. Second-Year Spanish: Cultural Emphasis, Third Quarter. 4-5 Units.**

Continuation of SPANLANG 12C. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: Placement Test, SPANLANG 12 or consent of instructor.

**SPANLANG 13R. Second-Year Spanish: Emphasis on International Relations, Third Quarter. 4-5 Units.**

Continuation of SPANLANG 12R. Sequence integrating geopolitics and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language, international relations, and socioeconomics of the Spanish-speaking world. Prerequisite: SPANLANG 12R or equivalent or consent of instructor. Fulfills the IR major Language Requirement.

**SPANLANG 15. Intermediate Oral Communication. 3 Units.**

Emphasis is on interaction in Spanish locally and globally. Regional vocabularies and cultures at home and abroad. Interaction with local native Spanish speakers and communities globally via the Internet. May be repeated once for credit. Prerequisite: SPANLANG 2A, SPANLANG 3 and demonstrated oral proficiency above the low intermediate level.

**SPANLANG 15S. Intermediate Oral Communication. 3 Units.**

Emphasis is on interaction in Spanish locally and globally. Regional vocabularies and cultures at home and abroad. Interaction with local native Spanish speakers and communities globally via the Internet. May be repeated once for credit. Prerequisite: first-year Spanish and demonstrated oral proficiency above the low intermediate level.

**SPANLANG 21B. Second-Year Spanish for Heritage Language Students, First Quarter. 3-5 Units.**

Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, movies, radio, and television. Written language skills include rules for editing written language. Third quarter focus is on the development of written and oral styles and registers used in more formal settings. Prerequisite: Placement Test or consent of instructor.

**SPANLANG 22B. Second-Year Spanish for Heritage Language Students, Second Quarter. 3-5 Units.**

Continuation of SPANLANG 21B. Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, movies, radio, and television. Written language skills include rules for editing written language. Prerequisite: Placement Test, SPANLANG 21B or consent of instructor.

**SPANLANG 23B. Second-Year Spanish for Heritage Language Students, Third Quarter. 3-5 Units.**

Continuation of SPANLANG 22B. Emphasis is on ability to communicate orally and in writing. Spelling and the written accent. Goal is to understand, interpret, and analyze texts, movies, radio, and television. Written language skills include rules for editing written language. Third quarter Focus is on the development of written and oral styles and registers used in more formal settings. Prerequisite: Placement Test, SPANLANG 22B, or consent of instructor.

**SPANLANG 25A. Intensive Second-Year Spanish, Part A. 4 Units.**

Same as SPANLANG 11. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: one year of college Spanish or equivalent.

**SPANLANG 25B. Intensive Second-Year Spanish, Part B. 4 Units.**

Same as SPANLANG 12. Continuation of 25A. Prerequisite: 25A or equivalent.

**SPANLANG 25C. Intensive Second-Year Spanish, Part C. 4 Units.**

Same as SPANLANG 13. Continuation of 25B. Prerequisite: 25B or equivalent.

**SPANLANG 99. Language Specials. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**SPANLANG 100. Advanced Oral Communication. 3 Units.**

For students who have completed second-year Spanish or who have oral skills above the intermediate level. Interactive activities require students to persuade, analyze, support opinions, and gather and interpret others' points of view. Focus is on vocabulary enrichment and idiomatic expressions. Cultural, literary, political, and journalistic readings. May be repeated once for credit. Prerequisite: SPANLANG 13 or equivalent.

**SPANLANG 101. The Structure of Spanish. 5 Units.**

Criteria and skills to analyze Spanish grammatical structure. Identification of word functions in sentences and texts, types of sentences, and terminology. Structure of nouns, adjectives, and verbs, and their relationship with meaning. The differences between Spanish grammar as a formal system and in everyday life. Prerequisite: SPANLANG 13C, SPANLANG 13R, SPANLANG 23B, or consent of instructor.

**SPANLANG 102. Composition and Writing Workshop. 3-5 Units.**

Individual development of the ability to write in Spanish. Emphasis is on style and diction, and on preparing and writing essays on literary topics. Non-Spanish majors or minors may choose topics more closely related to their studies for projects. Prerequisite: two years of college Spanish or equivalent. WIM.

**SPANLANG 102B. Composition and Writing Workshop for Heritage Language Students. 3-5 Units.**

For students with a good understanding of written accents, spelling, and syntax. Focus is on the craft of writing with emphasis on brainstorming, planning, outlining, drafting, revising, style, diction, and editing. Writing essays on literary topics. Non-Spanish majors or minors may choose topics related to their studies. Prerequisite: 23B or equivalent.

**SPANLANG 121M. Spanish for Medical Students. 2 Units.**

First quarter of three-quarter series. Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on taking the medical history. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

Same as: HRP 280.

**SPANLANG 122M. Spanish for Medical Students. 2 Units.**

Second quarter of three-quarter series. Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on performing a physical examination. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

Same as: HRP 281.

**SPANLANG 123M. Spanish for Medical Students. 2 Units.**

Third quarter of three-quarter series. Goal is a practical and culturally appropriate command of spoken Spanish. Emphasis is on different specialties and medical conditions. Topics include the human body, hospital procedures, diagnostics, food, and essential doctor-patient phrases when dealing with Spanish-speaking patients. Series can be taken independently, depending on the level of prior knowledge.

Same as: HRP 282.

**SPANLANG 131M. Spanish for Heritage and Foreign Language Pre-Med and Public Health Students. 3-4 Units.**

For pre-med or public health students who grew up in homes where Spanish is spoken or for students who possess a considerable command of Spanish. Focus is on developing the ability to provide information on health-related topics to Spanish speakers in the U.S. Students participate in the organization and delivery of information on preventive health care in a workshop setting to a Spanish-speaking community.

**SPANLANG 199. Individual Reading. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**SPANLANG 205A. Intensive First-Year Spanish for Stanford Grads, Part A. 3-5 Units.**

Same as SPANLANG 1. For Stanford graduate students only. Goal is to engage in interactions with Spanish speakers using socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Stanford graduate students restricted to 9 units may take 205A,B,C for a total of 9 units or 2 of the courses for a total of 9 units.

**SPANLANG 205B. Intensive First-Year Spanish for Stanford Grads, Part B. 3-5 Units.**

Same as SPANLANG 2. Continuation of 205A. For Stanford graduate students only. Goal is to engage in interactions with Spanish speakers using socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Stanford graduate students restricted to 9 units may take 205A,B,C for a total of 9 units or 2 of the courses for a total of 9 units. Prerequisite 205A or equivalent.

**SPANLANG 205C. Intensive First-Year Spanish for Stanford Grads, Part C. 3-5 Units.**

Same as SPANLANG 3. Continuation of 205B. For Stanford graduate students only. Goal is to engage in interactions with Spanish speakers using socially and culturally appropriate forms. Social and cultural influences shaping the production of oral and written texts in the Spanish- and English-speaking world. Stanford graduate students restricted to 9 units may take 205A,B,C for a total of 9 units or 2 of the courses for a total of 9 units. Prerequisite 205B or equivalent.

**SPANLANG 225A. Intensive Second-Year Spanish for Stanford Grads, Part A. 3-4 Units.**

Same as SPANLANG 11. For Stanford Graduate students restricted to 9 units. Sequence integrating culture and language. Emphasis is on advanced proficiency in oral and written discourse including presentational language and socioculturally appropriate discourse in formal and informal, academic, and professional contexts. Prerequisite: one year of college Spanish or equivalent.

**SPANLANG 225B. Intensive Second-Year Spanish for Stanford Grads, Part B. 3-4 Units.**

Same as SPANLANG 12. Continuation of 225A. For Stanford Graduate students restricted to 9 units. Prerequisite 225A or equivalent.

**SPANLANG 225C. Intensive Second-Year Spanish for Stanford Grads, Part C. 3-4 Units.**

Same as SPANLANG 13. Continuation of 225B. For Stanford Graduate students restricted to 9 units. Prerequisite 225B or equivalent.

**SPANLANG 250. Reading Spanish. 3 Units.**

Reading Spanish - For students who have already taken Spanish for at least one year or have superior reading proficiency in another Romance language. Emphasis is on academic texts. Fulfills University reading requirements for advanced degrees if students earn a grade of 'B.'

**SPANLANG 394. Graduate Studies in Spanish Conversation. 1-3 Units.**

Prerequisite: consent of instructor.

**SPANLANG 395. Graduate Studies in Spanish. 2-5 Units.**

Prerequisite: consent of instructor.

## Special Language Program Courses

**SPECLANG 75. Greek Culture, Ideals, and Themes. 3 Units.**

Introduction to Greek culture and its global influence in a social historical context, through images from its past and institutions in contemporary Greek society. Limited enrollment.

**SPECLANG 106A. Third-Year Albanian, First Quarter. 3 Units.**

Continuation of SPECLANG 105C. Prerequisite: SPECLANG 105C or consent of instructor.

**SPECLANG 106B. Third-Year Albanian, Second Quarter. 3 Units.**

Continuation of SPECLANG 106A. Prerequisite: SPECLANG 106A or consent of instructor.

**SPECLANG 129A. First-Year Ukrainian, First Quarter. 3 Units.**

Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Ukrainian culture.

**SPECLANG 129B. First-Year Ukrainian, Second Quarter. 3 Units.**

Continuation of SPECLANG 129A. Prerequisite: SPECLANG 129A or consent of instructor.

**SPECLANG 129C. First-Year Ukrainian, Third Quarter. 3 Units.**

Continuation of SPECLANG 129B. Prerequisite: SPECLANG 129B or consent of instructor.

**SPECLANG 138A. First-Year Navajo, First Quarter. 4 Units.**

Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Navajo culture.

**SPECLANG 138B. First-Year Navajo, Second Quarter. 4 Units.**

Continuation of SPECLANG 138A. Prerequisite: SPECLANG 138A or consent of instructor.

**SPECLANG 138C. First-Year Navajo, Third Quarter. 4 Units.**  
Continuation of SPECLAN 138B. Prerequisite: SPECLANG 138B or consent of instructor. Fulfills the University Foreign Language Requirement.

**SPECLANG 145A. Second-Year Tagalog, First Quarter. 4 Units.**  
Continuation of SPECLANG 144C. Prerequisite: SPECLANG 144C or consent of instructor.

**SPECLANG 145B. Second-Year Tagalog, Second Quarter. 4 Units.**  
Continuation of SPECLANG 145A. Prerequisite: SPECLANG 145A or consent of instructor.

**SPECLANG 145C. Second-Year Tagalog, Third Quarter. 4 Units.**  
Continuation of SPECLANG 145B. Prerequisite: SPECLANG 145B or consent of instructor.

**SPECLANG 150A. First-Year Vietnamese, First Quarter. 5 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Vietnamese culture.

**SPECLANG 150B. First-Year Vietnamese, Second Quarter. 5 Units.**  
Continuation of SPECLANG 150A. Prerequisite: SPECLANG 150A or consent of instructor.

**SPECLANG 150C. First-Year Vietnamese, Third Quarter. 5 Units.**  
Continuation of SPECLANG 150B. Prerequisite: SPECLANG 150B or consent of instructor. Fulfills the University Foreign Language Requirement.

**SPECLANG 151A. Second-Year Vietnamese, First Quarter. 4 Units.**  
Continuation of SPECLANG 150C. Prerequisite: SPECLANG 150C or consent of instructor.

**SPECLANG 151B. Second-Year Vietnamese, Second Quarter. 4 Units.**  
Continuation of SPECLANG 151A. Prerequisite: SPECLANG 151A or consent of instructor.

**SPECLANG 151C. Second-Year Vietnamese, Third Quarter. 4 Units.**  
Continuation of SPECLANG 151B. Prerequisite: SPECLANG 151B or consent of instructor.

**SPECLANG 152A. First-Year Hindi, First Quarter. 5 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hindi culture.

**SPECLANG 152B. First-Year Hindi, Second Quarter. 5 Units.**  
Continuation of SPECLANG 152A. Prerequisite: SPECLANG 152A or consent of instructor.

**SPECLANG 152C. First-Year Hindi, Third Quarter. 5 Units.**  
Continuation of SPECLANG 152B. Prerequisite: SPECLANG 152B or consent of instructor. Fulfills the University language requirement.

**SPECLANG 153A. Second-Year Hindi, First Quarter. 4 Units.**  
Continuation of SPECLANG 152C. Second year sequence requires completion of first year or consent of the instructor. Focus on expanding all language skills, mastering grammar patterns and new vocabulary through authentic readings, writing essays, oral presentations and the use of multimedia-based materials. Focus on cultural proficiency. Prerequisite: SPECLANG 152C or consent of instructor.

**SPECLANG 153B. Second-Year Hindi, Second Quarter. 4 Units.**  
Continuation of SPECLANG 153A. Prerequisite: SPECLANG 153A or consent of instructor.

**SPECLANG 153C. Second-Year Hindi, Third Quarter. 4 Units.**  
Continuation of SPECLANG 153B. Prerequisite: SPECLANG 153B or consent of instructor.

**SPECLANG 154A. Third-Year Hindi, First Quarter. 4 Units.**  
Continuation of SPECLANG 153C. Prerequisite: SPECLANG 153C or consent of instructor.

**SPECLANG 154B. Third-Year Hindi, Second Quarter. 4 Units.**  
Continuation of SPECLANG 154A. Prerequisite: SPECLANG 154A or consent of instructor.

**SPECLANG 154C. Third-Year Hindi, Third Quarter. 4 Units.**  
Continuation of SPECLANG 154B. Prerequisite: SPECLANG 154B or consent of instructor.

**SPECLANG 164A. First-Year Czech, First Quarter. 3 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Czech culture.

**SPECLANG 164B. First-Year Czech, Second Quarter. 3 Units.**  
Continuation of SPECLANG 164A. Prerequisite: SPECLANG 164A or consent of instructor.

**SPECLANG 164C. First-Year Beginning Czech, Third Quarter. 3 Units.**  
Continuation of SPECLANG 164B. Prerequisite: SPECLANG 164B or consent of instructor.

**SPECLANG 165A. Second-Year Czech, First Quarter. 3 Units.**  
Continuation of SPECLANG 164C. Prerequisite: SPECLANG 164C or consent of instructor. Fulfills the University language requirement.

**SPECLANG 165C. Second-Year Czech, Third Quarter. 3 Units.**  
Continuation of SPECLANG 165B. Prerequisite: SPECLANG 165B or consent of instructor.

**SPECLANG 167A. First-Year Polish, First Quarter. 3 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Polish culture.

**SPECLANG 167B. First-Year Polish, Second Quarter. 3 Units.**  
Continuation of SPECLANG 167A. Prerequisite: SPECLANG 167A or consent of instructor.

**SPECLANG 167C. First-Year Polish, Third Quarter. 3 Units.**  
Continuation of SPECLANG 167B. Prerequisite: SPECLANG 167B or consent of instructor.

**SPECLANG 168A. Second-Year Polish, First Quarter. 3 Units.**  
Continuation of SPECLANG 167C. Prerequisite: SPECLANG 167C or consent of instructor. Fulfills the University language requirement.

**SPECLANG 168B. Second-Year Polish, Second Quarter. 3 Units.**  
Continuation of SPECLANG 168A. Prerequisite: SPECLANG 168A or consent of instructor.

**SPECLANG 168C. Second-Year Polish, Third Quarter. 3 Units.**  
Continuation of SPECLANG 168B. Prerequisite: SPECLANG 168B or consent of instructor.

**SPECLANG 169A. Third-Year Polish, First Quarter. 3 Units.**  
Continuation of SPECLANG 168C. Prerequisite: SPECLANG 168C or consent of instructor.

**SPECLANG 170A. First-Year Modern Greek, First Quarter. 5 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Greek culture.

**SPECLANG 170B. First-Year Modern Greek, Second Quarter. 5 Units.**  
Continuation of SPECLANG 170A. Prerequisite: SPECLANG 170A or consent of instructor.

**SPECLANG 170C. First-Year Modern Greek, Third Quarter. 5 Units.**  
Continuation of SPECLANG 170B. Emphasis on speaking, reading, writing and listening. Student-centered, interactive approach focuses on mastering the basic grammar structures and basic vocabulary through a multimodal approach. Introduction to the Greek culture. Prerequisite: SPECLANG 170B. Fulfills the University language requirement.

**SPECLANG 171A. Second-Year Modern Greek, First Quarter. 4 Units.**  
Continuation of SPECLANG 170C. Grammar structures and vocabulary through authentic materials. Cultural proficiency. Prerequisite: SPECLANG 170C or consent of instructor.

**SPECLANG 171B. Second-Year Modern Greek, Second Quarter. 4 Units.**  
Continuation of SPECLANG 171A. Prerequisite: SPECLANG 171A or consent of instructor.

**SPECLANG 171C. Second-Year Modern Greek, Third Quarter. 4 Units.**  
Continuation of SPECLANG 171B. Prerequisite: SPECLANG 171B or consent of instructor.

**SPECLANG 172A. Modern Greek Language and Culture through Literature and Film, First Quarter. 4 Units.**  
Accelerated. Vocabulary enrichment through multimedia, online materials.

**SPECLANG 172B. Modern Greek Language and Culture through Literature and Film, Second Quarter. 4 Units.**  
Continuation of 172A.

**SPECLANG 172C. Modern Greek Language and Culture through Literature and Film, Third Quarter. 4 Units.**  
Accelerated. Vocabulary enrichment through multimedia, online materials.

**SPECLANG 173A. First-Year Hungarian, First Quarter. 3 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Hungarian culture.

**SPECLANG 173B. First-Year Hungarian, Second Quarter. 3 Units.**  
Continuation of SPECLANG 173A. Prerequisite: SPECLANG 173A or consent of instructor.

**SPECLANG 173C. First-Year Hungarian, Third Quarter. 3 Units.**  
Continuation of SPECLANG 173B. Prerequisite: SPECLANG 173B or consent of instructor.

**SPECLANG 174A. First-Year Quechua, First Quarter. 3 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Quechua culture.

**SPECLANG 174B. First-Year Quechua, Second Quarter. 3 Units.**  
Continuation of SPECLANG 174A. Prerequisite: SPECLANG 174A or consent of instructor.

**SPECLANG 174C. First-Year Quechua, Third Quarter. 3 Units.**  
Continuation of SPECLANG 174B. Prerequisite: SPECLANG 174B or consent of instructor.

**SPECLANG 174C. First-Year Quechua, Third Quarter. 3 Units.**  
Continuation of SPECLANG 174B. Prerequisite: SPECLANG 174B or consent of instructor.

**SPECLANG 176A. First-Year Thai, First Quarter. 4 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Thai culture.

**SPECLANG 176B. First-Year Thai, Second Quarter. 4 Units.**  
Continuation of SPECLANG 176A. Prerequisite: SPECLANG 176A or consent of instructor.

**SPECLANG 176C. First-Year Thai, Third Quarter. 4 Units.**  
Continuation of SPECLANG 176B. Prerequisite: SPECLANG 176B or consent of instructor.

**SPECLANG 178A. First-Year Sign Language, First Quarter. 4 Units.**  
Comprehension and production skills; cultural awareness necessary for communication. Limited enrollment.

**SPECLANG 178B. First-Year Sign Language, Second Quarter. 4 Units.**  
Continuation of SPECLANG 178A. Prerequisite: SPECLANG 178A or consent of instructor.

**SPECLANG 178C. First-Year Sign Language, Third Quarter. 4 Units.**  
Continuation of SPECLANG 178B. Prerequisite: SPECLANG 178B or consent of instructor. Fulfills the University language requirement.

**SPECLANG 179A. Second-Year Sign Language, First Quarter. 4 Units.**  
Continuation of SPECLANG 178C. Additional functional structures, lexical items, and history. Prerequisite: SPECLANG 178B or consent of instructor. Limited enrollment.

**SPECLANG 179B. Second-Year Sign Language, Second Quarter. 4 Units.**  
Continuation of SPECLANG 179A. Prerequisite: SPECLANG 179A or consent of instructor. Limited enrollment.

**SPECLANG 179C. Second-Year Sign Language, Third Quarter. 4 Units.**  
Continuation of SPECLANG 179B. Prerequisite: SPECLANG 179B or consent of instructor. Limited enrollment.

**SPECLANG 182B. Second-Year Hungarian, Second Quarter. 3 Units.**  
Continuation of SPECLANG 182A. Prerequisite: SPECLANG 182A or consent of instructor.

**SPECLANG 182C. Second-Year Hungarian, Third Quarter. 3 Units.**  
Continuation of SPECLANG 182B. Prerequisite: SPECLANG 182B or consent of instructor.

**SPECLANG 183A. First-Year Sanskrit, First Quarter. 3 Units.**  
Sanskrit script and literary readings.

**SPECLANG 183B. First-Year Sanskrit, Second Quarter. 3 Units.**  
Continuation of SPECLANG 183A. Prerequisite: SPECLANG 183A or consent of instructor.

**SPECLANG 183C. First-Year Sanskrit, Third Quarter. 3 Units.**  
Continuation of SPECLANG 183B. Prerequisite: SPECLANG 183B or consent of instructor.

**SPECLANG 186A. First-Year Serbo-Croatian, First Quarter. 3 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Serb and Croat culture.

**SPECLANG 186B. First-Year Serbo-Croatian, Second Quarter. 3 Units.**  
Continuation of SPECLANG 186A. Prerequisite: SPECLANG 186A or consent of instructor.

**SPECLANG 186C. First-Year Serbo-Croatian, Third Quarter. 3 Units.**  
Continuation of SPECLANG 186B. Prerequisite: SPECLANG 186B or consent of instructor.

**SPECLANG 189A. First-Year Hawaiian, First Quarter. 4 Units.**

**SPECLANG 189B. First-Year Beginning Hawaiian, Second Quarter. 4 Units.**  
Continuation of SPECLANG 189A. Prerequisite: SPECLANG 189A or consent of instructor.

**SPECLANG 189C. First-Year Hawaiian, Third Quarter. 4 Units.**  
Continuation of SPECLANG 189B. Prerequisite: SPECLANG 189B or consent of instructor. Fulfills the University Foreign Language Requirement.

**SPECLANG 192A. First-Year Kazakh, First Quarter. 3 Units.**  
Grammatical structures, vocabulary, and sentence patterns through speaking, reading, writing, and listening. Kazakh culture.

**SPECLANG 192B. First-Year Kazakh, Second Quarter. 3 Units.**  
Continuation of SPECLANG 192A. Prerequisite: SPECLANG 192A or consent of instructor.

**SPECLANG 192C. First-Year Kazakh, Third Quarter. 3 Units.**  
Continuation of SPECLANG 192B. Prerequisite: SPECLANG 192B or consent of instructor.

**SPECLANG 193A. Second-Year Kazakh, First Quarter. 3 Units.**  
Continuation of SPECLANG 192C. Prerequisite: SPECLANG 192C or consent of instructor. Fulfills the University language requirement.

**SPECLANG 193B. Second-Year Kazakh, Second Quarter. 3 Units.**  
Continuation of SPECLANG 193A. Prerequisite: SPECLANG 193A or consent of instructor.

**SPECLANG 193C. Second-Year Kazakh, Third Quarter. 3 Units.**  
Continuation of SPECLANG 193B. Prerequisite: SPECLANG 193B or consent of instructor.

**SPECLANG 198Q. Modern Greece in Film and Literature. 3-5 Units.**  
Preference to sophomores. Cultural and literary highlights. Filmmakers include Kakoyannis, Dassen, Boulmetis, Angelopoulos, and Scorsese; readings from Eugenides, Gage, Kavafis, Kazantzakis, Samarakis, Seferis, and Elytis.

**SPECLANG 215A. Modern Greek for Heritage Language Learners, First Quarter. 2-4 Units.**  
For students of Greek background. Sources include authentic texts, multimedia materials, and Greek media.

**SPECLANG 215B. Modern Greek for Heritage Language Learners, Second Quarter. 2-4 Units.**  
Continuation of SPECLANG 215A. Prerequisite: SPECLANG 215A or consent of instructor.

**SPECLANG 215C. Modern Greek for Heritage Language Learners, Third Quarter. 2-4 Units.**  
Continuation of SPECLANG 215B. Prerequisite: SPECLANG 215A or consent of instructor.

**SPECLANG 224A. Third-Year Vietnamese, First Quarter. 4 Units.**  
Continuation of SPECLANG 151C. Grammar structures and vocabulary through authentic materials. Cultural proficiency. Prerequisite: SPECLANG 151C or consent of instructor.

**SPECLANG 224B. Third-Year Vietnamese, Second Quarter. 3 Units.**  
Continuation of SPECLANG 224A. Prerequisite: SPECLANG 224A or consent of instructor.

**SPECLANG 224C. Third-Year Vietnamese, Third Quarter. 3 Units.**  
Continuation of SPECLANG 224B. Prerequisite: SPECLANG 224B or consent of instructor.

**SPECLANG 239A. Second-Year Uzbek, First Quarter. 3 Units.**  
Continuation of SPECLANG 238C. Prerequisite: SPECLANG 228C or consent of instructor. Fulfills the University Foreign Language Requirement.

**SPECLANG 239B. Second-Year Uzbek, Second Quarter. 3 Units.**  
Continuation of SPECLANG 239A. Prerequisite: SPECLANG 239A or consent of instructor.

**SPECLANG 239C. Second-Year Uzbek, Third Quarter. 3 Units.**  
Continuation of SPECLANG 239B. Prerequisite: SPECLANG 239B or consent of instructor.

**SPECLANG 240A. Third-Year Uzbek, First quarter. 3 Units.**  
Continuation of SPECLANG 239C. Prerequisite: SPECLANG 239C or consent of instructor.

**SPECLANG 247. Introduction to Siouan Language & Culture I. 5 Units.**  
introduction to the three dialects of the Siouan Language: Dakota, Nakota and Lakota. The focus will be on the Lakota dialect with accompanying notation on when it is appropriate to use the other two dialects. The method for teaching the Lakota dialect will be through the use of immersion techniques relying on cultural context, i.e. use of songs as poetry including current usage on Utube of Round Dance songs by today's youth to illustrate the adaptation of cultural ways to fit today's world. Use of a Dakota/Lakota grammar, Dakota/Lakota texts, and a basic introduction to a writing system that works for literacy. Definition of what oral culture means and the role of memory in the preservation of a way of life."

**SPECLANG 248. Introduction to Siouan Language & Culture II. 5 Units.**  
Continuation of the Introduction to Siouan Language & Culture I. This course will take a more focused approach on one cultural aspect of Dakota/Nakota/Lakota culture through the analysis of Dakota/Nakota/Lakota words in the lyrics of songs sung in the Sundance as a focus of study in the continuing use of language in the Dakota/Nakota/Lakota culture."

**SPECLANG 250A. First-Year Romanian, First Quarter. 3 Units.**

**SPECLANG 250B. First-Year Romanian, Second Quarter. 3 Units.**  
Continuation of SPECLANG 250A. Prerequisite: SPECLANG 250A or consent of instructor.

**SPECLANG 250C. First-Year Romanian, Third Quarter. 3 Units.**  
Continuation of SPECLANG 250B. Prerequisite: SPECLANG 250B or consent of instructor.

**SPECLANG 254C. Third-Year Hungarian, Third Quarter. 3 Units.**  
Continuation of SPECLANG 254B. Prerequisite: SPECLANG 254B or consent of instructor.

**SPECLANG 255A. Fourth-Year Albanian, 1st quarter. 3-4 Units.**  
Continuation of SPECLANG 106C.

**SPECLANG 255B. Fourth-Year Albanian, 2nd quarter. 3-4 Units.**  
Continuation of SPECLANG 255A.

**SPECLANG 255C. Fourth-Year Albanian, 3rd Quarter. 3-4 Units.**  
Continuation of 255B.

**SPECLANG 264A. Advanced Czech Conversation, First Quarter. 1-4 Units.**  
Repeatable once for credit.

**SPECLANG 265A. Third-Year Hungarian, First Quarter. 3 Units.**  
Continuation of SPECLANG 182C. Prerequisite completion of SPECLANG 182C or consent of instructor.

**SPECLANG 265B. Third-Year Hungarian, Second Quarter. 3 Units.**  
Continuation of SPECLANG 265A. Prerequisite completion of SPECLANG 265A or consent of instructor.

**SPECLANG 265C. Third-Year Hungarian, Third Quarter. 3 Units.**  
Continuation of SPECLANG 265B. Prerequisite completion of SPECLANG 265B or consent of instructor.

**SPECLANG 297. Directed Reading. 1-5 Units.**  
Prerequisite: consent of instructor.



**SPECLANG 395. Graduate Studies in Special Language. 1-5 Units.**  
Prerequisite: consent of instructor.

## Stanford in Washington Courses

**SIW 101. Policymaking in the Washington Community. 5 Units.**

**SIW 102. Promoting Democracy. 5 Units.**

**SIW 103. Economic Growth and Development Patterns, Policies, and Prospects. 5 Units.**

**SIW 104. Congressional Oversight and the Press. 5 Units.**

**SIW 105. Education Policy. 5 Units.**

**SIW 106. Criminal Justice Policy. 5 Units.**

**SIW 107. Civil Rights Law. 5 Units.**

**SIW 108. Urban Policy. 5 Units.**

**SIW 109. Trans-Atlantic Relations. 5 Units.**

**SIW 110. U.S. Foreign Policy. 3 Units.**

**SIW 111. Composing a Life in Public Service. 3 Units.**

**SIW 112. Health Policy Making in the US. 5 Units.**

**SIW 113. Critical Health Issues in the U.S. and Abroad. 5 Units.**

**SIW 114. Minority Health. 5 Units.**  
(Staff).

**SIW 115. Health and Environmental Regulatory Policy. 5 Units.**  
(Staff).

**SIW 116. International Environmental Policy. 5 Units.**

**SIW 117. The Management of US-China Relations. 5 Units.**

**SIW 118. Topics in American Politics and Public Policy. 3 Units.**

**SIW 120. Law and Public Policy in the Federal Government. 5 Units.**

**SIW 121. Economic Analysis of Federal Environmental and Health Regulations. 5 Units.**

**SIW 122. Energy, Environment and Security in South Asia. 5 Units.**

**SIW 124. The American Presidency: From TR to Nixon. 5 Units.**

**SIW 126. Election Series. 2 Units.**

**SIW 127. Democracy Promotion in American Foreign Policy. 5 Units.**  
The role of democracy promotion in American foreign policy, its successes and failures, its conditions for success, and the debates around it during different periods in American history. The expansion of democracy in recent decades, recurrent debates about the proper role of values and ideals in American foreign policy, and experiences with democracy promotion during the Cold War, the post-Cold War period, and the post-September 11 period. Tools and processes by which democracy can be promoted such as diplomacy, political assistance, and foreign aid, and the current debate about future policy directions.

**SIW 128. Transitions in Energy Policy Speakers Series. 2 Units.**

**SIW 129. Women's, Maternal, and Children's Health. 5 Units.**

**SIW 130. Security through Partnerships, Partnerships through Security. 5 Units.**

**SIW 131. United States and Europe in Comparative Perspective. 5 Units.**

**SIW 132. Bridging the gap between environmental science and policy. 5 Units.**

**SIW 133. How a "Green" Idea Becomes Law: Current State of US Environmental Law & Policy. 5 Units.**

**SIW 134. United States and Europe: Cooperation or Competition?. 5 Units.**

**SIW 135. Federal Education Policy. 5 Units.**

**SIW 137. Energy and Environment: Technology, Economics and Policy. 5 Units.**

**SIW 138. Game Theory and Mathematical Models of Politics. 5 Units.**

**SIW 140. Health and Environmental Policy Speaker Series. 2 Units.**

**SIW 141. The Role of Nonprofits, Philanthropy, and Social Entrepreneurship in the Political Process. 5 Units.**

**SIW 142. Images of National Politics from Classics in Political Science. 5 Units.**

**SIW 145. The Economics of Health in Poor Countries. 5 Units.**

**SIW 198. Women's Health Policy. 5 Units.**

**SIW 198A. Modern America in Historical Perspective. 5 Units.**

**SIW 198B. International Economic Policy. 5 Units.**

**SIW 198D. Criminal Justice. 5 Units.**

**SIW 198F. Globalization Policy. 5 Units.**

**SIW 198G. Foreign Policy. 5 Units.**

**SIW 198H. Congressional Elections. 2 Units.**

**SIW 198I. Health Policy. 5 Units.**

**SIW 198J. Environment and Energy Policy. 5 Units.**

**SIW 198K. Urban Environmental Issues. 5 Units.**

**SIW 198L. International Health. 5 Units.**

**SIW 198M. Women's Health. 5 Units.**

**SIW 198N. American Education and Public Policy. 5 Units.**

**SIW 198O. Civil Rights Policy. 5 Units.**

**SIW 198Q. Press and the Washington Community. 5 Units.**

**SIW 198R. Health Policy. 5 Units.**

**SIW 198S. Environment and Energy Policy. 5 Units.**

**SIW 198T. Globalization Issues. 5 Units.**

**SIW 198U. International Health Policy. 5 Units.**

**SIW 198V. Women and Children's Health. 5 Units.**

**SIW 198W. Environmental Education. 5 Units.**

**SIW 198X. International Environmental Policy. 5 Units.**

**SIW 198Y. Health Policy. 5 Units.**

**SIW 198Z. International Economic Policy. 5 Units.**

**SIW 201A. CSRE Public Policy Seminar. 3-5 Units.**

**SIW 201B. CSRE Public Policy Seminar. 3-5 Units.**

## Statistics Courses

**STATS 42Q. Undergraduate Admissions to Selective Universities - a Statistical Perspective. 2 Units.**

The goal is the building of a statistical model, based on applicant data, for predicting admission to selective universities. The model will consider factors such as gender, ethnicity, legacy status, public-private schooling, test scores, effects of early action, and athletics. Common misconceptions and statistical pitfalls are investigated. The applicant data are not those associated with any specific university.

**STATS 48N. Riding the Data Wave. 3 Units.**

Imagine collecting a bit of your saliva and sending it in to one of the personalized genomics company: for very little money you will get back information about hundreds of thousands of variable sites in your genome. Records of exposure to a variety of chemicals in the areas you have lived are only a few clicks away on the web; as are thousands of studies and informal reports on the effects of different diets, to which you can compare your own. What does this all mean for you? Never before in history humans have recorded so much information about themselves and the world that surrounds them. Nor has this data been so readily available to the lay person. Expression as "data deluge" are used to describe such wealth as well as the loss of proper bearings that it often generates. How to summarize all this information in a useful way? How to boil down millions of numbers to just a meaningful few? How to convey the gist of the story in a picture without misleading oversimplifications? To answer these questions we need to consider the use of the data, appreciate the diversity that they represent, and understand how people instinctively interpret numbers and pictures. During each week, we will consider a different data set to be summarized with a different goal. We will review analysis of similar problems carried out in the past and explore if and how the same tools can be useful today. We will pay attention to contemporary media (newspapers, blogs, etc.) to identify settings similar to the ones we are examining and critique the displays and summaries there documented. Taking an experimental approach, we will evaluate the effectiveness of different data summaries in conveying the desired information by testing them on subsets of the enrolled students.

**STATS 60. Introduction to Statistical Methods: Precalculus. 5 Units.**

Techniques for organizing data, computing, and interpreting measures of central tendency, variability, and association. Estimation, confidence intervals, tests of hypotheses, t-tests, correlation, and regression. Possible topics: analysis of variance and chi-square tests, computer statistical packages.

Same as: PSYCH 10, STATS 160.

**STATS 90. Mathematics and Statistics in the Real World. 3 Units.**

This is an introductory quantitative literacy course, that offers an introduction to the mathematics (outside of calculus) used in real-world problems. Topics include: (a) Exponential functions, compound interest, population growth. (b) Geometric series, applications to mortgage payments, amortization of loans, present value of money, drug doses and blood levels. (c) First-order approximation, estimating areas and volumes. (d) Basic probability: Bayes's rule, false positives in disease detection and drug testing. (e) Basic descriptive statistics: mean, median, standard deviation f) Least squares and linear regression.

Same as: MATH 16.

**STATS 110. Statistical Methods in Engineering and the Physical Sciences. 4-5 Units.**

Introduction to statistics for engineers and physical scientists. Topics: descriptive statistics, probability, interval estimation, tests of hypotheses, nonparametric methods, linear regression, analysis of variance, elementary experimental design. Prerequisite: one year of calculus.

**STATS 116. Theory of Probability. 3-5 Units.**

Probability spaces as models for phenomena with statistical regularity. Discrete spaces (binomial, hypergeometric, Poisson). Continuous spaces (normal, exponential) and densities. Random variables, expectation, independence, conditional probability. Introduction to the laws of large numbers and central limit theorem. Prerequisites: MATH 52 and familiarity with infinite series, or equivalent.

**STATS 141. Biostatistics. 3-5 Units.**

Introductory statistical methods for biological data: describing data (numerical and graphical summaries); introduction to probability; and statistical inference (hypothesis tests and confidence intervals). Intermediate statistical methods: comparing groups (analysis of variance); analyzing associations (linear and logistic regression); and methods for categorical data (contingency tables and odds ratio). Course content integrated with statistical computing in R.

Same as: BIO 141.

**STATS 160. Introduction to Statistical Methods: Precalculus. 5 Units.**

Techniques for organizing data, computing, and interpreting measures of central tendency, variability, and association. Estimation, confidence intervals, tests of hypotheses, t-tests, correlation, and regression. Possible topics: analysis of variance and chi-square tests, computer statistical packages.

Same as: PSYCH 10, STATS 60.

**STATS 166. Computational Algorithms for Statistical Genetics. 2-3 Units.**

Computational algorithms for human genetics research. Topics include: permutation, bootstrap, expectation maximization, hidden Markov model, and Markov chain Monte Carlo. Rationales and techniques illustrated with existing implementations commonly used in population genetics research, disease association studies, and genomics analysis. Prerequisite: GENE 244 or consent of instructor.

Same as: GENE 245, STATS 345.

**STATS 167. Probability: Ten Great Ideas About Chance. 4 Units.**

Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116.

Same as: PHIL 166, PHIL 266, STATS 267.

**STATS 191. Introduction to Applied Statistics. 3-4 Units.**

Statistical tools for modern data analysis. Topics include regression and prediction, elements of the analysis of variance, bootstrap, and cross-validation. Emphasis is on conceptual rather than theoretical understanding. Applications to social/biological sciences. Student assignments/projects require use of the software package R. Recommended: 60, 110, or 141.

**STATS 198. Practical Training. 1-3 Units.**

For students majoring in Mathematical and Computational Science only. Students obtain employment in a relevant industrial or research activity to enhance their professional experience.

**STATS 199. Independent Study. 1-15 Units.**

For undergraduates.

**STATS 200. Introduction to Statistical Inference. 3 Units.**

Modern statistical concepts and procedures derived from a mathematical framework. Statistical inference, decision theory; point and interval estimation, tests of hypotheses; Neyman-Pearson theory. Bayesian analysis; maximum likelihood, large sample theory. Prerequisite: 116.

**STATS 202. Data Mining and Analysis. 3 Units.**

Data mining is used to discover patterns and relationships in data. Emphasis is on large complex data sets such as those in very large databases or through web mining. Topics: decision trees, association rules, clustering, case based methods, and data visualization.

**STATS 203. Introduction to Regression Models and Analysis of Variance. 3 Units.**

Modeling and interpretation of observational and experimental data using linear and nonlinear regression methods. Model building and selection methods. Multivariable analysis. Fixed and random effects models. Experimental design. Pre- or corequisite: 200.

**STATS 205. Introduction to Nonparametric Statistics. 3 Units.**

Nonparametric analogs of the one- and two-sample  $t$ -tests and analysis of variance; the sign test, median test, Wilcoxon's tests, and the Kruskal-Wallis and Friedman tests, tests of independence. Nonparametric regression and nonparametric density estimation, modern nonparametric techniques, nonparametric confidence interval estimates.

**STATS 206. Applied Multivariate Analysis. 3 Units.**

Introduction to the statistical analysis of several quantitative measurements on each observational unit. Emphasis is on concepts, computer-intensive methods. Examples from economics, education, geology, psychology. Topics: multiple regression, multivariate analysis of variance, principal components, factor analysis, canonical correlations, multidimensional scaling, clustering. Pre- or corequisite: 200.

**STATS 207. Introduction to Time Series Analysis. 3 Units.**

Time series models used in economics and engineering. Trend fitting, autoregressive and moving average models and spectral analysis, Kalman filtering, and state-space models. Seasonality, transformations, and introduction to financial time series. Prerequisite: basic course in Statistics at the level of 200.

**STATS 208. Introduction to the Bootstrap. 3 Units.**

The bootstrap is a computer-based method for assigning measures of accuracy to statistical estimates. By substituting computation in place of mathematical formulas, it permits the statistical analysis of complicated estimators. Topics: nonparametric assessment of standard errors, biases, and confidence intervals; related resampling methods including the jackknife, cross-validation, and permutation tests. Theory and applications. Prerequisite: course in statistics or probability.

**STATS 209. Understanding Statistical Models and their Social Science Applications. 3 Units.**

Critical examination of statistical methods in social science applications, especially for cause and effect determinations. Topics: path analysis, multilevel models, matching and propensity score methods, analysis of covariance, instrumental variables, compliance, longitudinal data, mediating and moderating variables. See <http://www-stat.stanford.edu/~rag/stat209>. Prerequisite: intermediate-level statistical methods  
Same as: EDUC 260X, HRP 239.

**STATS 211. Meta-research: Appraising Research Findings, Bias, and Meta-analysis. 3 Units.**

Open to graduate, medical, and undergraduate students. Appraisal of the quality and credibility of research findings; evaluation of sources of bias. Meta-analysis as a quantitative (statistical) method for combining results of independent studies. Examples from medicine, epidemiology, genomics, ecology, social/behavioral sciences, education. Collaborative analyses. Project involving generation of a meta-research project or reworking and evaluation of an existing published meta-analysis. Prerequisite: knowledge of basic statistics.  
Same as: HRP 206, MED 206.

**STATS 212. Applied Statistics with SAS. 3 Units.**

Data analysis and implementation of statistical tools in SAS. Topics: reading in and describing data, categorical data, dates and longitudinal data, correlation and regression, nonparametric comparisons, ANOVA, multiple regression, multivariate data analysis, using arrays and macros in SAS. Prerequisite: statistical techniques at the level of STATS 191 or 203; knowledge of SAS not required.

**STATS 213. Introduction to Graphical Models. 3 Units.**

Multivariate Normal Distribution and Inference, Wishart distributions, graph theory, probabilistic Markov models, pairwise and global Markov property, decomposable graph, Markov equivalence, MLE for DAG models and undirected graphical models, Bayesian inference for DAG models and undirected graphical models. Prerequisites: STATS 116, MATH 104 or equivalent class in linear algebra.

**STATS 215. Statistical Models in Biology. 3 Units.**

Poisson and renewal processes, Markov chains in discrete and continuous time, branching processes, diffusion. Applications to models of nucleotide evolution, recombination, the Wright-Fisher process, coalescence, genetic mapping, sequence analysis. Theoretical material approximately the same as in STATS 217, but emphasis is on examples drawn from applications in biology, especially genetics. Prerequisite: 116 or equivalent.

**STATS 217. Introduction to Stochastic Processes. 3 Units.**

Discrete and continuous time Markov chains, poisson processes, random walks, branching processes, first passage times, recurrence and transience, stationary distributions. Non-Statistics masters students may want to consider taking STATS 215 instead. Prerequisite: STATS 116 or consent of instructor.

**STATS 218. Introduction to Stochastic Processes. 3 Units.**

Renewal theory, Brownian motion, Gaussian processes, second order processes, martingales.

**STATS 219. Stochastic Processes. 3 Units.**

Introduction to measure theory,  $L_p$  spaces and Hilbert spaces. Random variables, expectation, conditional expectation, conditional distribution. Uniform integrability, almost sure and  $L_p$  convergence. Stochastic processes: definition, stationarity, sample path continuity. Examples: random walk, Markov chains, Gaussian processes, Poisson processes, Martingales. Construction and basic properties of Brownian motion. Prerequisite: STATS 116 or MATH 151 or equivalent. Recommended: MATH 115 or equivalent.  
Same as: MATH 136.

**STATS 221. Introduction to Mathematical Finance. 3-4 Units.**

Interest rate and discounted value. Financial derivatives, hedging, and risk management. Stochastic models of financial markets, introduction to Ito calculus and stochastic differential equations. Black-Scholes pricing of European options. Optimal stopping and American options. Prerequisites: MATH 53, STATS 116, or equivalents.

**STATS 222. Statistical Methods for Longitudinal Data. 2-3 Units.**

Research designs and statistical procedures for time-ordered (repeated-measures) data. The analysis of longitudinal panel data is central to empirical research on learning and development. Topics: measurement of change, growth curve models, analysis of durations including survival analysis, experimental and non-experimental group comparisons, reciprocal effects, stability. See <http://www-stat.stanford.edu/~rag/stat222/>.

Prerequisite: intermediate statistical methods.

Same as: EDUC 351A.

**STATS 231. Statistical Learning Theory. 3 Units.**

(Same as STATS 231) For a given learning problem, what methods should be employed, and under what assumptions can we expect them to work?

This course focuses on developing algorithms for various scenarios (e.g., high-dimensional, online, unsupervised) as well as theoretical analyses of these algorithms. Topics include kernel methods, generalization bounds, spectral methods, online learning, and nonparametric Bayes. Prerequisites: A solid background in linear algebra and probability theory. Basic exposure to statistics and machine learning (STAT 315A or CS 229), and graphical models (CS 228) is helpful but not essential.

Same as: CS 229T.

**STATS 237. Theory of Investment Portfolios and Derivative Securities. 3 Units.**

Asset returns and their volatilities. Markowitz's portfolio theory, capital asset pricing model, multifactor pricing models. Measures of market risk. Financial derivatives and hedging. Black-Scholes pricing of European options. Valuation of American options. Implied volatility and the Greeks. Prerequisite: STATS 116 or equivalent.

**STATS 238. Policy & Strategy Issues in Financial Engineering. 3 Units.**

(Same as LAW 564). This is a non-technical course that will focus on a series of case studies each designed to illuminate a serious public policy issue raised by the evolution of modern financial engineering. These will include discussions of Freddie Mac, Fannie Mae, sub-prime and Alt-A mortgages and the flaws of AAA CDOs; the spectacular losses by Orange County and the Florida Local Government Investment Pool and the challenges posed by unregulated investment pools; how credit default swaps are likely to change with central clearing using the PIIGS (Portugal/ Ireland/ Iceland/ Greece/ Spain), the monolines, AIG, Lehman and MF Global as examples; views of rogue trading using the similarities and disparities of Askin, Madoff, Barings, Soc Gen and UBS for discussion; and Risk Management 101 : the why/ how/ where/ when firms went wrong plus what to keep and what to throw out in the next phase of risk programs among other case studies. The subject matter, by necessity, is multi-disciplinary and so the course is particularly suited to those students having an interest in public policy and the evolution of modern financial markets. This includes students from the law or business schools, or the public policy, economics, EES, political science, or financial math and engineering programs among others. Several themes will tie the case studies, reading and discussions together: -Is this an example of an innovation that got too far ahead of existing operations, risk management, legal, accounting, regulatory or supervisory oversight? -How might temporary infrastructure be implemented without stifling innovation or growth? -How might losses be avoided by requiring permanent infrastructure sooner? Will Dodd-Frank, Basel III, etc., help to prevent such problems? What are the potential unintended consequences? -Is this an example of improperly viewing exposures that are subject to uncertainty or incorrectly modeling risk or both? Guest speakers will be invited to share their experiences. This course will aim to provide a practitioner(s) view of financial engineering over the past 3 ½ decades as well as a broad understanding of what went right and what went wrong plus cutting edge views of the future of financial engineering. Prerequisite: STATS 237 or equivalent and consent of instructor.

**STATS 239A. Workshop in Quantitative Finance. 1 Unitss.**

Topics of current interest.

**STATS 240. Statistical Methods in Finance. 3-4 Units.**

(SCPD students register for 240P.) Regression analysis and applications to investment models. Principal components and multivariate analysis. Likelihood inference and Bayesian methods. Financial time series. Estimation and modeling of volatilities. Statistical methods for portfolio management. Prerequisite: STATS 200 or equivalent.

**STATS 240P. Statistical Methods in Finance. 3 Units.**

For SCPD students; see 240.

**STATS 241. Financial Modeling Methodology and Applications. 3-4 Units.**

(SCPD students register for 241P.) Substantive and empirical modeling approaches in options and interest rate markets. Nonlinear least squares and nonparametric regression. Multivariate time series modeling and forecasting. Applications of canonical correlation analysis and cointegration. Statistical trading strategies and their evaluation. Prerequisite: 240 or equivalent.

**STATS 241P. Financial Modeling Methodology and Applications. 3 Units.**

For SCPD students; see 241.

**STATS 242. Algorithmic Trading and Quantitative Strategies. 3 Units.**

An introduction to financial trading strategies based on methods of statistical arbitrage that can be automated. Methodologies related to high frequency data and stylized facts on asset returns; models of order book dynamics and order placement, dynamic trade planning with feedback; momentum strategies, pairs trading. Emphasis on developing and implementing models that reflect the market and behavioral patterns. Prerequisite: STATS 240 or equivalent.

**STATS 243. Statistical Models and Methods for Risk Management and Surveillance. 3-4 Units.**

(SCPD students register for 243P.) Market risk and credit risk, credit markets. Back testing, stress testing and Monte Carlo methods. Logistic regression, generalized linear models and generalized mixed models. Loan prepayment and default as competing risks. Survival and hazard functions, correlated default intensities, frailty and contagion. Risk surveillance, early warning and adaptive control methodologies. Banking and bank regulation, asset and liability management. Prerequisite: STATS 240 or equivalent.

**STATS 243P. Statistical Models and Methods for Risk Management and Surveillance. 3 Units.**

For SCPD students; see 243.

**STATS 250. Mathematical Finance. 3 Units.**

Stochastic models of financial markets. Forward and futures contracts. European options and equivalent martingale measures. Hedging strategies and management of risk. Term structure models and interest rate derivatives. Optimal stopping and American options. Corequisites: MATH 236 and 227 or equivalent.

Same as: MATH 238.

**STATS 253. Spatial Statistics. 3 Units.**

Statistical descriptions of spatial variability, spatial random functions, grid models, spatial partitions, spatial sampling, linear and nonlinear interpolation and smoothing with error estimation, Bayes methods and pattern simulation from posterior distributions, multivariate spatial statistics, spatial classification, nonstationary spatial statistics, space-time statistics and estimation of time trends from monitoring data, spatial point patterns, models of attraction and repulsion. Applications to earth and environmental sciences, meteorology, astronomy, remote-sensing, ecology, materials.

Same as: STATS 352.

**STATS 260A. Workshop in Biostatistics. 1-2 Units.**

Applications of statistical techniques to current problems in medical science. To receive credit for one or two units, a student must attend every workshop. To receive two units, in addition to attending every workshop, the student is required to write an acceptable one page summary of two of the workshops, with choices made by the student.  
Same as: HRP 260A.

**STATS 260B. Workshop in Biostatistics. 1-2 Units.**

Applications of statistical techniques to current problems in medical science. To receive credit for one or two units, a student must attend every workshop. To receive two units, in addition to attending every workshop, the student is required to write an acceptable one page summary of two of the workshops, with choices made by the student.  
Same as: HRP 260B.

**STATS 260C. Workshop in Biostatistics. 1-2 Units.**

Applications of statistical techniques to current problems in medical science. To receive credit for one or two units, a student must attend every workshop. To receive two units, in addition to attending every workshop, the student is required to write an acceptable one page summary of two of the workshops, with choices made by the student.  
Same as: HRP 260C.

**STATS 261. Intermediate Biostatistics: Analysis of Discrete Data. 3 Units.**

Methods for analyzing data from case-control and cross-sectional studies: the 2x2 table, chi-square test, Fisher's exact test, odds ratios, Mantel-Haenzel methods, stratification, tests for matched data, logistic regression, conditional logistic regression. Emphasis is on data analysis in SAS. Special topics: cross-fold validation and bootstrap inference.  
Same as: BIOMEDIN 233, HRP 261.

**STATS 262. Intermediate Biostatistics: Regression, Prediction, Survival Analysis. 3 Units.**

Methods for analyzing longitudinal data. Topics include Kaplan-Meier methods, Cox regression, hazard ratios, time-dependent variables, longitudinal data structures, profile plots, missing data, modeling change, MANOVA, repeated-measures ANOVA, GEE, and mixed models. Emphasis is on practical applications. Prerequisites: basic ANOVA and linear regression.  
Same as: HRP 262.

**STATS 267. Probability: Ten Great Ideas About Chance. 4 Units.**

Foundational approaches to thinking about chance in matters such as gambling, the law, and everyday affairs. Topics include: chance and decisions; the mathematics of chance; frequencies, symmetry, and chance; Bayes great idea; chance and psychology; misuses of chance; and harnessing chance. Emphasis is on the philosophical underpinnings and problems. Prerequisite: exposure to probability or a first course in statistics at the level of STATS 60 or 116.  
Same as: PHIL 166, PHIL 266, STATS 167.

**STATS 270. A Course in Bayesian Statistics. 3 Units.**

Advanced-level Bayesian statistics. Topics: Discussion of the mathematical and theoretical foundation for Bayesian inferential procedures. Examination of the construction of priors and the asymptotic properties of likelihoods and posterior densities. Discussion including but not limited to the case of finite dimensional parameter space. Prerequisite: familiarity with standard probability and multivariate distribution theory.  
Same as: STATS 370.

**STATS 290. Paradigms for Computing with Data. 3 Units.**

Advanced programming and computing techniques to support projects in data analysis and related research. For Statistics graduate students and others whose research involves data analysis and development of associated computational software. Prerequisites: Programming experience including familiarity with R; computing at least at the level of CS 106; statistics at the level of STATS 110 or 141.

**STATS 297. Practical Training. 1-3 Units.**

For students in the M.S. program in Financial Mathematics only. Students obtain employment, with the approval and supervision of a faculty member, in a relevant industrial or research activity to enhance their professional experience. Students must submit a written final report upon completion of the internship in order to receive credit. May be repeated for credit once. Prerequisite: consent of adviser.

**STATS 298. Industrial Research for Statisticians. 1-3 Units.**

Masters-level research as in 299, but with the approval and supervision of a faculty adviser, it must be conducted for an off-campus employer. Students must submit a written final report upon completion of the internship in order to receive credit. Prerequisite: enrollment in Statistics M.S. or Ph.D. program, prior to candidacy.

**STATS 299. Independent Study. 1-10 Units.**

For Statistics M.S. students only. Reading or research program under the supervision of a Statistics faculty member. May be repeated for credit.

**STATS 300. Advanced Topics in Statistics. 2-3 Units.**

May be repeated for credit.

**STATS 300A. Theory of Statistics. 2-3 Units.**

Elementary decision theory; loss and risk functions, Bayes estimation; UMVU estimator, minimax estimators, shrinkage estimators. Hypothesis testing and confidence intervals: Neyman-Pearson theory; UMP tests and uniformly most accurate confidence intervals; use of unbiasedness and invariance to eliminate nuisance parameters. Large sample theory: basic convergence concepts; robustness; efficiency; contiguity, locally asymptotically normal experiments; convolution theorem; asymptotically UMP and maximin tests. Asymptotic theory of likelihood ratio and score tests. Rank permutation and randomization tests; jackknife, bootstrap, subsampling and other resampling methods. Further topics: sequential analysis, optimal experimental design, empirical processes with applications to statistics, Edgeworth expansions, density estimation, time series.

**STATS 300B. Theory of Statistics. 2-4 Units.**

Elementary decision theory; loss and risk functions, Bayes estimation; UMVU estimator, minimax estimators, shrinkage estimators. Hypothesis testing and confidence intervals: Neyman-Pearson theory; UMP tests and uniformly most accurate confidence intervals; use of unbiasedness and invariance to eliminate nuisance parameters. Large sample theory: basic convergence concepts; robustness; efficiency; contiguity, locally asymptotically normal experiments; convolution theorem; asymptotically UMP and maximin tests. Asymptotic theory of likelihood ratio and score tests. Rank permutation and randomization tests; jackknife, bootstrap, subsampling and other resampling methods. Further topics: sequential analysis, optimal experimental design, empirical processes with applications to statistics, Edgeworth expansions, density estimation, time series.

**STATS 300C. Theory of Statistics. 2-4 Units.**

Decision theory formulation of statistical problems. Minimax, admissible procedures. Complete class theorems ("all" minimax or admissible procedures are "Bayes"), Bayes procedures, conjugate priors, hierarchical models. Bayesian non parametrics: diaichlet, tail free, polya trees, bayesian sieves. Inconsistency of bayes rules.

**STATS 302. Qualifying Exams Workshop. 3 Units.**

Prepares Statistics Ph.D. students for the qualifying exams by reviewing relevant course topics and problem solving strategies.

**STATS 303. PhD First Year Student Workshop. 1 Unitss.**

For Statistics First Year PhD students only. Discussion of relevant topics in first year student courses, consultation with PhD advisor.

**STATS 305. Introduction to Statistical Modeling. 2-4 Units.**

Review of univariate regression. Multiple regression. Geometry, subspaces, orthogonality, projections, normal equations, rank deficiency, estimable functions and Gauss-Markov theorem. Computation via QR decomposition, Gram-Schmidt orthogonalization and the SVD. Interpreting coefficients, collinearity, graphical displays. Fits and the Hat matrix, leverage & influence, diagnostics, weighted least squares and resistance. Model selection, Cp/Aic and crossvalidation, stepwise, lasso. Basis expansions, splines. Multivariate normal distribution theory. ANOVA: Sources of measurements, fixed and random effects, randomization. Emphasis on problem sets involving substantive computations with data sets. Prerequisites: consent of instructor, 116, 200, applied statistics course, CS 106A, MATH 114.

**STATS 306A. Methods for Applied Statistics. 2-4 Units.**

Regression modeling extended to categorical data. Logistic regression. Loglinear models. Generalized linear models. Discriminant analysis. Categorical data models from information retrieval and Internet modeling. Prerequisite: 305 or equivalent.

**STATS 306B. Methods for Applied Statistics: Unsupervised Learning. 2-3 Units.**

Unsupervised learning techniques in statistics, machine learning, and data mining.

**STATS 310A. Theory of Probability. 2-4 Units.**

Mathematical tools: sigma algebras, measure theory, connections between coin tossing and Lebesgue measure, basic convergence theorems. Probability: independence, Borel-Cantelli lemmas, almost sure and  $L_p$  convergence, weak and strong laws of large numbers. Large deviations. Weak convergence; central limit theorems; Poisson convergence; Stein's method. Prerequisites: 116, MATH 171. Same as: MATH 230A.

**STATS 310B. Theory of Probability. 2-3 Units.**

Conditional expectations, discrete time martingales, stopping times, uniform integrability, applications to 0-1 laws, Radon-Nikodym Theorem, ruin problems, etc. Other topics as time allows selected from (i) local limit theorems, (ii) renewal theory, (iii) discrete time Markov chains, (iv) random walk theory, (v) ergodic theory. Prerequisite: 310A or MATH 230A. Same as: MATH 230B.

**STATS 310C. Theory of Probability. 2-4 Units.**

Continuous time stochastic processes: martingales, Brownian motion, stationary independent increments, Markov jump processes and Gaussian processes. Invariance principle, random walks, LIL and functional CLT. Markov and strong Markov property. Infinitely divisible laws. Some ergodic theory. Prerequisite: 310B or MATH 230B. Same as: MATH 230C.

**STATS 314. Advanced Statistical Methods. 2-3 Units.**

Topic this year is multiple hypothesis testing. The demand for new methodology for the simultaneous testing of many hypotheses as driven by modern applications in genomics, imaging, astronomy, and finance. High dimensionality: how tests of many hypotheses may be considered simultaneously. Classical techniques, and recent developments. Stepwise methods, generalized error rates such as the false discovery rate, and the role of resampling. May be repeated for credit.

**STATS 315A. Modern Applied Statistics: Learning. 2-3 Units.**

Overview of supervised learning. Linear regression and related methods. Model selection, least angle regression and the lasso, stepwise methods. Classification. Linear discriminant analysis, logistic regression, and support vector machines (SVMs). Basis expansions, splines and regularization. Kernel methods. Generalized additive models. Kernel smoothing. Gaussian mixtures and the EM algorithm. Model assessment and selection: crossvalidation and the bootstrap. Pathwise coordinate descent. Sparse graphical models. Prerequisites: STATS 305, 306A,B or consent of instructor.

**STATS 315B. Modern Applied Statistics: Data Mining. 2-3 Units.**

Two-part sequence. New techniques for predictive and descriptive learning using ideas that bridge gaps among statistics, computer science, and artificial intelligence. Emphasis is on statistical aspects of their application and integration with more standard statistical methodology. Predictive learning refers to estimating models from data with the goal of predicting future outcomes, in particular, regression and classification models. Descriptive learning is used to discover general patterns and relationships in data without a predictive goal, viewed from a statistical perspective as computer automated exploratory analysis of large complex data sets.

**STATS 316. Stochastic Processes on Graphs. 1-3 Units.**

Local weak convergence, Gibbs measures on trees, cavity method, and replica symmetry breaking. Examples include random k-satisfiability, the assignment problem, spin glasses, and neural networks. Prerequisite: 310A or equivalent.

**STATS 317. Stochastic Processes. 3 Units.**

Semimartingales, stochastic integration, Ito's formula, Girsanov's theorem. Gaussian and related processes. Stationary/isotropic processes. Integral geometry and geometric probability. Maxima of random fields and applications to spatial statistics and imaging.

**STATS 318. Modern Markov Chains. 3 Units.**

Tools for understanding Markov chains as they arise in applications. Random walk on graphs, reversible Markov chains, Metropolis algorithm, Gibbs sampler, hybrid Monte Carlo, auxiliary variables, hit and run, Swedson-Wong algorithms, geometric theory, Poincare-Nash-Cheger-Log-Sobolov inequalities. Comparison techniques, coupling, stationary times, Harris recurrence, central limit theorems, and large deviations.

**STATS 319. Literature of Statistics. 1-3 Units.**

Literature study of topics in statistics and probability culminating in oral and written reports. May be repeated for credit.

**STATS 320. Heterogeneous Data with Kernels. 3 Units.**

Mathematical and computational methods necessary to understanding analysis of heterogeneous data using generalized inner products and kernels. For areas that need to integrate data from various sources, biology, environmental and chemical engineering, molecular biology, bioinformatics. Topics: Distances, inner products and duality. Multivariate projections. Complex heterogeneous data structures (networks, trees, categorical as well as multivariate continuous data). Canonical correlation analysis, canonical correspondence analysis. Kernel methods in Statistics. Representer theorem. Kernels on graphs. Kernel versions of standard statistical procedures. Data cubes and tensor methods.

**STATS 321. Modern Applied Statistics: Transposable Data. 2-3 Units.**

Topics: clustering, biclustering, and spectral clustering. Data analysis using the singular value decomposition, nonnegative decomposition, and generalizations. Plaid model, aspect model, and additive clustering. Correspondence analysis, Rasch model, and independent component analysis. Page rank, hubs, and authorities. Probabilistic latent semantic indexing. Recommender systems. Applications to genomics and information retrieval. Prerequisites: 315A,B, 305/306A,B, or consent of instructor.

**STATS 322. Function Estimation in White Noise. 3 Units.**

Gaussian white noise model sequence space form. Hyperrectangles, quadratic convexity, and Pinsker's theorem. Minimax estimation on  $L_p$  balls and Besov spaces. Role of wavelets and unconditional bases. Linear and threshold estimators. Oracle inequalities. Optimal recovery and universal thresholding. Stein's unbiased risk estimator and threshold choice. Complexity penalized model selection. Connecting fast wavelet algorithms and theory. Beyond orthogonal bases.

**STATS 324. Multivariate Analysis. 2-3 Units.**

Classic multivariate statistics: properties of the multivariate normal distribution, determinants, volumes, projections, matrix square roots, the singular value decomposition; Wishart distributions, Hotelling's T-square; principal components, canonical correlations, Fisher's discriminant, the Cauchy projection formula.

**STATS 325. Multivariate Analysis and Random Matrices in Statistics. 2-3 Units.**

Topics on Multivariate Analysis and Random Matrices in Statistics (full description TBA).

**STATS 329. Large-Scale Simultaneous Inference. 1-3 Units.**

Estimation, testing, and prediction for microarray-like data. Modern scientific technologies, typified by microarrays and imaging devices, produce inference problems with thousands of parallel cases to consider simultaneously. Topics: empirical Bayes techniques, James-Stein estimation, large-scale simultaneous testing, false discovery rates, local fdr, proper choice of null hypothesis (theoretical, permutation, empirical nulls), power, effects of correlation on tests and estimation accuracy, prediction methods, related sets of cases ("enrichment"), effect size estimation. Theory and methods illustrated on a variety of large-scale data sets.

**STATS 330. An Introduction to Compressed Sensing. 3 Units.**

Compressed sensing is a new data acquisition theory asserting that one can design nonadaptive sampling techniques that condense the information in a compressible signal into a small amount of data. This revelation may change the way engineers think about signal acquisition. Course covers fundamental theoretical ideas, numerical methods in large-scale convex optimization, hardware implementations, connections with statistical estimation in high dimensions, and extensions such as recovery of data matrices from few entries (famous Netflix Prize).

Same as: CME 362.

**STATS 338. Topics in Biostatistics. 3 Units.**

Data monitoring and interim analysis of clinical trials. Design of Phase I, II, III trials. Survival analysis. Longitudinal data analysis.

**STATS 341. Applied Multivariate Statistics. 3 Units.**

Theory, computational aspects, and practice of a variety of important multivariate statistical tools for data analysis. Topics include classical multivariate Gaussian and undirected graphical models, graphical displays. PCA, SVD and generalizations including canonical correlation analysis, linear discriminant analysis, correspondence analysis, with focus on recent variants. Factor analysis and independent component analysis. Multidimensional scaling and its variants (e.g. Isomap, spectral clustering). Students are expected to program in R. Prerequisite: STATS 305 or equivalent.

**STATS 345. Computational Algorithms for Statistical Genetics. 2-3 Units.**

Computational algorithms for human genetics research. Topics include: permutation, bootstrap, expectation maximization, hidden Markov model, and Markov chain Monte Carlo. Rationales and techniques illustrated with existing implementations commonly used in population genetics research, disease association studies, and genomics analysis. Prerequisite: GENE 244 or consent of instructor.

Same as: GENE 245, STATS 166.

**STATS 351A. An Introduction to Random Matrix Theory. 3 Units.**

Patterns in the eigenvalue distribution of typical large matrices, which also show up in physics (energy distribution in scattering experiments), combinatorics (length of longest increasing subsequence), first passage percolation and number theory (zeros of the zeta function). Classical compact ensembles (random orthogonal matrices). The tools of determinantal point processes.

Same as: MATH 231A.

**STATS 352. Spatial Statistics. 3 Units.**

Statistical descriptions of spatial variability, spatial random functions, grid models, spatial partitions, spatial sampling, linear and nonlinear interpolation and smoothing with error estimation, Bayes methods and pattern simulation from posterior distributions, multivariate spatial statistics, spatial classification, nonstationary spatial statistics, space-time statistics and estimation of time trends from monitoring data, spatial point patterns, models of attraction and repulsion. Applications to earth and environmental sciences, meteorology, astronomy, remote-sensing, ecology, materials.

Same as: STATS 253.

**STATS 355. Observational Studies. 2-3 Units.**

This course will cover statistical methods for the design and analysis of observational studies. Topics for the course will include the potential outcomes framework for causal inference; randomized experiments; methods for controlling for observed confounders in observational studies; sensitivity analysis for hidden bias; instrumental variables; tests of hidden bias; coherence; and design of observational studies.

Same as: HRP 255.

**STATS 362. Monte Carlo. 2-3 Units.**

Random numbers and vectors: inversion, acceptance-rejection, copulas. Variance reduction: antithetics, stratification, control variates, importance sampling. MCMC: Markov chains, detailed balance, Metropolis-Hastings, random walk Metropolis, independence sampler, Gibbs sampling, slice sampler, hybrids of Gibbs and Metropolis, tempering. Sequential Monte Carlo. Quasi-Monte Carlo. Randomized quasi-Monte Carlo. Examples, problems and motivation from Bayesian statistics, machine learning, computational finance and graphics.

**STATS 366. Modern Statistics for Modern Biology. 3 Units.**

Application based course in nonparametric statistics. Modern toolbox of visualization and statistical methods for the analysis of data, examples drawn from immunology, microbiology, cancer research and ecology. Methods covered include multivariate methods (PCA and extensions), sparse representations (trees, networks, contingency tables) as well as nonparametric testing (Bootstrap, permutation and Monte Carlo methods). Hands on, use R and cover many Bioconductor packages. Prerequisite: Minimal familiarity with computers. Instructor consent.

Same as: BIOS 221.

**STATS 370. A Course in Bayesian Statistics. 3 Units.**

Advanced-level Bayesian statistics. Topics: Discussion of the mathematical and theoretical foundation for Bayesian inferential procedures. Examination of the construction of priors and the asymptotic properties of likelihoods and posterior densities. Discussion including but not limited to the case of finite dimensional parameter space. Prerequisite: familiarity with standard probability and multivariate distribution theory.

Same as: STATS 270.

**STATS 374. Large Deviations Theory. 3 Units.**

Combinatorial estimates and the method of types. Large deviation probabilities for partial sums and for empirical distributions, Cramer's and Sanov's theorems and their Markov extensions. Applications in statistics, information theory, and statistical mechanics. Prerequisite: MATH 230A or STATS 310.

Same as: MATH 234.

**STATS 375. Inference in Graphical Models. 3 Units.**

Graphical models as a unifying framework for describing the statistical relationships between large sets of variables; computing the marginal distribution of one or a few such variables. Focus is on sparse graphical structures, low-complexity algorithms, and their analysis. Topics include: variational inference; message passing algorithms; belief propagation; generalized belief propagation; survey propagation. Analysis techniques: correlation decay; distributional recursions. Applications from engineering, computer science, and statistics. Prerequisite: EE 278, STATS 116, or CS 228. Recommended: EE 376A or STATS 217.

**STATS 376A. Information Theory. 3 Units.**

The fundamental ideas of information theory. Entropy and intrinsic randomness. Data compression to the entropy limit. Huffman coding. Arithmetic coding. Channel capacity, the communication limit. Gaussian channels. Kolmogorov complexity. Asymptotic equipartition property. Information theory and Kelly gambling. Applications to communication and data compression. Prerequisite: EE178/278A or STATS 116, or equivalent. Same as: EE 376A.

**STATS 390. Consulting Workshop. 1-3 Units.**

Skills required of practicing statistical consultants, including exposure to statistical applications. Students participate as consultants in the department's drop-in consulting service, analyze client data, and prepare formal written reports. Seminar provides supervised experience in short term consulting. May be repeated for credit. Prerequisites: course work in applied statistics or data analysis, and consent of instructor.

**STATS 396. Research Workshop in Computational Biology. 1-2 Units.**

Applications of Computational Statistics and Data Mining to Biological Data. Attendance mandatory. Instructor approval required.

**STATS 397. PhD Oral Exam Workshop. 1 Unitss.**

For Statistics PhD students defending their dissertation.

**STATS 398. Industrial Research for Statisticians. 1-3 Units.**

Doctoral research as in 298, but must be conducted for an off-campus employer. Final report required. May be repeated for credit. Prerequisite: Statistics Ph.D. candidate.

**STATS 399. Research. 1-10 Units.**

Research work as distinguished from independent study of nonresearch character listed in 199. May be repeated for credit.

**STATS 801. TGR Project. 0 Unit.****STATS 802. TGR Dissertation. 0 Unit.**

## Stem Cell Biology and Regenerative Medicine Courses

**STEMREM 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**STEMREM 200. Stem Cell Intensive. 1 Unitss.**

Open to first year Stem Cell Biology and Regenerative Medicine graduate students or consent of Instructor. Hands-on, five-day immersion to learn basic methods of tissue culture, mouse embryo fibroblast (MEF) preparation, embryonic stem and induced pluripotent stem (ES/iPS) cell culture, differentiation, DNA isolation, polymerase chain reaction (PCR), sequencing, and basic microscopy.

**STEMREM 201A. Stem Cells and Human Development: From Embryo to Cell Lineage Determination. 2 Units.**

Prerequisite STEMREM 200 or consent of instructor. For graduate and medical students. Offers didactic lectures focused on human developmental biology, derivation of pluripotent stem cells, cell sorting, genomics, bioinformatics, imaging and other related topics. Provides the educational foundation and social group building within each first-year class of STEMREM graduate students.

**STEMREM 201B. Stem Cells and Human Development Laboratory. 3 Units.**

Limited enrollment restricted to first year majors. Lab fee may apply. Focus is on human development from embryo to cell lineage determination. Emphasis is on human developmental biology, derivation of pluripotent stem cells, cell sorting, genomics, bioinformatics, imaging and other related topics. Comprehensive laboratory-based instruction focused on human developmental biology, derivation of pluripotent stem cells, cell sorting, genomics, bioinformatics, imaging and other related topics. Provides hands-on skills development within each first-year class of STEMREM graduate students. Must be taken concurrently with STEMREM 201A.

**STEMREM 202. Stem Cells and Translational Medicine. 5 Units.**

For graduate and medical students. Focus is on fundamentals of stem cell biology and regenerative Medicine. Topics include exploration of the well-studied system of hematopoiesis, molecular pathways of pluripotency and tissue-specific stem cells and ends with coverage of aging as related to stem cell dynamics. Features include lectures on the basic science of each topic, followed by clinical applications in order to show the mechanisms and methods to translate findings to therapeutic applications, culminated with construction of a research proposal or business plan in an area of interest, to be further explored in STEMREM 203.

**STEMREM 203. Stem Cells Immersion: Applications in Medicine, Business and Law. 3 Units.**

For graduate and medical students. Provides the clinical, pharmaceutical, biotechnology or business immersion necessary to allow insight into the world of medicine from multiple vantage points, setting the stage for students to translate research successfully beyond the academic sphere and gain the necessary knowledge to move their research proposal/business plan forward (from STEMREM 202). Prerequisites: STEMREM 201A and STEMREM 202.

**STEMREM 250. Regenerative Medicine Seminar Series. 1 Unitss.**

For graduate, medical and undergraduate students. A forum for Stanford researchers to meet, hear about what is going on in Stem Cell Biology and Regenerative Medicine at Stanford, and spark collaborations. Topics include all areas of regenerative medicine, broadly defined, ranging from fundamental biological principles and basic science advances to novel applications in biotechnology, stem cell biology, and human disease.

**STEMREM 280. Stem Cell Biology and Regenerative Medicine Journal Club. 2 Units.**

For graduate, medical and undergraduate students. Review of current literature in both basic and translational medicine as it relates to stem cell biology and/or regenerative medicine in a seminar format consisting of both faculty and student presentations. Includes discussions led by faculty experts in the area covered for that particular session. Topics may range widely, depending on the available literature and students' interests. Students are expected to review the chosen article before class presentations and participate in discussion. Discussion includes methodology and statistical analysis of each study and its relevance to stem cell biology and/or regenerative medicine.

**STEMREM 299. Directed Reading in Stem Cell Biology and Regenerative Medicine. 1-18 Units.**

Prerequisite: consent of instructor.



**STEMREM 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**STEMREM 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**STEMREM 801. TGR Project. 0 Unit.****STEMREM 802. TGR Dissertation. 0 Unit.**

## Strategic Management Courses

**STRAMGT 110Q. Making Sense of Strategy. 3 Units.**

Get the strategy right, and the chance for success is great. Nowhere is this more evident than in today's world of major challenges. Strategy is at the heart of problem solving and achieving objectives, yet few people can define strategy, much less understand how to conceptualize, design, and execute effective strategies that yield the best outcomes. This course will meet once a week to focus on interesting and engaging case studies, each of which illustrates a key ingredient of strategy. Some are well-known historical events, while others are less obvious, but all have a strategic lesson to share. They are quite diverse, from the planning of a high-risk rescue in the Colorado Rockies, to a product crisis in a Fortune 50 company, to a little-known failed military mission of WWII, to a commercial airline disaster. The ability to think through challenging and varied scenarios is both instructive and mind-stretching. There will be some pre-reading on each case study and there may be a field trip for students to put their lessons into practice. The course is designed to be highly interactive; all to enable students to unravel the mystery and power of strategic thinking. Students will also have the opportunity to select and analyze a case reflecting interests of their own. This course can help students not only prepare for a career in a range of fields, but also as they meet the challenges of their current coursework. Problem-solving skills are central in every walk of life; this seminar can help students build a stronger foundation for sound decision-making.

**STRAMGT 207. Strategic Leadership. 4 Units.**

This course examines fundamental issues of general management and leadership within an organization. You will learn about setting an organization's strategic direction, aligning structure to implement strategy, and leading individuals within the firm. You will master concepts, frameworks, and tools to assess an industry and a firm's competitive environment, and to craft alternatives. You will study the interplay among formal structure, informal networks, and culture in shaping organizational performance. By integrating leadership theory, the lessons of practical application, and your own experience, you will develop skills and capabilities essential to leading others. And you'll gain a better understanding of your own leadership preferences, strengths, and weaknesses.

**STRAMGT 209. Leadership Laboratory. 1 Unitss.**

Having the opportunity to choose one's colleagues is rare in corporate life - we usually inherit them when we join an organization. More often than not, when we assume a management position in an organization, we inherit our subordinates as well. - How do we maximize the performance of the teams we become part of? - What interpersonal skills give us influence? - Which interpersonal strengths can propel us to our next promotion? - What development areas might prevent our ascension to the executive suite? In the Leadership Labs, we focus on these questions. However, rather than tackle cases where you can distance yourself in comfortable analytical discussions, we throw you into experiential exercises, testing your ability to build effective relationships, motivate others, and influence outcomes. The Leadership Labs are designed for deep self-reflection about what behaviors you choose to use, the consequences of those behaviors, and given choices, how you might be even more productive. In total, there are ten Leadership Lab Sessions--six, three-hour Interpersonal Skills Labs, and four, 90-minute Managerial Skills Labs. The Interpersonal Skills Labs sessions are comprised of short lectures and increasingly challenging simulations and role-plays facilitated by the Arbuckle Leadership Fellows. The Leadership Fellows are second-year GSB students who have participated in a rigorous training program that prepares them to facilitate the exercises and cases used in the Interpersonal Skills Labs. In the 90-minute Managerial Skills Labs we examine several common managerial challenges faced by executives. Together with Faculty, students explore these topics using four case examples, each asking students to evaluate a series of situations, develop alternatives for their resolution, and ultimately recommend and implement a course of action from the point of view of the company's owner/manager. We have selected small to mid-sized businesses as the context for these discussions in order to highlight the impact that key decisions and their implementation can have on the broader organization. Class preparation should include not only analysis and conclusions, but also specific recommendations on implementation. Students should come to class prepared to role play important conversations between management and other key individuals.

**STRAMGT 210. Managerial Skills. 1 Unitss.**

In the Managerial Skills Labs we examine several common managerial challenges faced by executives. Together with Faculty, students explore these topics using four case examples, each asking students to evaluate a series of situations, develop alternatives for their resolution, and ultimately recommend and implement a course of action from the point of view of the company's owner/manager. We have selected small to mid-sized businesses as the context for these discussions in order to highlight the impact that key decisions and their implementation can have on the broader organization. Class preparation should include not only analysis and conclusions, but also specific recommendations on implementation. Students should come to class prepared to role play important conversations between management and other key individuals.

**STRAMGT 257. Sloan: Strategic Leadership. 2 Units.**

This 9-session course focuses on situations where senior executives must execute strategic action fast because of rapidly changing environmental conditions. The focus of the course is on the approaches successful leaders use to recognize the need for strategic change early, determine which particular approach is likely to be successful, and then implement the change to its conclusion. Leaders in these situations often confront the problem that many people in the organization do not yet recognize the need for change and resist making the personal adjustments required. The course provides these leaders with tools to initiate and execute the changes required to address key strategic challenges: how to capitalize better on the position an organization occupies in its environment, how to reposition the organization relative to its competitors and how to develop and implement a plan to accomplish the required changes successfully. GSB professor Robert A. Burgelman, an active field researcher of strategic change in complex organizations, and Dr. Robert Pearl, CEO of The Permanente Medical Group, Kaiser Permanente, who has taken one of the largest healthcare delivery organizations in the world through a major strategic change journey, jointly teach this course.

**STRAMGT 259. Sloan: Generative Leadership. 2 Units.**

**Generative Leadership: How to Create Innovative Ideas and Convey Them with Impact** There are three major sections to this course - Design Thinking, The Improvisational Mindset, and High Performance Communication. **Design Thinking Outcome:** Participants learn to employ User Centered Design as promoted by the Stanford d.school. They become adept at Empathizing with the end user, practicing focused Need Finding, Defining the Problem, Ideating, Rapidly Prototyping and Adapting to Feedback. **Experiences:** Participants learn the Design Thinking process through a hands-on, collaborative design challenge, like redesigning the Briefcase for a specific user. **The Improvisational Mindset Outcome:** The participants increase their ability to respond flexibly to novel situations and to generate innovative solutions on a collaborative, creative team. The mindset is cultivated by practicing 5 key principles. Say "Yes, and". Treat Mistakes as Gifts. Inspire your Partner. Dare to be Obvious. Notice the World. **Experiences:** The key principles are taught through a series of immersive theater exercises derived from Johnstone, Spolin, and Ryan. Valuable readings include IMPROV WISDOM, by Patricia Ryan and journal articles on improv and brainstorming. **High Performance Communication Outcome:** The final segment of the class is a chance to apply the principles of User Centered Design and the Improvisational Mindset to design and deliver messages that go beyond just transmitting information - they get results. Participants successfully use a version of the Design Thinking process to rapidly develop content that is tuned to the audience's needs, and that they can deliver in a way that is agile and responsive to real time feedback **Experiences** Generative Leadership culminates in a group presentation designed to influence key stakeholders. To be successful, participants will have to draw on all sections of the course. AS WE SPEAK is our text.

**STRAMGT 279. Sloan: Global Strategic Management. 4 Units.**

This course introduces the basic concepts of strategic management, focusing on their application in a semi-globalized world, where international borders are less significant than in the past but still very important. There are texts that will be required reading, but each class will also feature a case discussion.

**STRAMGT 321. Create a New Venture: From Idea to Launch I. 4 Units.**

This is an integrated lab course in Entrepreneurship designed to teach students the process of creating a new viable venture from idea to launch. It is a dynamic and interactive course organized around projects undertaken by teams of 3 to 4 registered students from the Sloan and MBA programs, together with other graduate students within Stanford who bring expertise of particular relevance to the idea being pursued. This course is designed not only for students with immediate entrepreneurial aspirations, but also for any student considering starting an entrepreneurial venture at some point in his or her career. The course is a two quarter class, with admission to the class by team and idea. In the winter quarter, teams will research, craft, and morph their idea into a viable business concept. In the spring quarter they will further refine their concept and develop a strategy and plan to attract financial, human and other resources. At the end of the spring quarter, teams will present their plan to a panel of experts and potential investors to simulate the funding process. The course is taught by a serial entrepreneur and former CEO who also led and taught the predecessor course S356 "Evaluating Entrepreneurial Opportunities". The new course builds on this experience and encapsulates new and important research and findings as they relate to the process of new venture creation. The teaching method is primarily learning by doing (LBD) through a structured process and supported by relevant lectures. Learning is further enhanced through meetings with the instructor, coaching by experienced mentors and review by peers. Field research as well as prototype product development are integral to the course. Since admittance to S321/S322 is by team and the quality of their idea, team formation takes place during the autumn quarter. Informal student mixers and seminars will be held to facilitate team formation and idea generation. Each team must consist of at least 2 enrolled Sloan students and preferably 1-2 enrolled graduate students from the MBA program or other Schools to bring diversity and depth to the team. The application-selection process is described on the S321/S322 website.

**STRAMGT 322. Create a New Venture: From Idea to Launch II. 4 Units.**

This is an integrated lab course in Entrepreneurship designed to teach students the process of creating a new viable venture from idea to launch. It is a dynamic and interactive course organized around projects undertaken by teams of 3 to 4 registered students from the Sloan and MBA programs, together with other graduate students within Stanford who bring expertise of particular relevance to the idea being pursued. This course is designed not only for students with immediate entrepreneurial aspirations, but also for any student considering starting an entrepreneurial venture at some point in his or her career. The course is a two quarter class, with admission to the class by team and idea. In the winter quarter, teams will research, craft, and morph their idea into a viable business concept. In the spring quarter they will further refine their concept and develop a strategy and plan to attract financial, human and other resources. At the end of the spring quarter, teams will present their plan to a panel of experts and potential investors to simulate the funding process. The course is taught by a serial entrepreneur and former CEO who also led and taught the predecessor course S356 "Evaluating Entrepreneurial Opportunities". The new course builds on this experience and encapsulates new and important research and findings as they relate to the process of new venture creation. The teaching method is primarily learning by doing (LBD) through a structured process and supported by relevant lectures. Learning is further enhanced through meetings with the instructor, coaching by experienced mentors and review by peers. Field research as well as prototype product development are integral to the course. Since admittance to S321/S322 is by team and the quality of their idea, team formation takes place during the autumn quarter. Informal student mixers and seminars will be held to facilitate team formation and idea generation. Each team must consist of at least 2 enrolled Sloan students and preferably 1-2 enrolled graduate students from the MBA program or other Schools to bring diversity and depth to the team. The application-selection process is described on the S321/S322 website.

**STRAMGT 341. Achieving Social Impact. 4 Units.**

Social Enterprise explores a range of leading issues focused on the challenges and opportunity for impact through social entrepreneurship. Students explore a range of organizations from nonprofits, to for-profits, to hybrid forms of organization, and examine issues from a variety of different perspectives, including those of entrepreneur, CEO, funder, and board member. Designed to appeal to students who seek to take on leadership roles in social value creation throughout their careers, whether as leaders in the private, nonprofit, or government sectors, or some combination thereof. Social Enterprise focuses on innovative approaches for creating social value through a variety of social enterprises. Cases explore the unique challenges of creating and leading social enterprises, particularly those that depart from traditional approaches to social value creation. The course modules encompass the following topics: Undertaking the Social Entrepreneurship Process; Mobilizing Economic and Human Resources; Achieving Social Objectives with Commercial Vehicles; Crafting Alliances; Managing Growth; Measuring and Managing Performance; Governing for Excellence. The course utilizes case studies and readings. There will also be frequent direct interaction with dynamic social entrepreneurs who will discuss challenges that they currently face in their organizations and who will share with students their experiential wisdom. For the course paper, students will carry out field-based research in teams, analyzing a significant strategic or operational issue of a social enterprise of their choosing. This field-based applied learning component in lieu of an exam has proven to be a particular enriching for students with high impact on the organizations.

**STRAMGT 348. Creating and Managing Very Early Stage Ventures. 4 Units.**

The early stages of a new venture pose special challenges and issues for founders. For some entrepreneurs, the questions are basic: Should I seek to start a new business? And, How can I find an idea worth pursuing? Later, the question is: How do I evaluate whether my (our) idea is worth pursuing? To answer these questions, it is useful for founders to have an integrated framework for evaluating new business opportunities. In this class we develop such a framework and show how it can usefully compare and contrast new product or service businesses. We also consider the very first steps startups must take. These include how startups can begin to accumulate resources, as well as early legal, organizational, personnel and financial issues that must be handled. The course is largely case-based. It is supplemented with lectures and guests. The target audience is students who are thinking about forming a new venture early in their career. This class is appropriate for first or second year MBAs who have not yet taken S356, as well as other Stanford graduate students.

**STRAMGT 350. Global Value Chain Strategies. 4 Units.**

This course addresses how the increasingly large number of firms that use or provide outsourcing and "offshoring" can create a sustainable competitive advantage. Students who complete the course will have a framework and a set of concepts that can be used to position a firm for strategic advantage in these supply networks. Positioning in and strategic analysis of product markets is covered in a variety of courses and books. A distinguishing feature of this course is that it addresses positioning and strategic analysis for firms operating as part of a network of providers, sellers and buyers... the factor markets. The course takes a general management perspective and provides examples through cases and discussions with visitors. The major theme of the course is that these firms must carefully consider how they position themselves in both the product and factor markets.

**STRAMGT 351. Building and Managing Professional Sales Organizations. 4 Units.**

The focus of this class is on the challenges and key issues associated with the creation and management of a professional sales organization. Our emphasis is developing and managing the selling effort of business-to-business and business-to-consumer capital goods and services. There will be relatively little emphasis on sales technique (i.e., students should not expect a course on "How to be a Better Salesperson"). The course is organized to follow the development of the sales function from strategic inception through to execution and implementation: choosing a go-to-market model (e.g., direct sales, VARs, OEMs, hybrid models); building and structuring the sales organization (e.g., sales learning curve, organizational structure, allocating territories and quotas); and managing the sales force (e.g., hiring/firing, compensation, forecasting, culture). We will address these topics in the context of both early stage ventures and later stage enterprises.

**STRAMGT 353. Entrepreneurship: Formation of New Ventures. 4 Units.**

This course is offered for students who at some time may want to undertake an entrepreneurial career by pursuing opportunities leading to partial or full ownership and control of a business. The course deals with case situations from the point of view of the entrepreneur/manager rather than the passive investor. Many cases involve visitors, since the premise is that opportunity and action have large idiosyncratic components. Students must assess opportunity and action in light of the perceived capabilities of the individuals and the nature of the environments they face. The course is integrative and will allow students to apply many facets of their business school education.

**STRAMGT 354. Entrepreneurship and Venture Capital. 4 Units.**

Many of America's most successful entrepreneurial companies have been substantially influenced by professionally managed venture capital. This relationship is examined from both the entrepreneur's and the venture capitalist's perspective. From the point of view of the entrepreneur, the course considers how significant business opportunities are identified, planned, and built into real companies; how resources are matched with opportunity; and how, within this framework, entrepreneurs seek capital and other assistance from venture capitalists or other sources. From the point of view of the venture capitalist, the course considers how potential entrepreneurial investments are evaluated, valued, structured, and enhanced; how different venture capital strategies are deployed; and how venture capitalists raise and manage their own funds. The course includes a term-long project where students work in teams (4-5 students per team) to write a business plan for a venture of the team's choosing.

**STRAMGT 355. Managing Growing Enterprises. 4 Units.**

This course is offered for students who, in the near term, aspire to the management and full or partial ownership of a new or newly-acquired business. The seminar, which is limited to 40 students, has a strong implementation focus, and deals in some depth with certain selected, generic entrepreneurial issues, viewed from the perspective of the owner/manager. Broad utilization is made of case materials, background readings, visiting experts, and role playing. Throughout the course, emphasis is placed on the application of analytical tools to administrative practice.

**STRAMGT 356. The Startup Garage: Design. 4 Units.**

The Startup Garage is an experiential lab course that focuses on the design, testing and launch of a new venture. Multidisciplinary student teams work through an iterative process of understanding user needs, creating a point of view statement, ideating and prototyping new product and services and their business models, and communicating the user need, product, service and business models to end-users, partners, and investors. In the autumn quarter, teams will: identify and validate a compelling user need and develop very preliminary prototypes for a new product or service and business models. Students form teams, conduct field work and iterate on the combination of business model -- product -- market. Teams will present their first prototypes (business model - product - market) at the end of the quarter to a panel of entrepreneurs, venture capitalists, angel investors and faculty.

**STRAMGT 359. Aligning Start-ups with their Market. 4 Units.**

Most everyone associated with technology start-ups would agree that the most important initial characteristic of a successful endeavor is a compelling vision. The journey from vision to escape velocity is highly dependent on management's ability to translate that vision into a product or service that closely and economically addresses a customer's significant point of pain. Without a tight product market fit, the start-up's offering will not be able to break through the market's gravitational forces which strongly favor existing solutions, resulting in likely failure. With tight product/market fit, it is far more likely the company will achieve repeatable and growing sales success. Conventional wisdom dictates that a start-up launching a new product should focus its energy understanding what the market wants (problem) and then translating that knowledge into an optimal set of product features (solution). This is the ideal strategy if one is attacking a market that already exists. However if the start-up pursues an entirely new market or re-segments an existing market, customers are unlikely to be able to articulate the benefits and features they will need. The approaches required to pursue new or re-segmented markets are radically different from those applied to existing markets. As a result it is not relentless execution and exploitation of a well understood market that will lead to success, but discovery of a new market or segment that is in need of the product as envisioned. If done well, this process of finding the optimal product/market fit has a disproportionate impact on success. Our intention is to create a course that explores the many issues associated with optimizing product/market fit. Two group papers comprise 50% of a student's grade with class participation representing the remainder. STRAMGT 353 is recommended prior to taking this course.

**STRAMGT 365. Strategic Decision Making. 4 Units.**

This compressed course concerns the analysis of strategic decision-making, with an emphasis on the process of "big stakes" analysis in complex corporate settings. The first week is devoted primarily to the tools of this process and to coping with (strategic) unawareness (especially in competitive situations). The second week is devoted primarily to "learning by doing," as we apply the tools developed in the first week to real-life problems. The overall objective of the course is to develop the student's working knowledge of these techniques, so the student can fruitfully apply these techniques on his/her own. The course may be taken as a two-unit compressed course by signing up for STRAMGT 565 and participating in the first week only. Alternately, students may sign up for both weeks, by registering for STRAMGT 365. Students who sign up initially for STRAMGT 565 will be able to decide late in week 1 whether to continue into week 2 (in effect, these students will have the registration changed from 565 to 365). Note that, in the registration process, students who rank STRAMGT 365 will have a greater chance of getting a spot than students ranking STRAMGT 565. (It will not be possible to change in midstream from 365 to 565, i.e., to drop the second week). Students will be expected to do approximately 90 minutes of work outside of class each day both weeks. A group project will be the main work product in the second week. The course will be taught jointly by Carl Spetzler, Chairman, Strategic Decisions Group and Professor Yossi Feinberg.

**STRAMGT 366. The Startup Garage: Testing and Launch. 4 Units.**

This is the second quarter of the two-quarter series. In this quarter, student teams expand the field work they started in the fall quarter. They get out of the building to talk to potential customers, partners, distributors, and investors to test and refine their business model, product/service and market. This quarter the teams will be expected to develop and test a minimally viable product, iterate, and focus on validated lessons on: the market opportunity, user need and behavior, user interactions with the product or service, business unit economics, sale and distribution models, partnerships, value proposition, and funding strategies. Teams will interact with customers, partners, distributors, investors and mentors with the end goal of developing and delivering a funding pitch to a panel of entrepreneurs, venture capitalists, angel investors and faculty.

**STRAMGT 367. Social Entrepreneurship and Social Innovation. 3 Units.**

This course examines individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ "entrepreneurial skills," such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur within or across the nonprofit, government or business sectors, has become increasingly prominent. While virtually all enterprises, commercial and social, generate social value, fundamental to this definition is that the primary focus of social entrepreneurship is to achieve social impact above all else. We will study some of the most promising and the best-proven innovations for improving people's lives. We will also examine mature projects that are now tackling the issue of "scale", moving from local innovations to solutions that create deep systemic changes for larger numbers of economically disadvantaged individuals and communities throughout the world. This year we will focus on what are the constraints and opportunities for creating a social enterprise at scale. The process of "scale" poses tremendous challenges. Even when organizations manage to overcome the many obstacles to growth, and achieve appreciable scale, this approach is seldom sufficient to achieve significant social impact on its own. This year our course will pay particular attention to network approaches which require the mobilization of a vast array of actors and resources, but have the potential to generate rapid and sustained social impact.

**STRAMGT 368. Strategic Management of Nonprofit Organizations and Social Ventures. 4 Units.**

This course seeks to provide a survey of the strategic, governance, and management issues facing a wide range of nonprofit organizations and their executive and board leaders, in the era of venture philanthropy and social entrepreneurship. The students will also be introduced to core managerial issues uniquely defined by this sector such as development/fundraising, investment management, performance management and nonprofit finance. The course also provides an overview of the sector, including its history and economics. Cases involve a range of nonprofits, from smaller, social entrepreneurial to larger, more traditional organizations, including education, social service, environment, health care, religion, NGO's and performing arts. In exploring these issues, this course reinforces the frameworks and concepts of strategic management introduced in the core first year courses. In addition to case discussions, the course employs role plays, study group exercises and many outsider speakers.

**STRAMGT 369. Social Entrepreneurship. 4 Units.**

This course is about the efforts of private citizens to create effective responses to social needs and innovative solutions to social problems. History is full of examples of this kind of activity, though its character continues to evolve. Social entrepreneurs are increasingly blurring the lines between the sectors, using for-profit and hybrid forms of organization to achieve social objectives. This creates new opportunities for applying business skills in the social sector. Despite its prominence and complexity, this combination of private initiative and public purpose is not well understood. The objectives of this course are: (1) to introduce students to the concepts, practices, and challenges of social entrepreneurship in the United States and around the world; (2) to equip students with frameworks and tools that will help them be more effective in their socially entrepreneurial pursuits, and (3) to engage students in a joint learning process as a better understanding of this emerging field is developed by all in this class.

**STRAMGT 371. Strategic Management of Technology and Innovation. 4 Units.**

This course focuses on the strategic management of technology-based innovation in the firm. The purpose is to provide students with concepts, frameworks, and experiences that are useful for taking part in the management of innovation processes in the firm. The course examines how they can be managed effectively. Specific topics include: assessing the innovative capabilities of the firm, managing the Corporate R & D function, managing the interfaces between functional groups in the development function in the firm, understanding and managing technical entrepreneurs, building technology-based distinctive competencies and competitive advantages, technological leadership versus followership in competitive strategy, institutionalizing innovation, attracting and keeping corporate entrepreneurs.

**STRAMGT 373. Strategic Thinking in Action --- in Business and Beyond. 4 Units.**

The seminar's aim is to develop participants' ability to create strategically informed action plans that are imaginative, inspiring and workable in highly dynamic environments. The seminar's pedagogy involves informed debate to evaluate and hone well-researched views by the participants and instructors, as well as the writing and presentation of position papers by small groups of seminar participants on the seminar's focal theme. Andy Grove will continue to participate as co-instructor of the seminar, but at a reduced level. In the course of the seminar discussions, we aim to deepen our understanding of strategic dynamics and transformational change at the societal, industry and organizational levels of analysis. In fall 2010, the focal theme of the seminar will be "The Future Role of Silicon Valley: Prospective Strategic Analyses." Within the overarching theme, we will research four sub-themes. Domain experts for three of the sub-themes have committed to co-leading the related sessions with the instructors (see below). The four sub-themes are: 1. The role of Silicon Valley in the future of the semiconductor industry. George Cogan, Partner at Bain & Company and expert of the semiconductor industry, will co-lead this sub-theme. 2. The role of Silicon Valley in the future of the computer industry. Tien Tzuo, CEO of Zuora Inc. and expert of SaaS and cloud computing, will co-lead this sub-theme. 3. The role of Silicon Valley in the future of the automotive industry. Sven Beiker, Executive Director of the Center for Automotive Research at Stanford - CARS, will co-lead this sub-theme. 4. The role of Silicon Valley in the future of U.S. Employment. Andy Grove will lead this sub-theme. Two seminar sessions will be devoted to each sub-theme. The first session will be led by the instructors. It will involve discussion of reading material and data and focus on refining the key research questions for the sub-theme. The second session (4 weeks later) will be led by the student team carrying out research on that sub-theme. Seminar participants will organize into four teams, each one focused on a sub-theme. Each team will research the forces that are shaping the evolving role of Silicon Valley in relation to their sub-theme, try to assess the implications of that evolution for the future of the U.S. economy, and propose executable recommendations for strengthening Silicon Valley's future role. Each team will be expected to produce a monograph (10-15 pages) presenting and discussing its findings and recommendations, to be handed in at the end of the quarter.

**STRAMGT 378. Strategic Leadership of Nonprofits. 4 Units.**

Formulating, evaluating, and implementing mission and strategy. Case studies from nonprofits in social services, health care, education, and arts and culture. The interaction of strategy and mission, industry structure and evolution, strategic change, growth and replication, corporate strategy, governance, commercialization, alliances, capacity building, and leadership. Same as: EDUC 377D.

**STRAMGT 381. Leading Strategic Change in the Health Care Industry. 3 Units.**

This seminar provides the opportunity for students to study the structure and dynamics of the U.S. health care industry, and some of the ways it intersects with the global health care industry. The U.S. health care industry represents over 15 percent of the nation's GDP and is rapidly changing as a result of government regulatory reform enacted in 2010. The seminar's aim is to develop participants' ability to create strategically informed action plans that are imaginative, inspiring and workable in this highly dynamic environment. The seminar's pedagogy involves informed debate to evaluate and hone well-researched views by the participants and instructors, as well as the writing and presentation of position papers by small groups of seminar participants on the key dynamics of the industry. In the course of the seminar discussions, we aim to deepen our understanding of strategic dynamics and transformational change at the societal, industry and organizational levels of analysis. After developing a complete picture of the structure of the health care industry and the strategic relationships among the key players - the strategic landscape -, the seminar will focus on how health care reform and other external forces will affect the strategic opportunities and challenges of four types of players in the strategic landscape: (1) Incumbents (e.g., pharmaceutical companies, hospital companies, insurance companies); (2) entrepreneurial startups (e.g., home monitoring, genetic testing companies, information services); (3) cross-boundary disruptors (e.g., health clinics, Wal-Mart, Cisco, Google); and (4) international health care providers (e.g. in Mexico, India, Thailand) Four student teams will be formed to focus on one of the four types of players. Each team will prepare a research paper focused on determining how their type of player can take advantage of the regulatory, technological, social, cultural and demographic changes, and who will be the likely winners and why. During the first round of discussions (sessions 2-5) all participants will take part in examining the different parts of the competitive landscape. During the second round (sessions 6-9), the different teams will present their research findings and perspectives about the strategic opportunities and threats which exist. As part of the second set of sessions, the instructors will bring in domain experts to further augment the discussion.

**STRAMGT 508. Entrepreneurship from the Perspective of Women. 2 Units.**

There are now over a dozen courses taught on entrepreneurship at the GSB. These courses cover a wide range of topics of interest to the budding entrepreneur and venture capitalists. But what unique challenges do women face when approaching entrepreneurship? This seminar will showcase successful women entrepreneurs and the challenges they encountered in funding, communication styles, lifestyle balance, and paths to success. We will do so with mini-cases, panel discussions, readings, and some social time with experienced entrepreneurs. Men are also welcome to enroll.

**STRAMGT 513. New Venture Pitch Workshop. 2 Units.**

This workshop provides students with a forum through which they can develop and receive feedback on a new venture idea. Class time will be devoted to understanding how to improve the viability of a new venture idea and how to present that idea clearly to others. At the course conclusion, students will present their idea to others in the class and outside guests. The workshop can handle up to 15 ideas or teams; you may develop your own idea and pitch, or partner with other students. You must have your team formed before registering for the course. Note: students should be pitching ideas that are at an EARLY stage, ones that have not been pitched previously or are existing businesses.

**STRAMGT 514. The Improvisational Entrepreneur. 1 Unitss.**

Improvisational acting (i.e., improv) requires fast, flexible, and creative thinking; intense listening and effective self-presentation; and the ability to act without fear of failure. These skills are also vital for being a successful entrepreneur. In this class, you will learn techniques of improvisational acting that can transform your thinking about business and your approach to life.

**STRAMGT 524. Strategy Implementation. 2 Units.**

The seminar is built around five company visits to some of the most innovative firms in Silicon Valley. We visit their location, meet with mid-level managers who are encouraged to engage us in candid conversation about the challenges facing the company, and the challenges they personally face on a daily basis to implement their firm's strategy. Key questions include: What is the role, if any, of middle-managers in helping to formulate strategy? How is the strategy communicated to employees? In what circumstances do middle-managers explicitly invoke the strategy, if at all? What role do middle-managers play in strategic change? Do you distinguish financial and strategic health in your business? If so, do you quantify strategic health? How important is culture to the company's success and how do you reinforce this? What challenges have you faced in managing growth and organizational change at your company? What are the challenges to managing innovation in your company? The seminar will be particularly useful to students interested in strategy consulting or line management positions where you will participate in the strategy process, or any kind of implementation role. Each day we will spend time in class before each company visit to discuss a reading, the company background, and share reactions to the day's visit (this is an especially important aspect of the experience). In the past we have visited: Apple, Cisco, Facebook, Google, Ideo, Tesla and Yahoo!, among others. We plan to organize the same or similar visits this year.

**STRAMGT 526. Managing to Outcomes in Education and Other Sectors. 2 Units.**

Whether as students, taxpayers, or philanthropists, we share an interest that schools, government agencies, and nonprofit organizations effectively achieve their intended outcomes. This course asks how stakeholders and managers can assess these institutions' performance and commitment to continuous improvement. This seemingly technocratic question is often the center of political controversy, as it is today in criticisms of the student assessments required by No Child Left Behind and of "value-added" assessments of teacher performance. Ever mindful that performance management is a graveyard of good intentions, we will study the practical aspects of institutional change - including leadership, accountability, learning, and culture - that often account for the difference between success and failure. We start with the presumption that you can't manage what you can't measure, but managers can usually measure only proxies rather than ultimate outcomes. In addition to the inevitable slippage between the proxies and ultimate outcomes, there is a tension between using assessments for learning and improvement, on the one hand, and for accountability, incentives, and penalties, on the other. Moreover, people have incentives to "game" any performance evaluation system. We will examine the challenges of managing to outcomes in various contexts, focusing particularly on students' and teachers' performance, but also including the performance of selected government agencies (e.g., police and welfare departments), nonprofit organizations, and foundations. We will focus on the interconnections among strategic planning, performance budgeting, and performance management. We will also look at experiments with new funding vehicles that depend on measuring outcomes, such as social impact bonds, conditional cash transfers, and pay for performance schemes in healthcare and other sectors.

**STRAMGT 543. Entrepreneurial Acquisition. 2 Units.**

For aspiring entrepreneurs who don't have a burning idea or desire to start a company from scratch, acquiring a small business can provide a direct route to running and growing a business. This class will explore entrepreneurial acquisition (EA), including the Search Fund model. Key topics to be addressed: - Raising the money to acquire a company and building an investor group - Conducting a search for a company to buy: analyzing industries, finding resources, creating deal flow and managing relationships - Evaluating acquisition opportunities, including financial analysis - Performing due diligence - Legal considerations - Structuring and closing the deal - Assuming leadership from the seller - Early stages of operating and building the business - Economics to the entrepreneur and investors - Partnering or doing it alone.

**STRAMGT 546. Small Business Strategy. 1 Unitss.**

We will visit and analyze four local small businesses. (I hope we will visit all four companies but, when it makes more sense logistically, we may meet the manager at the GSB). The companies will vary from very small companies with limited growth plans (for example, last year we visited a veterinary office and a small company that makes devices elderly people use to call for help) to start-up technology companies with dreams of rapid growth (last year we visited a venture-backed greentech company and a company developing an internet healthcare portal). We will talk with the owners about a wide range of strategic issues, including: \* How are they organized? \* What plans do they have for new lines of business? Why? How do these fit with the current business? \* How do they set prices? \* What incentive systems do they use to manage various types of employees? How do they find new employees? What do they look for when they hire? \* What do they see as their potential sources of competitive advantage? \* Where do they see their companies in 5 years? What will it take to get there? Before each meeting, we will spend a little time going over basic background information about the company and its industry. After each meeting, we will spend time analyzing the company and its challenges, focusing on what is and is not scalable, if and how the company can insure a profitable strategy going forward, and what strategic changes the company should consider now and as it grows. Students will be responsible for helping gather background information before the visits. They will be expected to participate in the visits and the discussions before and after the visits. Finally, if time allows, students will make a short presentation on the final day of the class about the strategy of a small business (either one they have worked for, one that they are familiar with, or even just one that they have read about.) This class is the result of a book project that the instructor is currently working on about small business strategy. He (along with two co-authors) has been visiting small businesses all over the United States (specializing in remote locations and, as luck would have it, extreme weather conditions.) This class brings his small business road trip to Silicon Valley.

**STRAMGT 552. Venture Capital: Financing and Valuation. 1 Unitss.**

This offers an overview of the fundamental principles relevant to angel and venture capital investments and is useful to future entrepreneurs who will be consumers of VC industry, future VC professionals, and angel investors. We will cover financing arrangements, decision-making processes, valuation, negotiations, and exit opportunities. We will use a number of real-life case studies and some protagonists are expected to come.

**STRAMGT 554. Entrepreneurship and Venture Capital. 2 Units.**

This new course, STRAMGT 554, is a two unit version of the popular course, STRAMGT 354: Entrepreneurship and Venture Capital. Many of America's most successful entrepreneurial companies have been substantially influenced and supported by professionally managed venture capital funds. This relationship is examined from both the entrepreneur's and the venture capitalist's perspective. From the point of view of the entrepreneur, the course considers how significant and global business opportunities are identified, planned, and built into real companies; how resources are matched with opportunity; and how, within this framework, entrepreneurs seek capital and other assistance from venture capitalists, angel investors or other sources. From the point of view of the venture capitalist, the course considers how potential entrepreneurial investments are evaluated, valued, structured, and enhanced; how different venture capital strategies are deployed; and how venture capitalists raise and manage their own funds and add value to their companies. This course represents a shorter, more intense version of STRAMGT 354 - Entrepreneurship and Venture Capital. Students should not take both courses, as there is considerable overlap in course content.

**STRAMGT 562. Intellectual Property: Financial and Strategic Management. 1 Unitss.**

In today's competitive marketplace, smart companies - from Fortune 500 firms to early stage start-ups - rely on innovation to keep them one step ahead of the game. This class will help you understand the value of firms' intellectual property (IP), by thinking strategically about how to effectively leverage the knowledge, trade secrets, patents, technologies, trademarks, structures and processes that are critical to many businesses. The class will focus on the state-of-the-art, best practices related to IP management, and how they are shaped by economic, strategic, legal, regulatory, and market factors. Through a combination of case studies, class discussion and guest speakers, we will cover a variety of issues shaping a successful IP strategy in today's global business environment. Some of the topics we will cover include: \* Building and managing an IP portfolio that is aligned with business objectives; \* The innovation cycle and technology transfer mechanisms; \* Extracting value from the IP portfolio through transactions (e.g., licensing, sale, enforcement); \* IP valuation in financial reporting; \* Tax planning related to IP (e.g., cross border transfer pricing, IP holding companies); \* Review of corporate IP litigation and the principals of IP damages; \* Patent reform and the role of the U.S. Patent & Trademark Office (USPTO); \* IP rights challenges while doing business in developing countries; \* IP strategies for start-ups & new media companies. Ron Kasznik is Professor of Accounting (Stanford GSB). Ms. Efrat Kasznik is a valuation expert with more than twenty years of management consulting experience, focusing primarily on IP valuation and strategy. She is the founder and President of Foresight Valuation Group, an IP consulting firm providing valuation and strategy services for a range of purposes, including M&A, financial reporting, technology commercialization decisions, tax compliance, transfer pricing, and litigation damages. Prior to founding FVG, she held partner level positions with leading litigation and management consulting organizations.

**STRAMGT 565. Strategic Decision Making. 2 Units.**

This compressed course concerns the analysis of strategic decision-making, with an emphasis on the process of "big stakes" analysis in complex corporate settings. The first week is devoted primarily to the tools of this process and to coping with (strategic) unawareness (especially in competitive situations). The second week is devoted primarily to "learning by doing," as we apply the tools developed in the first week to real-life problems. The overall objective of the course is to develop the student's working knowledge of these techniques, so the student can fruitfully apply these techniques on his/her own. The course may be taken as a two-unit compressed course by signing up for STRAMGT 565 and participating in the first week only. Alternately, students may sign up for both weeks, by registering for STRAMGT 365. Students who sign up initially for STRAMGT 565 will be able to decide late in week 1 whether to continue into week 2 (in effect, these students will have the registration changed from 565 to 365). Note that, in the registration process, students who rank STRAMGT 365 will have a greater chance of getting a spot than students ranking STRAMGT 565. (It will not be possible to change in midstream from 365 to 565, i.e., to drop the second week). Students will be expected to do approximately 90 minutes of work outside of class each day both weeks. A group project will be the main work product in the second week. The course will be taught jointly by Carl Spetzler, Chairman, Strategic Decisions Group and Professor Yossi Feinberg.

**STRAMGT 567. Social Entrepreneurship and Social Innovation. 2 Units.**

This course examines individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ "entrepreneurial skills," such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur within or across the nonprofit, government or business sectors, has become increasingly prominent. While virtually all enterprises, commercial and social, generate social value, fundamental to this definition is that the primary focus of social entrepreneurship is to achieve social impact above all else. We will study some of the most promising and the best-proven innovations for improving people's lives. We will also examine mature projects that are now tackling the issue of "scale", moving from local innovations to solutions that create deep systemic changes for larger numbers of economically disadvantaged individuals and communities throughout the world. This year we will focus on what are the constraints and opportunities for creating a social enterprise at scale. The process of "scale" poses tremendous challenges. Even when organizations manage to overcome the many obstacles to growth, and achieve appreciable scale, this approach is seldom sufficient to achieve significant social impact on its own. This year our course will pay particular attention to network approaches which require the mobilization of a vast array of actors and resources, but have the potential to generate rapid and sustained social impact.

**STRAMGT 573. Strategic Thinking in Action - In Business and Beyond. 2 Units.**

This five-session 2-point Bass seminar will involve students (maximum 15) on examining how to improve the effectiveness of "Translational Medicine." Translational medicine concerns the complex process involved in bringing medical inventions and discoveries to market as diagnostic and/or therapeutic applications. The time and cost involved in translational medicine have gone up exponentially during the last two decades. One purpose of the seminar is to examine the root causes of this unsustainable trajectory and to develop a strategic action plan to reverse it. Another, related, purpose is to help students sharpen their skills in leading strategic change in and of large complex systems. While the instructors will provide relevant pre-readings related to translational medicine and strategic analysis, students will be expected to complement these materials with their own research of theoretical and empirical sources. Class discussions will focus on three analytical sub-topics related to translational medicine, and students will be expected to help structure the discussion and move it forward toward conclusions. Students will organize into three research teams each focused on one of the sub-topics and prepare a five-to-ten page group report of their most important findings and conclusions that extend current knowledge, and also work together to integrate the findings across research teams.

Same as: I.

**STRAMGT 574. Strategic Thinking in Action - In Business and Beyond. 2 Units.**

This five-session 2-point Bass seminar will involve students (maximum 18) in analyzing the emerging global electric automotive industry by focusing on: (1) The electric automotive industry in the U.S. and Europe, (2) the electric automotive industry in Japan and Korea, and (3) the electric automotive industry in China. We will each time examine the strategies of the key automotive companies as well as that of the government and other key players such as infrastructure providers. The purpose of the seminar is to help students sharpen their skills in identifying facilitating and impeding forces of strategic change, and in assessing and estimating the direction and rate of strategic change. While the instructors will provide relevant pre-readings related to these topics, students will be expected to complement these materials with their own research of theoretical and empirical sources. They will also be expected to help structure the discussion and move it forward toward conclusions. Students will organize into three teams each focused on one of the regions and prepare a five-to-ten page group report of their most important findings and conclusions that extend current knowledge.

Same as: II.

**STRAMGT 577. Strategic Interactions. 1 Unitss.**

This course will cover advanced game theoretical tools by studying applications to competitive and cooperative interactions. Game theory provides an analytical method for modeling decision makers, their actions, preferences, information, dynamics and decision making process. Complex strategic environments usually do not yield themselves to a simple game structure, hence this course will be based on cases suggested by the students. Students will suggest a case (in the form of an industry, a specific interaction, a topic, etc.) the class will then jointly analyze the selected cases.

**STRAMGT 583. The Challenges in/with China. 2 Units.**

This course is designed to provide MBAs with a solid grasp of the socio-economic, business and political situation in China (with its challenges for China, the rest of the world and the planet). It will identify the multicausality conducive to the achievements and the performance of China (a "Chinese Renaissance") while assessing some of the important issues faced by China today. The dysfunctions brought by success will be discussed with their implications for foreign partners operating in China. Learning will be drawn from recent examples of corporate behavior in China and from Chinese strategies outside China. From the course and with a prospective perspective - we will explore alternative strategic approaches and responsible management practices likely to make less difficult the maintenance of a sustainable, mutually rewarding interdependence between China and the rest of the world. The course will rely upon different pedagogical methods and use a number of recent cases and research results. This course will be taught by Henri-Claude de BETTIGNIES, The Aviva Chair of Leadership and Responsibility, Emeritus Professor of Asian Business at INSEAD. He is also Distinguished Professor of Globally Responsible Leadership, Emeritus, at the China Europe International Business School (CEIBS), in Shanghai, where he has spent the last 5 years. Previously, he was for 16 years (1988-2004) Visiting Professor at the GSB, Stanford University.



**STRAMGT 584. New Business Models in the Developing World. 2 Units.**

In recent years, we've seen an explosion of innovative business models blazing new trails in emerging markets. Many of these models are achieving commercial success while transforming the lives of the poor. Using ten cases and drawing on the investor's lens, this course will examine best practices for seeding and scaling these new enterprises. It will also explore what is required to spark, nurture and scale entire sectors targeting fast-growing, often low-income markets. What does it mean to work in markets with limited infrastructure? What common mistakes are made, whether in business design, in supply chains, or in dealing with government, and how can we avoid them? Which are the right business models to serve markets that have traditionally been ignored by corporations, and where government has failed to deliver? Who might be threatened by the success of these new businesses? The seminar is a good match for Stanford students interested in working or investing in emerging markets. It will be taught by Matt Bannick, who leads Omidyar Network (a \$550m impact investing fund) and is the former President of eBay International and of PayPal.

**STRAMGT 585. International Business. 2 Units.**

This course addresses key issues in the creation and implementation of company strategies in the international environment: - Why and how do firms internationalize? - How should a firm assess the opportunities and risks in a foreign environment? - What are the competences a firm needs successfully to enter foreign markets, where it faces unfamiliar environments and entrenched local competitors?? - How does a firm balance risk and return in deciding the best mode of foreign market entry? - What are the strategic options available to a firm in competing internationally? - How do international firms organize to deal with complexity? The course is in two parts, which are closely linked. The first is concerned with the strategy and operations of international firm, focusing on how corporations overcome the challenges of foreign environments to expand globally. This section covers foreign market assessment (analyzing the business opportunities and investment climate in a foreign country) and foreign entry strategy, including the alternatives of exporting, licensing, greenfield foreign direct investment or cross-border M&A. We look at trade-offs firms face between global or regional operating economies, on the one hand, and responsiveness to local customers, on the other, leading them to adopt global versus multi-local strategies. In the second part, we consider the development and adaptation of competences in the face of international competition. This section concerns the operational processes and organization structures firms use to support their international strategies. These include the generation and diffusion of knowledge across the corporate network, and the role of innovation and leadership in the transformation of international companies. The course uses a combination of case studies, problems, lectures and discussion, over a variety of companies and countries. Country settings include Japan, Spain, Italy, Singapore, India, Brazil, Romania, China, and the US. Companies may include P&G, Singapore Airlines, Timken, Indesit, HP, Inditex (Zara), Arcor and others.

**STRAMGT 586. New World Global Business. 2 Units.**

This elective is concerned with two themes: 1. The strategies and competitive basis of new business challengers-- enterprises based in the countries of the "New World" of rapidly developing economies, including China, India, Brazil and Russia, Mexico, Indonesia and Turkey; 2. How companies based in the developed world can compete with the challengers. The rapidly developing economies are the home bases for highly competitive new firms which have employed novel and successful business models to gain significant stakes in domestic markets. Their home economies have been, to varying degrees, less affected than the mature economies by the global financial crisis and their firms have been able to continue remarkable domestic growth trajectories. Further, many of these firms are outwardly focused and rapidly gaining positions in the developed world, where they are challenging the interests of developed world multinationals. For global incumbents, it is critical to understand the strategies of the new challengers and how to compete with them. The focus of the course will be on these New World firms, with the aim of understanding the strategies and competences they are deploying in their successful expansion. Integral to their developing global competences is the role of disruptive innovation, addressing under-served markets, and exploiting institutional distance in establishing competitive positions in the home base. Yet it is not clear to what extent these competences can be successfully translated into more developed markets. The course will address strategies multinationals based in the developed world can adopt to counter the new challengers and succeed in their home markets, as well as in the home markets of these challengers. The course will be taught with newly developed case studies written for this and related courses. The cases provide insight into the strategies of New World companies, how companies from the developed world can address the opportunities and risks in New World countries and use them as platforms for expansion. The following are examples of companies which will be included: Natura - Exporting Brazilian Beauty, Brazil Lenovo: Managing a Global Merger, China Haier: Taking a Chinese Company Global, China Infosys Technologies Ltd.: Looking to the Future, India TNK-BP: Russian Oil and Foreign Interests, Russia Samsung Electronics: Global Flash Memory Business, Korea Arcor: The Challenge of Becoming a Global Competitor, Argentina Metro Cash & Carry, Russia, India, China Monsanto: Realizing Biotech Value in Brazil, Brazil, US Arcelik's International Expansion, Turkey Studio Moderna in Eastern Europe, Slovenia.

**STRAMGT 587. Strategy and Management in Developing Economies. 1 Units.**

An important channel for economic development, and the progress of poverty alleviation, is to drive productivity improvements and growth among firms in developing countries. Yet scaling firms in environments characterized by extreme poverty, weak institutions and high levels of inequality poses severe challenges. This seminar will explore the issues facing firms in such environments, including the strategic challenges the firms face as well as the challenges involved in improving managerial practices. Many of the issues and potential solutions to these problems are poorly understood, and the goal of the seminar will be to deepen everyone's understanding of the challenges, as well as brainstorm about potential solutions. This will be an interactive seminar, based on readings and/or guest speakers, with students expected to engage in active discussion of the materials.

**STRAMGT 691. PhD Directed Reading. 1-15 Units.**

This course is offered for students requiring specialized training in an area not covered by existing courses. To register, a student must obtain permission from the faculty member who is willing to supervise the reading.

Same as: ACCT 691, FINANCE 691, GSBGEN 691, HRMGT 691, MGTECON 691, MKTG 691, OB 691, OIT 691, POLECON 691.

**STRAMGT 692. PhD Dissertation Research. 1-15 Units.**

This course is elected as soon as a student is ready to begin research for the dissertation, usually shortly after admission to candidacy. To register, a student must obtain permission from the faculty member who is willing to supervise the research.

Same as: ACCT 692, FINANCE 692, GSBGEN 692, HRMGT 692, MGTECON 692, MKTG 692, OB 692, OIT 692, POLECON 692.

**STRAMGT 802. TGR Dissertation. 0 Unit.**

Same as: ACCT 802, FINANCE 802, GSBGEN 802, HRMGT 802, MGTECON 802, MKTG 802, OB 802, OIT 802, POLECON 802.

## Structural Biology Courses

**SBIO 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**SBIO 225. Bio-chips, Imaging and Nanomedicine. 3 Units.**

The course covers state-of-the-art and emerging bio-sensors, bio-chips, imaging modalities, and nano-therapies which will be studied in the context of human physiology including the nervous system, circulatory system and immune system. Medical diagnostics will be divided into bio-chips (in-vitro diagnostics) and medical and molecular imaging (in-vivo imaging). In-depth discussion on cancer and cardiovascular diseases and the role of diagnostics and nano-therapies.

Same as: EE 225, MATSCI 382.

**SBIO 228. Computational Structural Biology. 3 Units.**

Interatomic forces and interactions such as electrostatics and hydrophobicity, and protein structure in terms of amino acid properties, local chain conformation, secondary structure, domains, and families of folds. How protein motion can be simulated. Bioinformatics introduced in terms of methods that compare proteins via their amino acid sequences and their three-dimensional structures. Structure prediction via simple comparative modeling. How to detect and model remote homologues. Predicting the structure of a protein from knowledge of its amino acid sequence. Via Internet.

Same as: BIOPHYS 228.

**SBIO 241. Biological Macromolecules. 3-5 Units.**

The physical and chemical basis of macromolecular function. Forces that stabilize biopolymers with three-dimensional structures and their functional implications. Thermodynamics, molecular forces, structure and kinetics of enzymatic and diffusional processes, and relationship to their practical application in experimental design and interpretation. Biological function and the level of individual molecular interactions and at the level of complex processes. Case studies in lecture and discussion of classic and current literature. Enrollment limited to 30. Prerequisites: None; background in biochemistry and physical chemistry preferred but material available for those with deficiency; undergraduates with consent of instructor only.

Same as: BIOC 241, BIOPHYS 241.

**SBIO 242. Methods in Molecular Biophysics. 3 Units.**

Experimental methods in molecular biophysics from theoretical and practical standpoints. Emphasis is on X-ray diffraction, nuclear magnetic resonance, and fluorescence spectroscopy. Prerequisite: physical chemistry or consent of instructor.

Same as: BIOPHYS 242.

**SBIO 274. Topics in Nucleic Acid Structure and Function. 2 Units.**

Principles of nucleic acid structure and function. Methods for investigating nucleic acid structure. Limited to graduate students and postdoctoral fellows in structural biology. Prerequisite: consent of instructor.

**SBIO 299. Directed Reading in Structural Biology. 1-18 Units.**

Prerequisite: consent of instructor.

**SBIO 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**SBIO 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**SBIO 801. TGR Project. 0 Unit.****SBIO 802. TGR Dissertation. 0 Unit.**

## Structured Liberal Education Courses

**SLE 91. Structured Liberal Education. 8 Units.**

Three quarter sequence; restricted to and required of SLE students. Comprehensive study of the intellectual foundations of the western tradition in dialogue with eastern, indigenous, and postcolonial perspectives. The cultural foundations of western civilization in ancient Greece, Rome, and the Middle East, with attention to Buddhist and Hindu counterparts and the questions these traditions address in common. Texts and authors include Homer, Plato, Aristotle, Greek tragedy, Sappho, the Hebrew Bible, the New Testament, Saint Augustine, and texts from Hindu and Buddhist traditions.

**SLE 92. Structured Liberal Education. 8 Units.**

Three quarter sequence; restricted to and required of SLE students. Comprehensive study of the intellectual foundations of the western tradition in dialogue with eastern, indigenous, and postcolonial perspectives. The foundations of the modern world, from late antiquity through the Middle Ages, the Renaissance, the Enlightenment, and the Scientific Revolution. Authors include Dante, Descartes, Shakespeare, and texts from Chinese and Islamic traditions.

**SLE 93. Structured Liberal Education. 8 Units.**

Three quarter sequence; restricted to and required of SLE students. Comprehensive study of the intellectual foundations of the western tradition in dialogue with eastern, indigenous, and postcolonial perspectives. Modernity as a period in intellectual history and a problem in the human sciences. Authors include Marx, Nietzsche, Freud, Kafka, Woolf, Eliot, and Sartre.

**SLE 199. Teaching SLE. 1 Unitss.****SLE 299. Structured Liberal Education Capstone Seminar. 1 Unitss.**

Senior capstone project for students who were enrolled in SLE their freshman year.

## Surgery Courses

**SURG 68Q. Current Concepts in Transplantation. 3 Units.**

Preference to sophomores. Biological aspects of cell and organ transplantation, including issues that arise in the popular media. Diseases for which transplantation is a treatment, the state of the art in human transplantation, transplantation of animal tissue into humans (xenotransplantation), development of new tissue and organs in the laboratory (tissue engineering and cloning), and development of drugs and biological strategies to promote long-term survival of the tissue or organ (tolerance). How to write a scientific abstract, critique scientific literature, and research and present topics in contemporary transplantation.

**SURG 70Q. Surgical Anatomy of the Hand: From Rodin to Reconstruction. 2 Units.**

The surgical anatomy of the hand is extremely complex in terms of structure and function. Exploration of the anatomy of the hand in different contexts: its representation in art forms, the historical development of the study of hand anatomy, current operative techniques for reconstruction, advances in tissue engineering, and the future of hand transplantation.

**SURG 71Q. Procedural Anatomy. 3 Units.**

Study of human anatomy through the understanding of eight to ten common conditions, such as diseases, injuries, and genetic defects, that affect the head and neck region and the associated surgical procedures to treat these conditions. Students are exposed to the modalities involved in confirming the diagnosis of these common conditions, the benefits and risks of the procedures to treat these conditions, and the anatomy affected by the conditions and procedures. The laboratory component exposes students to surgical procedures on cadaver material and the learning of anatomy via 3D digital images, the 3D dissection table and models. The focus is on learning clinically relevant anatomy of the head and neck region.

**SURG 72Q. Anatomy in Society. 3 Units.**

Preference to sophomores. The influence of human anatomy on the design of commercial products and competitive activities (such as: automobile and furniture design, sports clothing and shoe design, robotics, and dance and choreography). How societal advancements have evolved to increasingly accommodate human form and function. Guest speakers in the fields of design, architecture, and sports. Exposure to human anatomy via cadaver material, 3D digital images, the 3D dissection table and models.

**SURG 101. Regional Study of Human Structure. 5 Units.**

Enrollment limited to seniors and graduate students. Comprises two parts, lecture and lab, both of which are required. Lectures in regional anatomy and dissection of the human cadaver; the anatomy of the trunk and limbs through the dissection process, excluding the head and neck.

**SURG 111A. Emergency Medical Technician Training. 3-4 Units.**

Basics of life support outside the hospital setting. Topics include emergency patient assessments for cardiac, respiratory, and neurological emergencies, as well as readiness training for emergencies on- and off-campus. Lectures, practicals, and applications. Students taking the class for 4 units complete additional FEMA training and additional clinical rotations. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Freshmen and Sophomores are highly encouraged to apply. Prerequisites: CPR-PR certification, application (see <http://surg211.stanford.edu>), and consent of instructor. Same as: SURG 211A.

**SURG 111B. Emergency Medical Technician Training. 3-4 Units.**

Continuation of 111A/211A. Approach to traumatic injuries. Topics include head, neck, and trunk injuries, bleeding and shock, burn emergencies, and environmental emergencies. Lectures, practicals, and applications. Students taking the class for 4 units complete additional online FEMA training and additional clinical rotations. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Freshmen and Sophomores are highly encouraged to apply. Prerequisites: 111A/211A, CPR-PR certification, and consent of instructor. Same as: SURG 211B.

**SURG 111C. Emergency Medical Technician Training. 3-4 Units.**

Continuation of 111B/211B. Special topics in EMS. Topics include pediatric, obstetric, and gynecologic emergencies, EMS operations, mass casualty incidents, and assault. Lectures, practicals, and applications. Students taking the class for 4 units complete additional online FEMA training and additional clinical rotations. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT certification exam. Freshmen and Sophomores are highly encouraged to apply. Prerequisites: 111B/211B, CPR-PR certification, and consent of instructor. Same as: SURG 211C.

**SURG 112A. Advanced Training and Teaching for the EMT. 2-3 Units.**

Ongoing training for current EMS providers. Students practice BLS assessments and medical care through simulated patient encounters. Topics include airway and stroke management, abdominal emergencies, prehospital pharmacology, and teaching skills. Students taking the course for 3 units also serve as teaching assistants for Surgery 111, the Stanford EMT training course. Prerequisites: SURG 111/211 A-C (or equivalent), CPR-PR certification, and consent of instructor. Same as: SURG 212A.

**SURG 112B. Advanced Training and Teaching for the EMT. 2-3 Units.**

Ongoing training for current EMS providers. Students practice BLS assessments and medical care through simulated patient encounters. Topics include assessment and treatment of the undifferentiated trauma patient (including airway management, monitoring, and evaluation) and prehospital care in nontraditional locations. Students taking the course for 3 units also serve as teaching assistants for Surgery 111, the Stanford EMT training course. Prerequisites: SURG 111/211 A-C (or equivalent), CPR-PR certification, and consent of instructor. Same as: SURG 212B.

**SURG 112C. Advanced Training and Teaching for the EMT. 2-3 Units.**

Ongoing training for current EMS providers. Students practice BLS assessments and medical care through simulated patient encounters. Topics include mass casualty incidents, assaults, and pediatric emergencies. Expanded scope topics may be included - ACLS, ultrasound, and suturing. Students taking the course for 3 units also serve as teaching assistants for Surgery 111, the Stanford EMT training course. Prerequisites: SURG 111/211 A-C (or equivalent), CPR-PR certification, and consent of instructor. Same as: SURG 212C.

**SURG 150. Global Humanitarian Medicine. 3 Units.**

Open to undergraduate, graduate, and medical students. Focus is on understanding the theory behind medical humanitarianism, the growing role of surgery in international health, and the clinical skills necessary for students to partake in global medical service. Internship opportunities are available for interested students. Guest speakers include world-renowned physicians and public health workers. Same as: SURG 250.

**SURG 199. Undergraduate Research. 1-18 Units.**

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

**SURG 201. Basic Cardiac Life Support. 1 Unitss.**

All medical students must be certified in Basic Cardiac Life Support before the end of the first (autumn) quarter. Students who provide documentation of certification received within six months prior to the date of matriculation will be exempted from the requirement. The course teaches one- and two-rescuer CPR, management of an obstructed airway, and CPR for infants and children. Upon completion of the course, students receive an American Heart Association certificate in BLS.

**SURG 203A. Clinical Anatomy. 11 Units.**

Introduction to human structure and function presented from a clinical perspective. Includes clinical scenarios, frequently used medical imaging techniques, and interventional procedures to illustrate the underlying anatomy. Students are required to attend lectures and engage in dissection of the human body in the anatomy laboratory. Surgery 203A presents structures of the thorax, abdomen, pelvis, back, upper and lower limbs.

**SURG 203B. Clinical Anatomy. 4 Units.**

Continues the introduction to human structure and function from a clinical perspective. Includes clinical scenarios, frequently used medical imaging techniques, and interventional procedures to illustrate the underlying anatomy. Students are required to attend lectures and engage in dissection of the human body in the anatomy laboratory. Surgery 203B presents structures of the head and neck.

**SURG 204. Introduction to Surgery. 1 Unitss.**

Designed to give pre-clinical MD students a broad overview of all the surgical specialties. Lectures by leading surgeons from General Surgery, Plastic Surgery, Neurosurgery, Orthopedic Surgery, Head and Neck Surgery, Transplantation Surgery and Cardiac Surgery highlight the array of diseases and operations performed in their disciplines. In addition, each lecture gives students a "roadmap" as to how to enter that discipline.

**SURG 205. Advanced Suturing Techniques. 1 Unitss.**

Designed for preclinical medical students. Builds upon skills taught in the Surgical Interest Group's introductory suturing workshops. Topics include knot tying, suturing, hand-sewn anastomosis, stapled anastomosis, and laparoscopic technique. Emphasizes hands-on work with live tissue and surgical simulation. Preference to second year medical students.

**SURG 208. Plastic Surgery Tutorial. 2 Units.**

Diagnosis, theory, and practice of plastic and reconstructive surgery. Limited to two students per faculty member.

**SURG 209. Plastic Surgery. 1-18 Units.**

Students participate in plastic and reconstructive surgery as functioning members of the clinical team. Students are exposed to operative surgery, emergency and trauma care, evaluation of operative candidates in the outpatient setting, and also attend teaching conferences. Limited to four students. Prerequisite: completion of first year or clinical experience.

**SURG 211A. Emergency Medical Technician Training. 3-4 Units.**

Basics of life support outside the hospital setting. Topics include emergency patient assessments for cardiac, respiratory, and neurological emergencies, as well as readiness training for emergencies on- and off-campus. Lectures, practicals, and applications. Students taking the class for 4 units complete additional FEMA training and additional clinical rotations. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Freshmen and Sophomores are highly encouraged to apply. Prerequisites: CPR-PR certification, application (see <http://surg211.stanford.edu>), and consent of instructor. Same as: SURG 111A.

**SURG 211B. Emergency Medical Technician Training. 3-4 Units.**

Continuation of 111A/211A. Approach to traumatic injuries. Topics include head, neck, and trunk injuries, bleeding and shock, burn emergencies, and environmental emergencies. Lectures, practicals, and applications. Students taking the class for 4 units complete additional online FEMA training and additional clinical rotations. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT licensure exam. Freshmen and Sophomores are highly encouraged to apply. Prerequisites: 111A/211A, CPR-PR certification, and consent of instructor. Same as: SURG 111B.

**SURG 211C. Emergency Medical Technician Training. 3-4 Units.**

Continuation of 111B/211B. Special topics in EMS. Topics include pediatric, obstetric, and gynecologic emergencies, EMS operations, mass casualty incidents, and assault. Lectures, practicals, and applications. Students taking the class for 4 units complete additional online FEMA training and additional clinical rotations. Upon completion of SURG 111A,B,C or 211A,B,C, students are eligible to sit for the National Registry EMT certification exam. Freshmen and Sophomores are highly encouraged to apply. Prerequisites: 111B/211B, CPR-PR certification, and consent of instructor. Same as: SURG 111C.

**SURG 212A. Advanced Training and Teaching for the EMT. 2-3 Units.**

Ongoing training for current EMS providers. Students practice BLS assessments and medical care through simulated patient encounters. Topics include airway and stroke management, abdominal emergencies, prehospital pharmacology, and teaching skills. Students taking the course for 3 units also serve as teaching assistants for Surgery 111, the Stanford EMT training course. Prerequisites: SURG 111/211 A-C (or equivalent), CPR-PR certification, and consent of instructor. Same as: SURG 112A.

**SURG 212B. Advanced Training and Teaching for the EMT. 2-3 Units.**

Ongoing training for current EMS providers. Students practice BLS assessments and medical care through simulated patient encounters. Topics include assessment and treatment of the undifferentiated trauma patient (including airway management, monitoring, and evaluation) and prehospital care in nontraditional locations. Students taking the course for 3 units also serve as teaching assistants for Surgery 111, the Stanford EMT training course. Prerequisites: SURG 111/211 A-C (or equivalent), CPR-PR certification, and consent of instructor. Same as: SURG 112B.

**SURG 212C. Advanced Training and Teaching for the EMT. 2-3 Units.**

Ongoing training for current EMS providers. Students practice BLS assessments and medical care through simulated patient encounters. Topics include mass casualty incidents, assaults, and pediatric emergencies. Expanded scope topics may be included - ACLS, ultrasound, and suturing. Students taking the course for 3 units also serve as teaching assistants for Surgery 111, the Stanford EMT training course. Prerequisites: SURG 111/211 A-C (or equivalent), CPR-PR certification, and consent of instructor. Same as: SURG 112C.

**SURG 220. Emergency Medicine: Introduction. 1-2 Units.**

The specialty of emergency medicine and initial care of emergency patients, both in the pre-hospital phase and in the emergency department. Lectures and/or practical sessions cover: patient assessment; the initial management of the multiple trauma patient; and common medical emergencies, such as poisoning, asthma, and chest pain. 2 units includes two four-hour ED shadowing shifts.

**SURG 222. Biosecurity and Bioterrorism Response. 2-6 Units.**

Open to medical, graduate, and undergraduate students. Explores the questions of how well the US and global healthcare systems are prepared to withstand a bioterrorism attack, what the parallels are to withstanding a pandemic, what can be done to prevent an attack. How the medical/healthcare field, government, and the technology sectors are involved in biosecurity and bioterrorism response, how these sectors interface, and the multidisciplinary challenges involved. Focus is on current biosecurity challenges, including global bio-surveillance, making the medical diagnosis, isolation, containment, hospital surge capacity, stockpiling and distribution of countermeasures, food and agriculture biosecurity, new promising technologies for detection of bio-threats and countermeasures. 4 unit option for class participation and short paper. 6 unit option includes a research paper. 2 unit option for once a week attendance (Wednesdays only) and short paper. Same as: PUBLPOL 122, PUBLPOL 222.

**SURG 223. Wilderness Medicine. 2-3 Units.**

Open to all students. Wilderness-related illnesses and injuries; a framework for evaluation and treatment of emergencies in the backcountry. Hands-on clinical skills. Topics include high altitude medicine, hypothermia, envenomations, search and rescue, improvisation, and survival medicine. Includes opportunity for certification in Wilderness First Aid (WFA). 3 units includes participation in an Emergency Department observation shift and a day-long field-trip for hands-on field work.

**SURG 230. Obesity in America. 1 Unitss.**

Prevalence and effects of the obesity epidemic in America and the growing prevalence of associated comorbidities such as diabetes, hypertension, hyperlipidemia, sleep apnea, and joint problems. Risk factors, multi-disciplinary treatment options, the role of food in society, patients' perspectives, and current research in the field.

**SURG 231. Haiti and Healthcare. 1 Unitss.**

Originally developed to highlight healthcare in extreme poverty in Haiti, related lectures have been added covering healthcare in resource poor environments with the objective to introduce students to the complexity and unique problems of working in the Third World's healthcare morass.

**SURG 242. Art and Anatomy Studio. 1 Unitss.**

Discusses the intersection of art and anatomy and provides the opportunity to explore one art medium in depth. Students select a medium from drawing, painting, sculpture, digital art and art appreciation, and work in small groups with a mentor artist. Class time includes art instruction, creation and feedback. Enrollment limited to 15. May be repeated for credit. May be taken for 1-3 units; units awarded commensurate with project time. Prerequisites: SURG 203A, SURG 203B, or SURG 101.

**SURG 250. Global Humanitarian Medicine. 3 Units.**

Open to undergraduate, graduate, and medical students. Focus is on understanding the theory behind medical humanitarianism, the growing role of surgery in international health, and the clinical skills necessary for students to partake in global medical service. Internship opportunities are available for interested students. Guest speakers include world-renowned physicians and public health workers. Same as: SURG 150.

**SURG 252. Bedside Anatomy. 1 Unitss.**

Provides an opportunity to revisit anatomy in a clinical context. Using case discussions, clinical vignettes, radiological imaging, and hands-on exercises, students are challenged to apply their knowledge of anatomy to explain common diagnostic maneuvers and interventional procedures performed at the bedside or in the outpatient setting. Emphasis will be on anatomical considerations in successfully performing these procedures and avoiding errors that may arise due to anatomical changes, oddities, or variations.

**SURG 254. Operative Anatomy and Techniques. 1 Unitss.**

For preclinical students; provides a background in and integrates knowledge of surgical anatomy and therapy. Surgical or operative anatomy differs from gross anatomy in that the area exposed during surgery may be limited, the dissection may require exposing other seemingly unrelated anatomic structures with unique landmarks, and the procedure may require unusual technical facility. Provides an opportunity for students to understand the goals of representative surgical procedures (translating pathophysiology to surgical decision making to actual incision). Students learn surgical skills and perform the dissection of a number of commonly performed operations in the bio-skills laboratory. Emphasizes hands-on participation in surgical procedures in the laboratory and is taught by attending physicians in general, cardiothoracic, vascular, plastic, head and neck, urologic, and orthopedic surgery.

**SURG 280. Early Clinical Experience in Surgery. 1-2 Units.**

Provides an observational experience in a surgery specialty. Prerequisite: consent of instructor.

**SURG 290. 3D Biomedical Visualization: Techniques, Methods, and Applications. 1 Unitss.**

Explores the power of digital anatomy. How 3D anatomical data sets like CT and MRI scans are created from human specimens; how they are processed, analyzed, and rendered. Focus on how digital content is best used for learning anatomy, patient education, and clinical practice.

**SURG 296. Individual Work: Human Anatomy. 1-18 Units.**

Carried out under the supervision of one or more members of the staff. Prerequisite: consent of instructor.

**SURG 299. Directed Reading in Surgery. 1-18 Units.**

Consists of studies in progress, including cardiovascular and circulatory problems; gastric physiology; hemostatic disorders; homotransplantation; liver disorders; orthopedic pathology; bone growth; radiation injury; immunology, bacteriology, pathology, and physiology of the eye; physiological optics; comparative ophthalmology; neurophysiology of hearing; spatial orientation and disorientation; nasal function; and psychophysics of sensation. Prerequisite: consent of instructor.

**SURG 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

**SURG 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members.

## Symbolic Systems Courses

**SYMSYS 100. Introduction to Cognitive and Information Sciences. 4 Units.**

The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major. Same as: LINGUIST 144, PHIL 190, PSYCH 35.

**SYMSYS 130. Research Methods in the Cognitive and Information Sciences. 3 Units.**

TBA.

**SYMSYS 145. Cognition in Interaction Design. 3 Units.**

Interactive systems from the standpoint of human cognition. Topics include skill acquisition, complex learning, reasoning, language, perception, methods in usability testing, special computational techniques such as intelligent and adaptive interfaces, and design for people with cognitive disabilities. Students conduct analyses of real world problems of their own choosing and redesign/analyze a project of an interactive system. Same as: SYMSYS 245.

**SYMSYS 170. Decision Behavior: Theory and Evidence. 3-4 Units.**

Introduction to the study of judgment and decision making, relating theory and evidence from disciplines such as psychology, economics, statistics, neuroscience, and philosophy. The development and critique of Homo economicus as a model of human behavior, and more recent theories based on empirical findings. Recommended: background in formal reasoning. Same as: SYMSYS 270.

**SYMSYS 190. Senior Honors Tutorial. 1-5 Units.**

Under the supervision of their faculty honors adviser, students work on their senior honors project. May be repeated for credit.

**SYMSYS 191. Senior Honors Seminar. 1 Unitss.**

Recommended for seniors doing an honors project. Under the leadership of the Symbolic Systems program coordinator, students discuss, and present their honors project.

**SYMSYS 196. Independent Study. 1-15 Units.**

Independent work under the supervision of a faculty member. Can be repeated for credit.

**SYMSYS 200. Symbolic Systems in Practice. 2-3 Units.**

Applying a Symbolic Systems education at Stanford and outside. The basics of research and practice. Students develop and present a project, and investigate different career paths, including academic, industrial, professional, and public service, through interviews with alumni.

**SYMSYS 201. ICT, Society, and Democracy. 3 Units.**

The impact of information and communication technologies on social and political life. Interdisciplinary. Classic and contemporary readings focusing on topics such as social networks, virtual versus face-to-face communication, the public sphere, voting technology, and collaborative production.

**SYMSYS 206. philosophy of neuroscience. 4 Units.**

Can problems of mind be solved by understanding the brain, or models of the brain? We will examine the views of philosophers and neuroscientists who believe so, and others who are skeptical of neurophilosophical approaches to the mind. The course will examine historical and recent literature in philosophy and neuroscience. Topics may include perception, memory, neural accounts of consciousness, neurophenomenology, neuroscience and physics, computational models, and eliminativism, among others.

Same as: PHIL 167D, PHIL 267D.

**SYMSYS 209. Battles Over Bits. 3 Units.**

The changing nature of information in the Internet age and its relationship to human behavior. Philosophical assumptions underlying practices such as open source software development, file sharing, common carriage, and community wireless networks, contrasted with arguments for protecting private and commercial interests such as software patents, copy protection, copyright infringement lawsuits, and regulatory barriers. Theory and evidence from disciplines including psychology, economics, computer science, law, and political science. Prerequisite: PSYCH 40, 55, 70, or SYMSYS 202.

**SYMSYS 210. Learning Facial Emotions: Art and Psychology. 3 Units.**

Artistic and psychological learning approaches for emotion recognition from facial expressions. The advantages of learning by image-based microexpressions, subtle expressions, macro expressions, art drawing and actor mimicry when there are cognitive deficits due to conditions such as autism. Comparative analysis uses brain studies, learning theory, and human-computer interaction. Studio component conveys the artistic and psychological approaches. Prerequisites: PSYCH 1, SYMSYS 100 or consent of instructor. Go to [www.stanford.edu/~dwilkins/Symsys210Enroll.doc](http://www.stanford.edu/~dwilkins/Symsys210Enroll.doc) to sign up for a Permission Number.

**SYMSYS 211. Learning Facial Emotions: Art, Psychology, Human-Computer Interaction. 3 Units.**

Learning to recognize facial emotions by drawing a live model versus the psychology method of using classified images of subtle and micro expressions. Dimensions of analysis include cognitive modeling and neuroscience. The design of human-computer interaction systems for people with cognitive deficits such as autism and Aspergers, which integrate the art and psychology approaches using methods such as robot heads, avatars, and facial recognition software. Prerequisites: PSYCH 1 or consent of instructor.

**SYMSYS 245. Cognition in Interaction Design. 3 Units.**

Interactive systems from the standpoint of human cognition. Topics include skill acquisition, complex learning, reasoning, language, perception, methods in usability testing, special computational techniques such as intelligent and adaptive interfaces, and design for people with cognitive disabilities. Students conduct analyses of real world problems of their own choosing and redesign/analyze a project of an interactive system. Same as: SYMSYS 145.

**SYMSYS 270. Decision Behavior: Theory and Evidence. 3-4 Units.**

Introduction to the study of judgment and decision making, relating theory and evidence from disciplines such as psychology, economics, statistics, neuroscience, and philosophy. The development and critique of Homo economicus as a model of human behavior, and more recent theories based on empirical findings. Recommended: background in formal reasoning. Same as: SYMSYS 170.

**SYMSYS 280. Symbolic Systems Research Seminar. 1 Unitss.**

A mixture of public lectures of interest to Symbolic Systems students (the Symbolic Systems Forum) and student-led meetings to discuss research in Symbolic Systems. Can be repeated for credit. Open to both undergraduates and Master's students.

**SYMSYS 290. Master's Degree Project. 1-15 Units.****SYMSYS 291. Master's Program Seminar. 1 Unitss.**

Enrollment limited to students in the Symbolic Systems M.S. degree program. May be repeated for credit.

**SYMSYS 296. Independent Study. 1-15 Units.**

Independent work under the supervision of a faculty member. Can be repeated for credit.

**SYMSYS 299. Curricular Practical Training. 1 Unitss.**

Students obtain employment in a relevant research or industrial activity to enhance their professional experience consistent with their degree programs. Meets the requirements for curricular practical training for students on F-1 visas. Students submit a concise report detailing work activities, problems worked on, and key results. May be repeated for credit. Prerequisite: qualified offer of employment and consent of advisor.

## Theater and Performance Studies Courses

**TAPS 1. Introduction to Theater and Performance Studies. 4 Units.**

What brings together Hamlet and Lance Armstrong? What sets apart The Avatar from Angry Birds? This class explores performance as a paradigm that cuts across diverse branches of contemporary culture, and uses it as a mode and method of analysis that encompasses everything from sports events, social dances, political protests to the organization of a workplace. This course offers an overview of performance across disciplines: from theater and other performing arts, to law, management, sports, and new technologies. It is designed to serve students who may go on to major or minor in Theater and Performance Studies including the Dance division and also students for whom this knowledge is a general contribution to their liberal arts education or to their own field of study. It integrates scholarly research and practical use of performance. No previous performing arts training or skills are required.

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**TAPS 10AX. Acting Intensive: Theatre and Beyond, Into the World of Film. 2 Units.**

Introduction to the craft of acting for film and reinforcement of basic concepts for the experienced student. Skill-building in the areas of acting, movement, voice, and speech, utilizing material from the film and theater. In-depth work on technique, utilization of action, specificity of language, personalization, emotional truth, character, and given circumstance. Blocking of scenes live performance and video recording of performances. Final performance of the two scenes in a showcase afternoon.

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**TAPS 10N. Arts and Ideas: 20th Century Art in Conflict. 4 Units.**

The second quarter of Art & Ideas builds on the examples of Modernism students in Arts and Ideas studied in the first quarter. The Frosh Seminar *20th-Century Art in Conflict*, will focus on drama and film that experiments with new possibilities of form, shaping the direction of later artistic practice. We will trace how the political and aesthetic concerns of the 20th century reflect and exploit new technologies, both in theater and film, altering the position and function of author, actor, director, and audience.

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**TAPS 11AX. Set Design. 2 Units.**

How ideas in fine art, architecture, and installation inform the practice of theatre set design. Traditional techniques of stage scenery design, basic drafting and model making guide the process of designing a set for an opera or play in this hands-on workshop.

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**TAPS 11N. Dramatic Tensions: Theater and the Marketplace. 4 Units.**

Preference to freshmen. This seminar explores the current state of the American theater and its artists. Much conventional wisdom tells us that theater is a dying art, and something of a lost cause, especially in an age of multi-media entertainment. But the roots of the drama are very old and very deep, and there are more young playwrights, actors, and directors entering the field today than at any other time in American history. We'll get to know the work of today's theater artists, with an emphasis on an emerging generation of playwrights that is still finding plenty to say from the classic platform of the living stage. Students will read a cross-section of plays from writers currently working in the US and UK, covering a broad spectrum of subjects and styles from serious to comic, from the musical to the straight play. We'll look at the hits and misses from recent seasons of the New York and London stages and examine some of the differences of artistic taste across the Atlantic. In the second part of the course we will explore, hands-on, the arts and skills necessary to make a play succeed. Students will get the chance to develop their own areas of interest, in guided projects in design, direction or performance. Class visits will be arranged to allow for conversations with playwrights, designers and directors. Labs and master-classes will allow students to solve problems posed in areas of creative production. And finally, we'll meet some of the literary managers and producers who are on the frontlines of underwriting new talent. Students completing this seminar should come away with an informed appreciation of the state of the arts in America today, and some excitement about the possibilities that lie both within the field and in themselves. Class trips will include two plays at major Bay Area Stages.

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**TAPS 11SC. Learning Theater: From Audience to Critic at the Oregon Shakespeare Festival. 2 Units.**

Who doesn't love going to a play: sitting in the darkened theater, an anonymous member of the audience waiting to be entertained, charmed, and challenged? But how many of us know enough about the details of the plays, their interpretation, their production, and acting itself, to allow us to appreciate fully the theatrical experience? In this seminar, we will spend 13 days in Ashland, Oregon, at the Oregon Shakespeare Festival (OSF), where we will attend these plays: Shakespeare's *Romeo and Juliet*, *As You Like It*, *Henry V*, and *Troilus and Cressida*; George Kaufman and Morrie Ryskind's *Animal Crackers*; the world premiere of Robert Schenkkan's *All the Way*; Bill Rauch and Tracy Young's new adaptation, *Medea/Macbeth/Cinderella*; the world premiere of *Party People*, by UNIVERSES; and a new Shakespearean adaptation by Alison Carey, *The Very Merry Wives of Windsor*, Iowa. (To read more about these productions, go to <http://www.osfashland.org>.) We will also spend time backstage, meeting with actors, designers, and artistic and administrative directors of OSF. Students will read the plays before the seminar begins. In Ashland, they will produce staged readings and design a final paper based on one of the productions. These reviews will be delivered to the group and turned in on Thursday, September 20. Note: This seminar will convene in Ashland on Monday, September 3, and will adjourn to Stanford on Sunday, September 16. Students must arrive in Ashland by 4:00 p.m. on September 3. Room and board in Ashland and transportation to Stanford will be provided and paid for by the program.

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**TAPS 12AX. Sketch Comedy and Improvisation. 2 Units.**

Explore improvisation and sketch comedy in an intensive ensemble and create an original show. Pure improvisational theater techniques. Concepts covered include spontaneity, shared control, creative collaboration, narrative, and status. Students apply those skills to writing and staging scripted monologues, two-handers, and ensemble sketches. Students create an original show with the entire class.

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**TAPS 12N. Antigone: From Ancient Democracy to Contemporary Dissent. 4 Units.**

Preference to freshmen. Tensions inherent in the democracy of ancient Athens; how the character of Antigone emerges in later drama, film, and political thought as a figure of resistance against illegitimate authority; and her relevance to contemporary struggles for women's and workers' rights and national liberation. Readings and screenings include versions of *Antigone* by Sophocles, Anouilh, Brecht, Fugard/Kani/Ntshona, Paulin, Glowacki, Gurney, and von Trotta. Same as: CLASSGEN 6N.

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**TAPS 12SC. Playwriting Lab: The Art of Dramatic Writing. 2 Units.**

Workshop. Each student develops an original script which is presented in theater by the other students. How to develop, expand, and condition the creative mind. Topics including dramatic action, text and subtext, characterization, language, and style. Students function as a theatrical collective where each has the opportunity to participate in reading and serving the vision of each student-author.

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**TAPS 13AX. Acting Intensive: Musical Theater. 2 Units.**

Have you ever seen a great musical and wondered, "How do the actors do it?" In this workshop we will explore the mechanics of acting in musicals as we practice solos and scene work from contemporary and classic musicals. Material will range from the "golden age" of musicals of the 1930's to new releases. Possible choices are: *Gypsy*, *Company*, *My Fair Lady*, *Sweeney Todd*, *Oklahoma!*, *Guys and Dolls*, *Cabaret*, *West Side Story*, *A Chorus Line*, *Ragtime*, *Urinetown*, *Dreamgirls*, *Hair*, *Avenue Q*, *South Pacific*, *Damn Yankees*, *Anything Goes*, *Hedwig and the Angry Inch*, *Caroline, or Change*, *Ain't Misbehavin'*, *Next to Normal*, *Hairspray*, and many others. Students are encouraged to suggest their own material in their application for the program. Isn't there a role you've always wanted to play? The class will be accessible to both beginners and experienced actors/singers and will include in-depth work on vocal technique, utilization of action, specificity of language, personalization, emotional truth, character, and given circumstance. Students will develop an awareness of the demands of the performance experience in a safe and supportive environment. They will be encouraged to work to expand their range and will study and perform a solo and a scene from a musical. These assignments will require a minimum of 2 two-hour sessions with a scene partner during a scene rehearsal week. Commitment and responsibility to scene partners is a crucial component to successful work in the theater. In addition to required readings, students will be expected to conduct some research on the world of the playwright, librettist, and composer. We will end our workshop with a final performance of the work in a showcase afternoon for an invited audience. All levels welcome!



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**TAPS 13N. Law and Drama. 4 Units.**

Preference to Freshmen. Beyond the obvious traits that make a good (court room) drama, theater and jurisprudence have much more in common. Just as drama is engaged not only in entertainment but also in examination of social conventions and mechanisms, so law is not only concerned with dispensing justice but with shaping and maintaining a viable human community. In this class we will read and discuss a series of plays in which court proceedings are at the center of dramatic action and concluding with an investigation of the new genre of documentary drama.

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**TAPS 20. Acting for Non-Majors. 1-3 Units.**

A class designed for all interested students. Creative play, ensemble work in a supportive environment. Designed for the student to experience a range of new creative skills, from group improvisation to partner work. Introductory work on freeing the natural voice and physical relaxation. Emphasis on rediscovering imaginative and creative impulses. Movement improvisation, listening exercises, and theater games release the energy, playfulness and willingness to take risks that is the essence of free and powerful performance. Course culminates with work on dramatic text. Same as: TAPS 124D.

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**TAPS 22. Scene Work. 1-2 Units.**

For actors who complete substantial scene work with graduate directors in the graduate workshop.

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**TAPS 25N. Science-in-Theatre: A New Genre?. 3 Units.**

Preference to sophomores. How scientists acquire their rules, mores, and idiosyncrasies through a form of intellectual osmosis in a mentor-disciple relationship. Scientists represented as Frankensteins or nerds, rather than normal. Why more intellectually challenging plays have appeared on the Anglo-American theatre scene where scientific behavior and even science are presented accurately. Students engage in a playwriting experiment. Same as: CHEM 25Q.

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**TAPS 28. Makeup for the Stage. 2 Units.**

Techniques of make-up application and design for the actor and artist including corrective, age, character, and fantasy. Emphasis placed on utilizing make-up for development of character by the actor. Limited enrollment.

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**TAPS 29. Theater Performance: Acting. 1-3 Units.**

Students cast in department productions receive credit for their participation as actors; 1-2 units for graduate directing workshop projects and 1-3 units for major productions (units determined by instructor). May be repeated for credit. Prerequisite: consent of instructor.

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**TAPS 30. How Theater is Designed. 4 Units.**

Team-taught. An introduction to theatrical set, costume and lighting design. Emphasis on balancing practical skill with conceptual ideas for live stage performance. Hands-on projects.

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**TAPS 31. Introduction to Lighting and Production. 4 Units.**

How light contributes to the creation of mood and atmosphere and different kinds of visibility in theatrical storytelling. The use of controllable qualities of light including color, brightness, angle, and movement in the theatrical process of creative scenography. Hands-on laboratory time.

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**TAPS 34. Stage Management Techniques. 4 Units.**

The production process, duties, and responsibilities of a stage manager. Skills needed to stage manage a production.

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**TAPS 39. Theatre Crew. 1-3 Units.**

Under faculty guidance, working backstage on Drama Department productions. Open to any student interested in gaining backstage experience. Night and weekend time required.

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Under faculty guidance, working backstage on Drama Department productions. Open to any student interested in gaining backstage experience. Night and weekend time required.

**TAPS 39D. Theater Performance: Prosser Stage Management. 2-4 Units.**

For students stage managing a Department of Drama Senior Project or Assistant Stage managing a Department Drama production.

**TAPS 39D. Theater Performance: Prosser Stage Management. 2-4 Units.**

For students stage managing a Department of Drama Senior Project or Assistant Stage managing a Department Drama production.

**TAPS 103. Beginning Improvising. 3 Units.**

The improvisational theater techniques that teach spontaneity, cooperation, team building, and rapid problem solving, emphasizing common sense, attention to reality, and helping your partner. Based on TheatreSports by Keith Johnstone. Readings, papers, and attendance at performances of improvisational theater. Limited enrollment.

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**TAPS 105V. Improv & Design. 2 Units.**

Improv & Design is a wildly practical class exploring the intersection of Improvisational Theater & Design Thinking. The class is for: Improvisers who want to practice using their skills in other domains. Improvisers who want to learn about design thinking. Designers who want to deepen their core skills in collaboration, creativity, empathy, acting and rich scenario prototyping. Undergraduates who want to check out the d.school. Graduates who want to practice with a diverse group. You are guaranteed to learn 10 useful things! (We do not guarantee everyone will learn the same 10 things!). Design Institute class; see <http://dschool.stanford.edu>.

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**TAPS 120A. Fundamentals of Acting. 1-3 Units.**

A substantive introduction to the basics of the craft of acting, this course gives all incoming students the foundation of a common vocabulary. Students will learn fundamental elements of dramatic analysis, and how to apply it in action. Topics include scene analysis, environment work, psychological and physical scoring, and development of a sound and serviceable rehearsal technique. Scene work will be chosen from accessible, contemporary, and realistic plays. Outside rehearsal time required.

**TAPS 120A. Fundamentals of Acting. 1-3 Units.**

A substantive introduction to the basics of the craft of acting, this course gives all incoming students the foundation of a common vocabulary. Students will learn fundamental elements of dramatic analysis, and how to apply it in action. Topics include scene analysis, environment work, psychological and physical scoring, and development of a sound and serviceable rehearsal technique. Scene work will be chosen from accessible, contemporary, and realistic plays. Outside rehearsal time required.

**TAPS 120B. Fundamentals of Acting. 1-3 Units.**

Learn how to expand character work, beyond what is immediately familiar. Continuing basic practices from the first part of the sequence, in this quarter they will look beyond the strictly contemporary, and may begin to approach roles drawn from more challenging dramatic texts. This might include plays chosen from mid-century American classics, World Theater, or other works with specific historic or cultural requirements. Actors begin to learn how a performing artist researches and how that research can be used to enrich and deepen performance. Prerequisite: 120A or consent of instructor.

**TAPS 120B. Fundamentals of Acting. 1-3 Units.**

Learn how to expand character work, beyond what is immediately familiar. Continuing basic practices from the first part of the sequence, in this quarter they will look beyond the strictly contemporary, and may begin to approach roles drawn from more challenging dramatic texts. This might include plays chosen from mid-century American classics, World Theater, or other works with specific historic or cultural requirements. Actors begin to learn how a performing artist researches and how that research can be used to enrich and deepen performance. Prerequisite: 120A or consent of instructor.

**TAPS 120D. Studio Performance. 1-5 Units.**

Rehearsal and development of a studio performance project for an end of quarter presentation. Emphasis is on development of acting skills with minimal technical support. Material chosen from classic plays, American realism, world theater, or created group ensemble pieces.

**TAPS 120D. Studio Performance. 1-5 Units.**

Rehearsal and development of a studio performance project for an end of quarter presentation. Emphasis is on development of acting skills with minimal technical support. Material chosen from classic plays, American realism, world theater, or created group ensemble pieces.

**TAPS 120V. Vocal Production and Audition. 1-3 Units.**

An introductory study of the vocal mechanism and the development of voice and articulation for the stage. Students will be introduced to the actor's tools of phonetics, verbal action and text analysis. Vocal technique will then be applied to the actor's process in preparation for audition. Actors will fully participate in the audition process, from beginning to end. Emphasis will be on relaxation, selection of appropriate material, and versatility to show contrast and range.

Same as: TAPS 210V.

**TAPS 120V. Vocal Production and Audition. 1-3 Units.**

An introductory study of the vocal mechanism and the development of voice and articulation for the stage. Students will be introduced to the actor's tools of phonetics, verbal action and text analysis. Vocal technique will then be applied to the actor's process in preparation for audition. Actors will fully participate in the audition process, from beginning to end. Emphasis will be on relaxation, selection of appropriate material, and versatility to show contrast and range.

Same as: TAPS 210V.

**TAPS 121C. Physical Characterization. 3 Units.**

Workshop incorporating styles of movement and characterization for the stage. Tools to aid in theatrical transformation. Triggers include psychological gesture, shifting centers, full face photographs, collected live studies, vocal shifts, and rhythmic and metabolic changes.

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Workshop incorporating styles of movement and characterization for the stage. Tools to aid in theatrical transformation. Triggers include psychological gesture, shifting centers, full face photographs, collected live studies, vocal shifts, and rhythmic and metabolic changes.

**TAPS 121P. Period and Style:Acting. 3 Units.**

This course is designed for the actor and theater-lover who has completed 120a or an equivalent basic acting class. Students will develop their acting skills towards the ability to perform in some of the major classics of the theater, from Shakespeare's plays through the fast-paced physical comedies of twentieth-century farce. Acting in "big" plays without damaging the voice, working physically with safety, how to research like an artist, and rehearse like a professional are all topics that will be covered. Class culminates in an open Scene Showing of Period Plays.

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**TAPS 122P. Arthur Miller's `The Crucible, and Stephen Karam's `Speech and Debate,". 2-9 Units.**

The Undergraduate Acting Project provides students the opportunity to study and perform in major dramatic works. The 2013 Undergraduate Acting Project will present two plays: Arthur Miller's classic work, "The Crucible," and Stephen Karam's contemporary play, "Speech and Debate." Students will learn to form an artistic ensemble, develop dramaturgical materials, learn professional arts protocols and practice, and develop live performance ability. They will also work with guest artists in areas of voice and movement. Audition required (TBA Fall Quarter). Preference to Majors/Minors. Please note that some weeknight rehearsal times will be required, as called.

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**TAPS 124D. Acting for Non-Majors. 1-3 Units.**

A class designed for all interested students. Creative play, ensemble work in a supportive environment. Designed for the student to experience a range of new creative skills, from group improvisation to partner work. Introductory work on freeing the natural voice and physical relaxation. Emphasis on rediscovering imaginative and creative impulses. Movement improvisation, listening exercises, and theater games release the energy, playfulness and willingness to take risks that is the essence of free and powerful performance. Course culminates with work on dramatic text. Same as: TAPS 20.

**TAPS 124D. Acting for Non-Majors. 1-3 Units.**

A class designed for all interested students. Creative play, ensemble work in a supportive environment. Designed for the student to experience a range of new creative skills, from group improvisation to partner work. Introductory work on freeing the natural voice and physical relaxation. Emphasis on rediscovering imaginative and creative impulses. Movement improvisation, listening exercises, and theater games release the energy, playfulness and willingness to take risks that is the essence of free and powerful performance. Course culminates with work on dramatic text. Same as: TAPS 20.

**TAPS 127L. Viewpoints & Contact Improvisation. 2 Units.**

Aimed at actors and dancers this course develops kinesthetic awareness and physical presence in relationship to others through techniques of focus, spatial intent, task, and choreographic improvisation. Drawing on Contact Improvisation and Viewpoints technique this work centers on developing the capacity to perform with physical versatility from a place of authentic emotional commitment and open creative potential. Same as: DANCE 127L.

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**TAPS 131. Lighting Design. 4 Units.**

Hands-on laboratory projects in lighting and designing stage productions and other live performances. The content and format of lighting plots. Prerequisite DRAMA 31.

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Hands-on laboratory projects in lighting and designing stage productions and other live performances. The content and format of lighting plots. Prerequisite DRAMA 31.

**TAPS 132. Costume Design. 4 Units.**

Process of designing costumes for the stage, covering script analysis, rendering techniques, character development and conceptual ideas. Project related work with smaller, pertinent exercises. Prerequisite: 30 or consent of instructor.

**TAPS 132. Costume Design. 4 Units.**

Process of designing costumes for the stage, covering script analysis, rendering techniques, character development and conceptual ideas. Project related work with smaller, pertinent exercises. Prerequisite: 30 or consent of instructor.

**TAPS 133. Stage Scenery Design. 3-4 Units.**

Craft and Theory of stage scenery design including visual research, spatial organization, basic drafting, sketching and model-building. Prerequisite: 30, or consent of instructor.

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Craft and Theory of stage scenery design including visual research, spatial organization, basic drafting, sketching and model-building. Prerequisite: 30, or consent of instructor.

**TAPS 134. Stage Management Project. 2-5 Units.**

For students stage managing a Department of Drama production.

**TAPS 134. Stage Management Project. 2-5 Units.**

For students stage managing a Department of Drama production.

**TAPS 137. Hand Drafting for Designers. 3 Units.**

Fundamentals of hand-drafting. Standard drawing conventions; the use of line weight, color, composition, and graphic style. Creation of construction documents for real-world applications. May be repeated for credit.

**TAPS 137. Hand Drafting for Designers. 3 Units.**

Fundamentals of hand-drafting. Standard drawing conventions; the use of line weight, color, composition, and graphic style. Creation of construction documents for real-world applications. May be repeated for credit.

**TAPS 140. Projects in Theatrical Production. 1-4 Units.**

An independent study course for students performing significant production work on Drama Department or other Stanford University student theatre projects. Students serving as producers, directors or designers who wish mentorship and credit for their production work sign up for this course and contact the Michael Ramsaur, Director of Production, at mram@stanford.edu Prerequisite: consent of instructor.

**TAPS 140. Projects in Theatrical Production. 1-4 Units.**

An independent study course for students performing significant production work on Drama Department or other Stanford University student theatre projects. Students serving as producers, directors or designers who wish mentorship and credit for their production work sign up for this course and contact the Michael Ramsaur, Director of Production, at mram@stanford.edu Prerequisite: consent of instructor.

**TAPS 151H. Improvisational Strategy Laboratory for Innovation through Performance. 4-5 Units.**

Students will build a theoretical and practical foundation for improvisational practices used in Dance and Performance as methodologies for the creation of innovative artistic work. Guest Artists Workshops and a Public Lecture Series will accompany the texts, discussions, videos, and studio practice. We will explore improvisation as both praxis and theory. Texts include work by John Cage, Fred Moten, Anthony Braxton, Twyla Tharpe, Yayoi Kusama, Kwodo Oshun, Bill T. Jones, Harryette Mullen and more.

Same as: DANCE 151H, DANCE 251H, TAPS 351H.

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Same as: DANCE 151H, DANCE 251H, TAPS 351H.

**TAPS 153S. Japanese Theater: Noh to Contemporary Performance. 4 Units.**

This course will provide a historical overview of Japanese theater from traditional (Noh, Kabuki, Bunraku) to contemporary (Angura, Butoh, and performance art). We will focus on the relationship between Japanese theaters and its audiences, exploring the contexts in which theater forms developed and how these forms themselves reflect Japanese culture and society.

**TAPS 153S. Japanese Theater: Noh to Contemporary Performance. 4 Units.**

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**TAPS 154S. Theater and Legal Regulation. 4 Units.**

This course examines how legal statutes, lawsuits, and contracts police theatrical practice, particularly in Britain and the United States in the nineteenth and twentieth centuries. Three particular forms of legal intervention will concern us: ownership of theaters and plays, government censorship and authorial control, and health and safety laws. We will explore how, despite their apparently different aims, these manifestations of the law pursue closely related ends.

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**TAPS 155T. Theatre of War. 4 Units.**

Military personnel and politicians alike use the phrase *the theatre of war* to refer to the geographical area of a military conflict and the more intangible concerns of battle. The primary concern of this class is the intersection between performance and war. Our inquiry will focus on drama, film, the media, and role-playing scenarios as a military training tool, and we will approach these objects through critical theories of justice, performance theory, and trauma.

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**TAPS 158H. Proximity and Temporality in Performance. 4-5 Units.**

This course considers the relationship between proximity and temporality in live performance, looking quite literally at the distance in space and time between performers and audiences. Alongside case studies of performance works, class readings will be drawn from current Performance Studies scholarship as well as discourses in postmodern geographies and anthropological studies of *proxemics* as well as key philosophic works such as Lefebvre's *The Production of Space* and Heidegger's *The Concept of Time*.

Same as: TAPS 358H.

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Same as: TAPS 358H.

**TAPS 158L. The Ethics of Storytelling: The Autobiographical Monologue in Theory, in Practice, and in the World. 4 Units.**

Recently a theatrical monologist gained notoriety when it was revealed that key aspects of one of his autobiographical stories had been fabricated. In this class another autobiographical monologist -- who has himself lied many times in his theater pieces, without ever getting caught -- will examine the ethics of telling our life stories onstage. Does theatrical truth trump factual truth? We will interrogate several autobiographical works, and then -- through autobiographical pieces created in class -- we will interrogate ourselves.

Same as: TAPS 358L.

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Same as: TAPS 358L.

**TAPS 160. Performance and History: Rethinking the Ballerina. 4 Units.**

The ballerina occupies a unique place in popular imagination as an object of over-determined femininity as well as an emblem of extreme physical accomplishment for the female dancer. This seminar is designed as an investigation into histories of the ballerina as an iconographic symbol and cultural reference point for challenges to political and gender ideals. Through readings, videos, discussions and viewings of live performances this class investigates pivotal works, artists and eras in the global histories of ballet from its origins as a symbol of patronage and power in the 15th century through to its radical experiments as a site of cultural obedience and disobedience in the 20th and 21st centuries.

Same as: DANCE 160, TAPS 260.

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Same as: DANCE 160, TAPS 260.

**TAPS 161H. Dance, History and Conflict. 4 Units.**

This seminar investigates how moving bodies are compelling agents of social, cultural, and political change. Through readings, videos, discussions and viewings of live performances this class questions the impact of social conflict and war on selected 20th and 21st century dances and dance practices. This class asks to what extent dance, in its history as well as contemporary development, is linked to concepts of the political and conflict.

Same as: DANCE 161H.

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Same as: DANCE 161H.

**TAPS 162. Performance and the Text. 5 Units.**

Formal elements in Greek, Elizabethan, Noh, Restoration, romantic, realistic, and contemporary world drama; how they intersect with the history of performance styles, character, and notions of action. Emphasis is on how performance and media intervene to reproduce, historicize, or criticize the history of drama.

Same as: TAPS 262.

**TAPS 162. Performance and the Text. 5 Units.**

Formal elements in Greek, Elizabethan, Noh, Restoration, romantic, realistic, and contemporary world drama; how they intersect with the history of performance styles, character, and notions of action. Emphasis is on how performance and media intervene to reproduce, historicize, or criticize the history of drama.

Same as: TAPS 262.

**TAPS 162H. Baroque Modernities: Dance, Theater, Film, Political Theory. 4 Units.**

What do seventeenth-century choreography and dramaturgy contribute to (mean to) choreographic and theatrical modernity? How can we explain the recurrent baroque phenomenon across the twentieth century -- becoming particularly prominent in the 1980s -- beyond the historicist accounts of theatrical reconstruction? How does the baroque locate itself within cultural modernity? This seminar asks this question of choreography at several junctures: The analysis of seventeenth century baroque spectacle that fashioned dance and theatre into political tools of monarchical sovereignty; Twentieth-century literature on the Baroque that destabilizes received notions of subjectivity and political sovereignty; Twentieth-century choreography and film that deploys baroque figures and techniques. Thus, our material shall range from seventeenth-century dance and theater to contemporary dance, film and literature.

Same as: DANCE 162H.

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Same as: DANCE 162H.

**TAPS 164T. Queer Art and Performance. 4-5 Units.**

Examines the late 19th, 20th and 21st century forms of performance-- including examples from drama, theater, cabaret, and performance art -- through the perspectives of contemporary critical gender and queer theories. Texts and movements range from early avant-garde (Dada, Futurism) to gay and lesbian drama (Lillian Hellmann, Joe Orton, Tony Kushner) to post-liberation Queer performance and video (Split Britches, Carmelita Tropicana, Kalup Linzy). Theorists include Judith Butler, Michel Foucault, and Eve Kosofsky Sedgwick.  
Same as: FEMST 140P, TAPS 364T.

**TAPS 164T. Queer Art and Performance. 4-5 Units.**

Examines the late 19th, 20th and 21st century forms of performance-- including examples from drama, theater, cabaret, and performance art -- through the perspectives of contemporary critical gender and queer theories. Texts and movements range from early avant-garde (Dada, Futurism) to gay and lesbian drama (Lillian Hellmann, Joe Orton, Tony Kushner) to post-liberation Queer performance and video (Split Britches, Carmelita Tropicana, Kalup Linzy). Theorists include Judith Butler, Michel Foucault, and Eve Kosofsky Sedgwick.  
Same as: FEMST 140P, TAPS 364T.

**TAPS 166H. Historiography of Theater. 3-5 Units.**

Goal is to design an undergraduate theater history class. Standard theater history textbooks, alternative models of theater history scholarship, and critical literature engaging historiography in general.  
Same as: TAPS 304.

**TAPS 166H. Historiography of Theater. 3-5 Units.**

Goal is to design an undergraduate theater history class. Standard theater history textbooks, alternative models of theater history scholarship, and critical literature engaging historiography in general.  
Same as: TAPS 304.

**TAPS 170B. Directing Workshop: The Actor-Director Dialogue. 5 Units.**

This course focuses on the actor-director dialogue. We will work with actors and directors developing approaches to collaboration that make the actor-director dialogue in theater.  
Same as: TAPS 372.

**TAPS 170B. Directing Workshop: The Actor-Director Dialogue. 5 Units.**

This course focuses on the actor-director dialogue. We will work with actors and directors developing approaches to collaboration that make the actor-director dialogue in theater.  
Same as: TAPS 372.

**TAPS 171. Performance Making: Process. 5 Units.**

A studio course focused on creative processes and generating original material. Students will be encouraged to think critically about the relationship between form and content exploring the possibilities of site specific, gallery and theatre settings. Students will reflect throughout on the types of contact and communication uniquely possible in the live moment, such as interaction or the engagement of the senses. The emphasis is on weekly experimentation in the creation of short works rather than on a final production.  
Same as: TAPS 371.

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A studio course focused on creative processes and generating original material. Students will be encouraged to think critically about the relationship between form and content exploring the possibilities of site specific, gallery and theatre settings. Students will reflect throughout on the types of contact and communication uniquely possible in the live moment, such as interaction or the engagement of the senses. The emphasis is on weekly experimentation in the creation of short works rather than on a final production.  
Same as: TAPS 371.

**TAPS 173. SOLO PERFORMANCE. 4-5 Units.**

Students will learn how to draw from the specificity of their own unique experiences, connecting with ideas, issues and questions that resonate with race, class, gender, environmental and global issues. The course will give students the creative and critical tools to enable them to connect the personal with the political and see the solo voice as a powerful, potent form of artistic expression. Students will have the opportunity to hone their own creative talents in writing, devising, composing, producing and creating work.  
Same as: TAPS 373W.

**TAPS 173. SOLO PERFORMANCE. 4-5 Units.**

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Same as: TAPS 373W.

**TAPS 174A. Performance Making: Production. 5 Units.**

A structured, creative environment for students working toward the realization of Senior Projects and 2nd year graduate productions. Instructors will work with students to develop the relationships between the content and the form of their productions using critical and creative tools to develop and reflect on the work. There will be a staged class showing at the end of the quarter followed by critiques designed to help students as they begin preparing for their final public performances (beyond the class).  
Same as: TAPS 374A.

**TAPS 174A. Performance Making: Production. 5 Units.**

A structured, creative environment for students working toward the realization of Senior Projects and 2nd year graduate productions. Instructors will work with students to develop the relationships between the content and the form of their productions using critical and creative tools to develop and reflect on the work. There will be a staged class showing at the end of the quarter followed by critiques designed to help students as they begin preparing for their final public performances (beyond the class).  
Same as: TAPS 374A.

**TAPS 177. Writing for Performance: The Fundamentals. 5 Units.**

Course introduces students to the basic elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis and others. Table readings of one-act length work required by quarter's end.  
Same as: CSRE 177, TAPS 277.

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Same as: CSRE 177, TAPS 277.

**TAPS 178. Page to Stage: Playwriting and Solo Performance. 3-5 Units.**

Dramatic writing: scripted and solo, and as performed by actors or by the playwright. Physical and psychological theatrical action. Development of skills in dialogue, story structure, style, and personal voice. Script readings and directed staging sessions.

Same as: TAPS 278.

**TAPS 178. Page to Stage: Playwriting and Solo Performance. 3-5 Units.**

Dramatic writing: scripted and solo, and as performed by actors or by the playwright. Physical and psychological theatrical action. Development of skills in dialogue, story structure, style, and personal voice. Script readings and directed staging sessions.

Same as: TAPS 278.

**TAPS 179. Chicano & Chicana Theater: Politics In Performance. 3-5 Units.**

This is a practicum course, where the basic tenets and evolving politic and philosophies of Chicano and Latin American liberationist theater are examined through direct engagement with its theatrical forms, including, social protest & agit-prop, myth & ritual, scripting through improvisation, in-depth character and solo work, collective conceptualization and more. The course will culminate in an end-of-the quarter play performance in the Nitery Theater (Old Union) and at a Mission District theater in San Francisco.

Same as: CHILATST 179, TAPS 379.

**TAPS 179. Chicano & Chicana Theater: Politics In Performance. 3-5 Units.**

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Same as: CHILATST 179, TAPS 379.

**TAPS 179C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop. 3-5 Units.**

This course emphasizes the study and practice of personal memoir writing and literary journalism. The class will explore those writings that contain a public and private story, navigating an intimate and institutional world. Student writers will serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what the facts can offer.

Same as: CSRE 179C, CSRE 279C, TAPS 279C.

**TAPS 179C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop. 3-5 Units.**

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Same as: CSRE 179C, CSRE 279C, TAPS 279C.

**TAPS 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America. 3-5 Units.**

This "gateway" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

Same as: CSRE 179G, CSRE 279G, TAPS 279G.

**TAPS 179G. Indigenous Identity in Diaspora: People of Color Art Practice in North America. 3-5 Units.**

This "gateway" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

Same as: CSRE 179G, CSRE 279G, TAPS 279G.

**TAPS 180Q. Noam Chomsky: The Drama of Resistance. 4 Units.**

Preference to sophomores. Chomsky's ideas and work which challenge the political and economic paradigms governing the U.S. Topics include his model for linguistics; cold war U.S. involvements in S.E. Asia, the Middle East, Central and S. America, the Caribbean, and Indonesia and E. Timor; the media, terrorism, ideology, and culture; student and popular movements; and the role of resistance.

**TAPS 180Q. Noam Chomsky: The Drama of Resistance. 4 Units.**

Preference to sophomores. Chomsky's ideas and work which challenge the political and economic paradigms governing the U.S. Topics include his model for linguistics; cold war U.S. involvements in S.E. Asia, the Middle East, Central and S. America, the Caribbean, and Indonesia and E. Timor; the media, terrorism, ideology, and culture; student and popular movements; and the role of resistance.

**TAPS 184Q. The Personal is Political: Art, Activism and Performance. 4-5 Units.**

SOPHOMORE SEMINAR: This course looks at the performance of personal truths in political contexts, challenging inequalities of race, gender, sexual orientation and class through performance, visual art and activism. Students will engage in seminar discussions and writing on case studies such as the Occupy Movement and the works of key artists as well as working individually and in groups to think creatively about strategies for putting their own personal truths into political/public contexts to draw attention to issues they are passionate about.

**TAPS 184Q. The Personal is Political: Art, Activism and Performance. 4-5 Units.**

SOPHOMORE SEMINAR: This course looks at the performance of personal truths in political contexts, challenging inequalities of race, gender, sexual orientation and class through performance, visual art and activism. Students will engage in seminar discussions and writing on case studies such as the Occupy Movement and the works of key artists as well as working individually and in groups to think creatively about strategies for putting their own personal truths into political/public contexts to draw attention to issues they are passionate about.

**TAPS 190. Special Research. 1-5 Units.**

Individual project on the work of a playwright, period, or genre. Prerequisite: consent of instructor.

**TAPS 190. Special Research. 1-5 Units.**

Individual project on the work of a playwright, period, or genre. Prerequisite: consent of instructor.

**TAPS 191. Independent Study. 1-18 Units.**

Individual supervision of off-campus internship. Prerequisite: consent of instructor.

**TAPS 191. Independent Study. 1-18 Units.**

Individual supervision of off-campus internship. Prerequisite: consent of instructor.

**TAPS 192. The Road to PSI 2013. 1-5 Units.**

This class explores issues related to performance and temporality, the main theme of the topic of PSI conference hosted by Drama department in June 2013. Also, students actively participate in preparations for the conference. Same as: TAPS 392.

**TAPS 192. The Road to PSI 2013. 1-5 Units.**

This class explores issues related to performance and temporality, the main theme of the topic of PSI conference hosted by Drama department in June 2013. Also, students actively participate in preparations for the conference. Same as: TAPS 392.

**TAPS 193. Life in the Body, Performing the Self. 2 Units.**

No Class on January 8th. Class meets 7:00-8:50 every Tuesday beginning January 15th through March 12th, with a 10th and final required class during finals week on March 19th from 7:00-8:50. Also, students will be joined in the classroom by Continuing Studies students. Life is a performance of gestures. Dance is any conscious movement. Based on a "choreography of the everyday," this course invites participants to experience the subtle surprise of performing oneself. Working with our own gestures, words, thoughts, and perceptions, and drawing upon the basic elements of composition in performance, music, and choreography, we will develop a performance work in the mode of a "chamber piece." Building individual movement-based portraits, and then weaving them together as a whole, this gestural performance "chamber piece" will reflect the community of class participants and the Stanford community as a whole. Considerations of time, space, and quality of motion will be at the forefront of our work together. We will investigate the cultural identity and history of our gestures, as well as trace the evolution of this type of performance work in art, dance, and performance history. Participants can expect to find inspiration, delight, refreshment, and renewal through this performance process. No experience is necessary, just a willingness to move and reflect upon having a life in a body at this moment in history. The work of this course is the springboard of a larger performance work, "The Symphonic Body," which is scheduled to be performed at the new Bing Concert Hall in May 2013. Course participants have the option to perform in the larger work.

**TAPS 193. Life in the Body, Performing the Self. 2 Units.**

No Class on January 8th. Class meets 7:00-8:50 every Tuesday beginning January 15th through March 12th, with a 10th and final required class during finals week on March 19th from 7:00-8:50. Also, students will be joined in the classroom by Continuing Studies students. Life is a performance of gestures. Dance is any conscious movement. Based on a "choreography of the everyday," this course invites participants to experience the subtle surprise of performing oneself. Working with our own gestures, words, thoughts, and perceptions, and drawing upon the basic elements of composition in performance, music, and choreography, we will develop a performance work in the mode of a "chamber piece." Building individual movement-based portraits, and then weaving them together as a whole, this gestural performance "chamber piece" will reflect the community of class participants and the Stanford community as a whole. Considerations of time, space, and quality of motion will be at the forefront of our work together. We will investigate the cultural identity and history of our gestures, as well as trace the evolution of this type of performance work in art, dance, and performance history. Participants can expect to find inspiration, delight, refreshment, and renewal through this performance process. No experience is necessary, just a willingness to move and reflect upon having a life in a body at this moment in history. The work of this course is the springboard of a larger performance work, "The Symphonic Body," which is scheduled to be performed at the new Bing Concert Hall in May 2013. Course participants have the option to perform in the larger work.

**TAPS 200. Senior Project. 2-9 Units.**

See "Undergraduate Programs" for description. (Staff).

**TAPS 200. Senior Project. 2-9 Units.**

See "Undergraduate Programs" for description. (Staff).

**TAPS 201A. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201A. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201B. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201B. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201C. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201C. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201D. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 201D. Honors Colloquium. 1 Unitss.**

See "Undergraduate Programs" for description.

**TAPS 202. Honors Thesis. 2-9 Units.**

See "Undergraduate Programs" for description. May be repeated for credit. (Staff).

**TAPS 202. Honors Thesis. 2-9 Units.**

See "Undergraduate Programs" for description. May be repeated for credit. (Staff).

**TAPS 203. Advanced Improvisation. 3 Units.**

Further development of improvisational skills.

**TAPS 203. Advanced Improvisation. 3 Units.**

Further development of improvisational skills.



**TAPS 210V. Vocal Production and Audition. 1-3 Units.**

An introductory study of the vocal mechanism and the development of voice and articulation for the stage. Students will be introduced to the actor's tools of phonetics, verbal action and text analysis. Vocal technique will then be applied to the actor's process in preparation for audition. Actors will fully participate in the audition process, from beginning to end. Emphasis will be on relaxation, selection of appropriate material, and versatility to show contrast and range.  
Same as: TAPS 120V.

**TAPS 210V. Vocal Production and Audition. 1-3 Units.**

An introductory study of the vocal mechanism and the development of voice and articulation for the stage. Students will be introduced to the actor's tools of phonetics, verbal action and text analysis. Vocal technique will then be applied to the actor's process in preparation for audition. Actors will fully participate in the audition process, from beginning to end. Emphasis will be on relaxation, selection of appropriate material, and versatility to show contrast and range.  
Same as: TAPS 120V.

**TAPS 213. Stanford Improv Ensemble. 1-2 Units.**

By audition only, for members of the improvisation troupe. Special project work. Prerequisite: 103.

**TAPS 213. Stanford Improv Ensemble. 1-2 Units.**

By audition only, for members of the improvisation troupe. Special project work. Prerequisite: 103.

**TAPS 231. Advanced Stage Lighting Design. 1-5 Units.**

Individually structured class in lighting mechanics and design through experimentation, discussions, and written reports. Prerequisite: 131 or consent of instructor.

**TAPS 231. Advanced Stage Lighting Design. 1-5 Units.**

Individually structured class in lighting mechanics and design through experimentation, discussions, and written reports. Prerequisite: 131 or consent of instructor.

**TAPS 232. Advanced Costume Design. 1-5 Units.**

Individually structured tutorial for costume designers. May be repeated for credit. Prerequisite: 132 or consent of instructor.

**TAPS 232. Advanced Costume Design. 1-5 Units.**

Individually structured tutorial for costume designers. May be repeated for credit. Prerequisite: 132 or consent of instructor.

**TAPS 233. Advanced Scene Design. 1-5 Units.**

Individually structured workshop. May be repeated for credit. Prerequisite: 133 or consent of instructor.

**TAPS 233. Advanced Scene Design. 1-5 Units.**

Individually structured workshop. May be repeated for credit. Prerequisite: 133 or consent of instructor.

**TAPS 234. Advanced Stage Management Project. 2-9 Units.**

For students stage managing a Department of Drama production. Prerequisite: 134.

**TAPS 234. Advanced Stage Management Project. 2-9 Units.**

For students stage managing a Department of Drama production. Prerequisite: 134.

**TAPS 248. Family Drama: American Plays about Families. 5 Units.**

Plays written by 20th century writers that concentrate on the family as the primary source of dramatic conflict and comedy. Writers include Williams, O'Neill, Wilder, Albee, Vogel, Parks, Lindsay-Abaire, and Hwang.  
Same as: ENGLISH 148.

**TAPS 248. Family Drama: American Plays about Families. 5 Units.**

Plays written by 20th century writers that concentrate on the family as the primary source of dramatic conflict and comedy. Writers include Williams, O'Neill, Wilder, Albee, Vogel, Parks, Lindsay-Abaire, and Hwang.  
Same as: ENGLISH 148.

**TAPS 260. Performance and History: Rethinking the Ballerina. 4 Units.**

The ballerina occupies a unique place in popular imagination as an object of over-determined femininity as well as an emblem of extreme physical accomplishment for the female dancer. This seminar is designed as an investigation into histories of the ballerina as an iconographic symbol and cultural reference point for challenges to political and gender ideals. Through readings, videos, discussions and viewings of live performances this class investigates pivotal works, artists and eras in the global histories of ballet from its origins as a symbol of patronage and power in the 15th century through to its radical experiments as a site of cultural obedience and disobedience in the 20th and 21st centuries.  
Same as: DANCE 160, TAPS 160.

**TAPS 260. Performance and History: Rethinking the Ballerina. 4 Units.**

The ballerina occupies a unique place in popular imagination as an object of over-determined femininity as well as an emblem of extreme physical accomplishment for the female dancer. This seminar is designed as an investigation into histories of the ballerina as an iconographic symbol and cultural reference point for challenges to political and gender ideals. Through readings, videos, discussions and viewings of live performances this class investigates pivotal works, artists and eras in the global histories of ballet from its origins as a symbol of patronage and power in the 15th century through to its radical experiments as a site of cultural obedience and disobedience in the 20th and 21st centuries.  
Same as: DANCE 160, TAPS 160.

**TAPS 262. Performance and the Text. 5 Units.**

Formal elements in Greek, Elizabethan, Noh, Restoration, romantic, realistic, and contemporary world drama; how they intersect with the history of performance styles, character, and notions of action. Emphasis is on how performance and media intervene to reproduce, historicize, or criticize the history of drama.  
Same as: TAPS 162.

**TAPS 262. Performance and the Text. 5 Units.**

Formal elements in Greek, Elizabethan, Noh, Restoration, romantic, realistic, and contemporary world drama; how they intersect with the history of performance styles, character, and notions of action. Emphasis is on how performance and media intervene to reproduce, historicize, or criticize the history of drama.  
Same as: TAPS 162.

**TAPS 277. Writing for Performance: The Fundamentals. 5 Units.**

Course introduces students to the basic elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis and others. Table readings of one-act length work required by quarter's end.  
Same as: CSRE 177, TAPS 177.

**TAPS 277. Writing for Performance: The Fundamentals. 5 Units.**

Course introduces students to the basic elements of playwriting and creative experimentation for the stage. Topics include: character development, conflict and plot construction, staging and setting, and play structure. Script analysis of works by contemporary playwrights may include: Marsha Norman, Patrick Shanley, August Wilson, Suzan-Lori Parks, Paula Vogel, Octavio Solis and others. Table readings of one-act length work required by quarter's end.

Same as: CSRE 177, TAPS 177.

**TAPS 278. Page to Stage: Playwriting and Solo Performance. 3-5 Units.**

Dramatic writing: scripted and solo, and as performed by actors or by the playwright. Physical and psychological theatrical action. Development of skills in dialogue, story structure, style, and personal voice. Script readings and directed staging sessions.

Same as: TAPS 178.

**TAPS 278. Page to Stage: Playwriting and Solo Performance. 3-5 Units.**

Dramatic writing: scripted and solo, and as performed by actors or by the playwright. Physical and psychological theatrical action. Development of skills in dialogue, story structure, style, and personal voice. Script readings and directed staging sessions.

Same as: TAPS 178.

**TAPS 279C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop. 3-5 Units.**

This course emphasizes the study and practice of personal memoir writing and literary journalism. The class will explore those writings that contain a public and private story, navigating an intimate and institutional world. Student writers will serve as public chroniclers whose subjective point of view and experience attempt to provide a truth greater than what the facts can offer.

Same as: CSRE 179C, CSRE 279C, TAPS 179C.

**TAPS 279C. Chroniclers of Desire: Creative Non-Fiction Writing Workshop. 3-5 Units.**

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Same as: CSRE 179C, CSRE 279C, TAPS 179C.

**TAPS 279G. Indigenous Identity in Diaspora: People of Color Art Practice in North America. 3-5 Units.**

This "gateway" core course to the IDA emphasis in CSRE offers a 21st century examination of people of color aesthetics and related politics, drawing from contemporary works (literature, music, visual and performing arts) in conversation with their native (especially American Indigenous and African) origins. Issues of gender and sexuality in relation to cultural identity are also integral to this study. Students will be required to produce a final work, integrating critical writing with a creative project.

Same as: CSRE 179G, CSRE 279G, TAPS 179G.

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Same as: CSRE 179G, CSRE 279G, TAPS 179G.

**TAPS 290. Special Research. 1-5 Units.**

Individual project on the work of a playwright, period, or genre.

**TAPS 290. Special Research. 1-5 Units.**

Individual project on the work of a playwright, period, or genre.

**TAPS 300A. Critical Styles I. 5 Units.**

Literary criticism and theory, emphasizing style as evidence of historical, cultural, and ideological concerns. Assumptions about written texts by authors such as Coleridge, Bradley, and Burke. How style reveals context. Students write in the style of authors discussed.

**TAPS 300A. Critical Styles I. 5 Units.**

Literary criticism and theory, emphasizing style as evidence of historical, cultural, and ideological concerns. Assumptions about written texts by authors such as Coleridge, Bradley, and Burke. How style reveals context. Students write in the style of authors discussed.

**TAPS 300B. Critical Styles II. 5 Units.**

This seminar follows on from Critical Styles I in which students were grounded in the rigors of critical writing. In this sequel seminar, the emphasis will be on the overtones and undertones of critical thought in performance making and performance analysis. Students will generate weekly critical and creative responses to readings from contemporary writers and artists such as Jacques Rancière, Amelia Jones, Guillermo Gómez-Peña and Marina Abramovic. Workshop activities and performances will take place alongside seminar discussions of readings.

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**TAPS 301. Performance and Performativity. 5 Units.**

Performance theory through topics including: affect/trauma, embodiment, empathy, theatricality/performativity, specularity/visibility, liveness/disappearance, belonging/abjection, and utopias and dystopias. Readings from Schechner, Phelan, Austin, Butler, Conquergood, Roach, Schneider, Silverman, Caruth, Fanon, Moten, Anzaldúa, Agamben, Freud, and Lacan. May be repeated for credit.

**TAPS 301. Performance and Performativity. 5 Units.**

Performance theory through topics including: affect/trauma, embodiment, empathy, theatricality/performativity, specularity/visibility, liveness/disappearance, belonging/abjection, and utopias and dystopias. Readings from Schechner, Phelan, Austin, Butler, Conquergood, Roach, Schneider, Silverman, Caruth, Fanon, Moten, Anzaldúa, Agamben, Freud, and Lacan. May be repeated for credit.

**TAPS 303. Race and Performance: Art, Atrocity and Activism. 5 Units.**

This team taught course focuses on contemporary South Asian and Black diasporic art work that concerns itself with questions of atrocity and activism. We will ask how artists engage world-historical events and what constitutes activism. Theoretical work will be wide-ranging as will the kinds of art and topics studied: indeed, we will discuss everything from Agamben to AIDS, Ai Wei-Wei to feminist punk in Russia, female circumcision in Sweden to U.N. aid workers in Afghanistan, queer subjects and global ideas freedom.

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**TAPS 304. Historiography of Theater. 3-5 Units.**

Goal is to design an undergraduate theater history class. Standard theater history textbooks, alternative models of theater history scholarship, and critical literature engaging historiography in general.  
Same as: TAPS 166H.

**TAPS 304. Historiography of Theater. 3-5 Units.**

Goal is to design an undergraduate theater history class. Standard theater history textbooks, alternative models of theater history scholarship, and critical literature engaging historiography in general.  
Same as: TAPS 166H.

**TAPS 321. Proseminar. 3-5 Units.**

Workshop. Skills needed to participate in the academic profession including abstract, conference presentation, and dissertation or book chapter.

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Workshop. Skills needed to participate in the academic profession including abstract, conference presentation, and dissertation or book chapter.

**TAPS 351H. Improvisational Strategy Laboratory for Innovation through Performance. 4-5 Units.**

Students will build a theoretical and practical foundation for improvisational practices used in Dance and Performance as methodologies for the creation of innovative artistic work. Guest Artists Workshops and a Public Lecture Series will accompany the texts, discussions, videos, and studio practice. We will explore improvisation as both praxis and theory. Texts include work by John Cage, Fred Moten, Anthony Braxton, Twyla Tharpe, Yayoi Kusama, Kwodo Oshun, Bill T. Jones, Harryette Mullen and more.

Same as: DANCE 151H, DANCE 251H, TAPS 151H.

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Same as: DANCE 151H, DANCE 251H, TAPS 151H.

**TAPS 358H. Proximity and Temporality in Performance. 4-5 Units.**

This course considers the relationship between proximity and temporality in live performance, looking quite literally at the distance in space and time between performers and audiences. Alongside case studies of performance works, class readings will be drawn from current Performance Studies scholarship as well as discourses in postmodern geographies and anthropological studies of `proxemics; as well as key philosophic works such as Lefebvre;s The Production of Space and Heidegger;s The Concept of Time.

Same as: TAPS 158H.

**TAPS 358H. Proximity and Temporality in Performance. 4-5 Units.**

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Same as: TAPS 158H.

**TAPS 358L. The Ethics of Storytelling: The Autobiographical Monologue in Theory, in Practice, and in the World. 4 Units.**

Recently a theatrical monologist gained notoriety when it was revealed that key aspects of one of his `autobiographical; stories had been fabricated. In this class another autobiographical monologist -- who has himself lied many times in his theater pieces, without ever getting caught -- will examine the ethics of telling our life stories onstage. Does theatrical `truth; trump factual truth? We will interrogate several autobiographical works, and then -- through autobiographical pieces created in class -- we will interrogate ourselves.

Same as: TAPS 158L.

**TAPS 358L. The Ethics of Storytelling: The Autobiographical Monologue in Theory, in Practice, and in the World. 4 Units.**

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Same as: TAPS 158L.

**TAPS 364T. Queer Art and Performance. 4-5 Units.**

Examines the late 19th, 20th and 21st century forms of performance-- including examples from drama, theater, cabaret, and performance art -- through the perspectives of contemporary critical gender and queer theories. Texts and movements range from early avant-garde (Dada, Futurism) to gay and lesbian drama (Lillian Hellmann, Joe Orton, Tony Kushner) to post-liberation Queer performance and video (Split Britches, Carmelita Tropicana, Kalup Linzy). Theorists include Judith Butler, Michel Foucault, and Eve Kosofsky Sedgwick.

Same as: FEMST 140P, TAPS 164T.

**TAPS 364T. Queer Art and Performance. 4-5 Units.**

Examines the late 19th, 20th and 21st century forms of performance-- including examples from drama, theater, cabaret, and performance art -- through the perspectives of contemporary critical gender and queer theories. Texts and movements range from early avant-garde (Dada, Futurism) to gay and lesbian drama (Lillian Hellmann, Joe Orton, Tony Kushner) to post-liberation Queer performance and video (Split Britches, Carmelita Tropicana, Kalup Linzy). Theorists include Judith Butler, Michel Foucault, and Eve Kosofsky Sedgwick.

Same as: FEMST 140P, TAPS 164T.

**TAPS 368S. Understanding and Staging Molière Theatre. 3-5 Units.**

Devoted to an in depth analysis of Molière's major plays, as well as a study of contemporary productions of his work. Taught in French.

Same as: FRENCH 316.

**TAPS 368S. Understanding and Staging Molière Theatre. 3-5 Units.**

Devoted to an in depth analysis of Molière's major plays, as well as a study of contemporary productions of his work. Taught in French.

Same as: FRENCH 316.

**TAPS 371. Performance Making: Process. 5 Units.**

A studio course focused on creative processes and generating original material. Students will be encouraged to think critically about the relationship between form and content exploring the possibilities of site specific, gallery and theatre settings. Students will reflect throughout on the types of contact and communication uniquely possible in the live moment, such as interaction or the engagement of the senses. The emphasis is on weekly experimentation in the creation of short works rather than on a final production.

Same as: TAPS 171.

**TAPS 371. Performance Making: Process. 5 Units.**

A studio course focused on creative processes and generating original material. Students will be encouraged to think critically about the relationship between form and content exploring the possibilities of site specific, gallery and theatre settings. Students will reflect throughout on the types of contact and communication uniquely possible in the live moment, such as interaction or the engagement of the senses. The emphasis is on weekly experimentation in the creation of short works rather than on a final production.

Same as: TAPS 171.

**TAPS 372. Directing Workshop: The Actor-Director Dialogue. 5 Units.**

This course focuses on the actor-director dialogue. We will work with actors and directors developing approaches to collaboration that make the actor-director dialogue in theater.

Same as: TAPS 170B.

**TAPS 372. Directing Workshop: The Actor-Director Dialogue. 5 Units.**

This course focuses on the actor-director dialogue. We will work with actors and directors developing approaches to collaboration that make the actor-director dialogue in theater.

Same as: TAPS 170B.

**TAPS 373W. SOLO PERFORMANCE. 4-5 Units.**

Students will learn how to draw from the specificity of their own unique experiences, connecting with ideas, issues and questions that resonate with race, class, gender, environmental and global issues. The course will give students the creative and critical tools to enable them to connect the personal with the political and see the solo voice as a powerful, potent form of artistic expression. Students will have the opportunity to hone their own creative talents in writing, devising, composing, producing and creating work.

Same as: TAPS 173.

**TAPS 373W. SOLO PERFORMANCE. 4-5 Units.**

Students will learn how to draw from the specificity of their own unique experiences, connecting with ideas, issues and questions that resonate with race, class, gender, environmental and global issues. The course will give students the creative and critical tools to enable them to connect the personal with the political and see the solo voice as a powerful, potent form of artistic expression. Students will have the opportunity to hone their own creative talents in writing, devising, composing, producing and creating work.

Same as: TAPS 173.

**TAPS 374A. Performance Making: Production. 5 Units.**

A structured, creative environment for students working toward the realization of Senior Projects and 2nd year graduate productions. Instructors will work with students to develop the relationships between the content and the form of their productions using critical and creative tools to develop and reflect on the work. There will be a staged class showing at the end of the quarter followed by critiques designed to help students as they begin preparing for their final public performances (beyond the class).

Same as: TAPS 174A.

**TAPS 374A. Performance Making: Production. 5 Units.**

A structured, creative environment for students working toward the realization of Senior Projects and 2nd year graduate productions. Instructors will work with students to develop the relationships between the content and the form of their productions using critical and creative tools to develop and reflect on the work. There will be a staged class showing at the end of the quarter followed by critiques designed to help students as they begin preparing for their final public performances (beyond the class).

Same as: TAPS 174A.

**TAPS 374B. Projects in Performance. 3-5 Units.**

Creative projects to be determined in consultation with Drama graduate faculty and production advisor.

**TAPS 374B. Projects in Performance. 3-5 Units.**

Creative projects to be determined in consultation with Drama graduate faculty and production advisor.

**TAPS 375. Main Stage Production. 3-5 Units.**

Production of a full-length play as part of the Department of Drama season. Public performance.

**TAPS 375. Main Stage Production. 3-5 Units.**

Production of a full-length play as part of the Department of Drama season. Public performance.

**TAPS 377. Graduate Directors' Staged Reading Project. 2 Units.**

Presentation of a new or newly adapted work for the stage, in a mode employed in professional theater for the development of new plays. Two to four rehearsals. Public performance.

**TAPS 377. Graduate Directors' Staged Reading Project. 2 Units.**

Presentation of a new or newly adapted work for the stage, in a mode employed in professional theater for the development of new plays. Two to four rehearsals. Public performance.

**TAPS 379. Chicano & Chicana Theater: Politics In Performance. 3-5 Units.**

This is a practicum course, where the basic tenets and evolving politic and philosophies of Chicano and Latin American liberationist theater are examined through direct engagement with its theatrical forms, including, social protest & agit-prop, myth & ritual, scripting through improvisation, in-depth character and solo work, collective conceptualization and more. The course will culminate in an end-of-the quarter play performance in the Niterly Theater (Old Union) and at a Mission District theater in San Francisco.

Same as: CHILATST 179, TAPS 179.

**TAPS 379. Chicano & Chicana Theater: Politics In Performance. 3-5 Units.**

This is a practicum course, where the basic tenets and evolving politic and philosophies of Chicano and Latin American liberationist theater are examined through direct engagement with its theatrical forms, including, social protest & agit-prop, myth & ritual, scripting through improvisation, in-depth character and solo work, collective conceptualization and more. The course will culminate in an end-of-the quarter play performance in the Niterly Theater (Old Union) and at a Mission District theater in San Francisco.

Same as: CHILATST 179, TAPS 179.

**TAPS 390. Directed Reading. 1-6 Units.**

(Staff) Students may take directing reading only with the permission of their dissertation advisor. Might be repeatable for credit twice for 6 units total.

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(Staff) Students may take directing reading only with the permission of their dissertation advisor. Might be repeatable for credit twice for 6 units total.

**TAPS 392. The Road to PSI 2013. 1-5 Units.**

This class explores issues related to performance and temporality, the main theme of the topic of PSI conference hosted by Drama department in June 2013. Also, students actively participate in preparations for the conference. Same as: TAPS 192.

**TAPS 392. The Road to PSI 2013. 1-5 Units.**

This class explores issues related to performance and temporality, the main theme of the topic of PSI conference hosted by Drama department in June 2013. Also, students actively participate in preparations for the conference. Same as: TAPS 192.

**TAPS 399. Dissertation Research. 1-9 Units.**

(Staff).

**TAPS 399. Dissertation Research. 1-9 Units.**

(Staff).

**TAPS 801. TGR Project. 0 Unit.**

(Staff).

**TAPS 801. TGR Project. 0 Unit.**

(Staff).

**TAPS 802. TGR Dissertation. 0 Unit.**

(Staff).

**TAPS 802. TGR Dissertation. 0 Unit.**

(Staff).

## Thinking Matters Courses

**THINK 1. The Science of MythBusters. 4 Units.**

How do scientists actually go about answering practical questions? How does science function as a way of understanding our world, and importantly how does it differ from other approaches? As its point of departure, this course will examine and critique selected episodes of the television series, MythBusters (Discovery Channel), which tests the validity of many popular beliefs, including myths, rumors, traditions, and stories, in a variety of imaginative ways. We will take the opportunity to delve more deeply into the applicability of the scientific method in understanding a vast range of real-world problems, and into the practical acquisition of fact-based knowledge, which together form the cornerstone of all science. The intellectual framework of this course will be based, first and foremost, on skeptical inquiry, combined with the other key ingredients of good science, which include: careful experimental design, meticulous observation and measurement, quantitative analysis and modeling, the evaluation of statistical significance, recovery from failure, and the continuous cycle of hypothesis and testing. We hope to inculcate in our students a taste for questioning, a sense of observation, intellectual rigor, practice with reasoning, modesty in the face of facts, the ability to distinguish between true and false, and an attachment to logical and precise language. (Yves Quéré, 2010 Science 330:605).

**THINK 2. The Art of Living. 4 Units.**

Where do our ideals for living come from, and how should they be structured? How do we justify them in the face of criticism? What role do great works of art play in this creative process? Our lives are not simply given to us, but also something we make: as we examine the circumstances of our existence, recognizing certain facts as immutable and others as subject to our control, each of us faces the challenge of fashioning out of them a way of living that is both meaningful and justifiable. The Art of Living will explore different ways to think about the nature of that challenge, how to accommodate conflicting demands and values, how to make our choices artfully, how we might use works of imaginative literature to inspire us. We will read important works of literature and philosophy, each of which implies a different value by which to live, whether reason, authenticity, community, art, or faith. In each case, you will be presented with different perspectives and asked to work out for yourself what you find most persuasive, thereby fine-tuning skills essential to your own lifelong project of self-construction.

**THINK 3. Breaking Codes, Finding Patterns. 4 Units.**

Why are humans drawn to making and breaking codes? To what extent is finding patterns both an art and a science? Cryptography has been used for millennia for secure communications, and its counterpart, cryptanalysis, or code breaking, has been around for just slightly less time. In this course we will explore the history of cryptography and cryptanalysis including the Enigma code, Navajo windtalkers, early computer science and the invention of modern Bayesian inference. We will try our own hand at breaking codes using some basic statistical tools for which no prior experience is necessary. Finally, we will consider the topic of patterns more generally, raising such questions as why we impute meaning to patterns, such as Biblical codes, and why we assume a complexity within a pattern when it's not there, such as the coincidence of birthdays in a group.

**THINK 4. Can the People Rule?. 4 Units.**

How did our ideas about democracy as a universal norm evolve from a term once used to describe a handful of ancient Greek city-states? Would American democracy function better if we applied ancient practices that allowed the people to rule more directly and knowledgeably? In this course, we will explore the idea of democracy through the experience of the American republic, focusing on the constitutional experiments of the Revolutionary era and the 19th-century democracy analyzed by Alexis de Tocqueville. We then address contemporary criticisms voiced against many democracies today: that the public is not well informed and therefore incapable of governing. You will read and learn to draw on major works of political theory to think critically about the complexities of American democracy. You will also be asked to participate in a two-week experiment in Deliberative Polling, which involves gathering citizens in random groups to study and discuss issues. Through this exercise, you will explore whether this structure might offer an attractive or complementary alternative to representative rule.

**THINK 5. Constituting Justice. 4 Units.**

How does justice incorporate the ideals of freedom, equality, and security? How are these ideals balanced against each other? How are they made concrete in the U.S. Constitution and law? In this course we consider three core ideals that animate the idea of justice: freedom, equality, and security. We explore the relationship between these different concepts through an interdisciplinary inquiry that includes political philosophy, history, and law. In your reading, writing, and thinking, you will move between the realm of abstract ideas and actual legal cases. We begin with the philosophical roots of the ideals of freedom, equality, and security, and then focus on their articulation in the U.S. Constitution and the overarching U.S. legal framework. Students will learn to analyze the distinctive challenges posed to the ideals of freedom, equality, and security by 21st century developments such as the emergence of the internet and the rise of non-state warfare.

**THINK 6. Everyday Life: How History Happens. 4 Units.**

To what extent can individuals' daily actions influence world events, and to what extent are individuals influenced by world events? This course investigates the relationship between private lives and public affairs. We will trace how small acts contribute to global change and, in turn, how global change can shape one's sense of self. We will explore the shifting mentalities of individuals during the most dramatic transformations in 20th century Europe: World War I, communist revolution, the rise of Nazism, World War II, the Holocaust, and the Cold War. Through analysis of memoirs, diaries, essays, novels, and state documents, you will examine how social and political developments can reveal the very boundaries between self and society. To make this exploration more personal, you will develop a fictional persona that you will keep throughout the quarter through which you explore the everyday workings behind momentous change.

**THINK 7. Journeys. 4 Units.**

Is death final or only the beginning of another journey? How do the mysteries of destination give rise to our most basic questions of purpose, meaning, and faith, and challenge us to consider our proper relation to others? Journeys will examine works written across a span of some 2,300 years, from Chinese philosophy to American short stories. Each of these forms and genres presents some essential aspect of the journey we all share, and of the various passages we make within that one great journey that relentlessly challenge and transform us even as we advance toward what the poet Thomas Gray called our "inevitable hour." By reading, discussing, and interpreting these works, we will ask you to consider how each text compels us, by the penetration of its vision and the power of its art, to make part of our own journey in its company.

**THINK 8. Sustainability and Collapse. 4 Units.**

What does it mean to live sustainably? How do our different definitions of nature: scientific, literary, cultural, and historical: shape the way we answer that question? Sustainability and Collapse will explore what people in different places and periods of time have envisioned as successful ways of living with nature and how such ways of life have come under pressure. We will focus particularly on the interface between scientific and humanistic approaches to questions of environmental sustainability through a study of novels, historical texts, and works of biogeography. You will learn to ask how textual and visual images inform our ideas about what it means to live sustainably. We will then consider whether those ideas are in accordance with or in conflict with scientific understandings of human uses of nature. This course takes on some of the fundamental problems that presently confront our global community.

**THINK 9. Technological Visions of Utopia. 4 Units.**

How do science and technology shape the frameworks for imagining utopian or dystopian societies? Sir Thomas More gave a name to the philosophical ideal of a good society: a word that is now a part of common language: utopia. In the almost 500 years since More's Utopia appeared, changes in society: including enormous advances in science and technology: have opened up new possibilities for the utopian society that More and his predecessors could not have envisioned. At the same time science and technology also entail risks that suggest more dystopian scenarios: in their most extreme form, threats to humanity's very survival. We will look at several works that consider how literary visions of society have evolved with the progress of science and technology. The readings begin with More and include examples of more technologically determined visions of the late 20th century, as imagined in works of fiction.

**THINK 10. Voyages and Visionaries. 4 Units.**

How did cross-cultural contact between Europe and Asia in the pre-modern era produce our modern concept of civilization? In this course we examine five moments of intellectual encounter in the pre-modern era among civilizations of the eastern hemisphere, including India and China and what we now call the Middle East. Through the eyes of scholars, pilgrims, and missionaries, you will learn to map the itineraries of early travelers and to analyze their experiences from a comparative perspective. We will focus on reconstructing the worldviews and geographical imaginations that inform each text with reference to historical maps and images.

**THINK 11. Bioethical Challenges of New Technology. 4 Units.**

How might we apply ideas from ethical theory to contemporary issues and debates in biotechnology? This course will provide critical encounters with some of the central topics in the field of bioethics, with an emphasis on new technologies. Controversies over genetic engineering, stem cell research, reproductive technologies, and genetic testing will provide an opportunity for you to critically assess arguments and evidence. We will begin with an overview of the field and the theoretical approaches to bioethics that have been derived from philosophy. You will then have the opportunity to engage in debate and learn how to identify underlying values and how to apply ideas from ethical theory to contemporary problems.

**THINK 12. Century of Violence. 4 Units.**

What is modern about modern mass violence? This course explores the evolution, varieties, and logic of mass violence from the early 20th century to the present day. You will engage with and analyze primary accounts of such violence by victims, observers, perpetrators, and courts. We will then consider the effectiveness of various efforts to confront genocides and crimes against humanity in international courts and institutions, past and present. We start with the emergence of genocide as a modern, international issue; proceed with colonial massacres in early 20th century Africa; moved to the Armenian genocide in the Ottoman Empire and WWI, Nazi and Nazi-inspired racial murder, communist-induced mass violence in the Soviet Union and Asia, ethnic cleansing in former Yugoslavia; and end with an examination of the recent genocides in Rwanda, Sudan, and the Middle East.

**THINK 13. Epic Journeys. 4 Units.**

What makes an epic hero? How does the epic poem externalize our quest for identity and self-definition? The human quest for identity and self-knowledge is the oldest story of human culture. It almost always involves a confrontation with death. As the epic hero journeys across the physical world and descends into the underworld to visit the dead and seek counsel from them, he gradually comes to understand himself in a deeper, more meaningful way than before he set out on his journey. In this course, you will learn to engage in depth with some of the great epics of the Western tradition, beginning with The Epic of Gilgamesh and ending with Dante's masterpiece, The Divine Comedy. In each case, we will consider the unique goals of each hero's journey and the obstacles he must confront in order to reach his destination, with particular attention to the themes of violence in self and society, exile and alienation, the encounter with ancestors, the female voice, and divine guidance. We will focus on how the hero's search for a moral identity in relation to his community connects to current definitions of the ethical life in relation to political violence, war, honoring the dead, and confronting our mortality.

**THINK 14. From the Closed World to the Infinite Universe. 4 Units.**

How and why did the Copernican revolution in astronomy, which placed the Sun at the center of the solar system rather than the earth, have such a profound effect on the relationship between science, philosophy, and religion? How did it ultimately lead to the secularization of modern society? This course examines the defining moments when western science, philosophy, and religion became disentangled from one another, eventually leading to the development of our modern secular culture. As background for understanding the Copernican revolution and its aftermath, we begin with a brief examination of Plato and Aristotle, and how these two Ancient Greek thinkers were later taken up in the medieval period, resulting in a synthesis in which science, philosophy, and religion were intimately interconnected. Against this background we will then focus on the scientific revolution of the 16th and 17th centuries and encounter thinkers who during their lifetimes defied easy categorization: Were Galileo and Newton philosophers or scientists? What about Descartes and Leibniz? In reading texts that we now understand as belonging to one or the other category, we will see how the two disciplines eventually became sharply distinguished from one another, which then led, in turn, to the modern separation between science and religion.

**THINK 15. How Does Your Brain Work?. 4 Units.**

How do the biological and chemical processes in the brain give rise to the mind that lets us talk, walk, laugh, love, learn, remember, and forget? How does the brain, in other words, make us human? The human brain is the most complex organ we know. It has evolved over time by adapting to the various behavioral and environmental constraints. The highly interactive lectures and discussions in this course will be directed at understanding the biological mechanisms of brain function, from the individual structures to functioning brains. You will learn to analyze how the science of the brain has emerged by critically reading and writing about experiments and other observations. In addition, you will learn to assess the accuracy of how brain science is reported in the press, the web, and in other forms of popular representation.

**THINK 16. Is the Universe Just? Explorations in the Classics. 4 Units.**

What can the Classics teach us about understanding justice and injustice? Do you ask yourself whether your life is controlled more by your own free choices or by your genetic code? Do you worry whether a superpower can function without hubristic arrogance? Do you ponder what constitutes the Good Life? If these sorts of issues are central to your intellectual and personal growth, this course will demonstrate to you that the ancient Mediterranean world was equally consumed with questions about the nature of human society and human existence. We will explore certain recurring themes within classical text such as the relationship between power and gender; gods and humans; innocence and evil. We will read a wide and deep selection of important and influential literary texts from the Near East, Greece, and Rome, spanning from c.2000 BCE to the first century BCE. The readings will include creation texts, epic, lyric, tragedy, and philosophy.

**THINK 17. The Poet Re-Making the World. 4 Units.**

Can poetry change the world? Poets use form and language to hold up a mirror to the events that change the world and the making of a poem can also be the re-making of a world. We will read and study poetry from different historical, cultural, and poetic traditions, and explore whether something as individual as artistic expression can help us cope with the social and political events that bring suffering and destruction. The course follows the adventures of the individual poet: from a young man caught in the trenches of the First World War, to a Japanese haiku master of the 17th century, to an American Beat, to an English woman trapped in the conventions of her time, to a contemporary U.S. soldier in Iraq. Poets show us the many similarities, as well as rich cultural differences, between us all.

**THINK 18. Rebellious Daughters and Filial Sons of the Chinese Family. 4 Units.**

How has the family been broken, preserved, and reinvented in the fast-changing world of revolution and modernization? *Rebellious Daughters and Filial Sons of the Chinese Family* follows the theme of the Chinese family in fiction and film to investigate the core values that hold it together in the midst of great historical change. You will learn to interpret both fiction and film as visual and textual narratives that illuminate the multiple aspects of family and community. We will explore how modernization, colonialism, revolution, war, and immigration disrupt traditional home and family. Through film and text, we will discover the various poignant attempts to rebuild family relations in the midst of such dislocation. As you embark on your college education and take leave of your own families, you might start to consider how your familial ties shape your concept of self, your emotional attachment to community, social relationships with society, and political consciousness.

**THINK 19. Rules of War. 4 Units.**

When, if ever, is war justified? How are ethical norms translated into rules that govern armed conflict? Are these rules still relevant in light of the changing nature of warfare? We will examine seminal readings on just war theory, investigate the legal rules that govern the resort to and conduct of war, and study whether these rules affect the conduct of states and individuals. We will examine alternative ethical frameworks, competing disciplinary approaches to war, and tensions between the outcomes suggested by ethical norms, on the one hand, and legal rules, on the other. Students will engage actively with these questions by participating in an interactive role-playing simulation, in which they will be assigned roles as government officials, advisors, or other actors who will confront ethical, legal, and strategic problems as they make decisions about military intervention and policies regarding the threat and use of force in an international crisis.

**THINK 20. Ultimate Meanings. 4 Units.**

Does life have some ultimate meaning or purpose? How can the stories used by the world's religions help us find the answer to this question? *Ultimate Meanings* will focus on stories shared by the world's three great monotheistic traditions: stories first recorded in the Hebrew Bible/Old Testament and later elaborated upon by Jews, Christians, Muslims, and secular readers. Our aim is to understand the original meaning of these stories, what their authors intended them to mean, as well as to examine how different kinds of readers, from religious scholars to artists to feminists, have interpreted and understood them. This course will help you further develop your skills as an interpreter, which includes not only the ability to find meaning in texts but also to appreciate the meanings that others find there.

**THINK 21. Why do we like (to read about) Vampires? (Mostly Russian) Literature, Film, Folklore. 4 Units.**

What is folklore, and what is its purpose? How do we decide if something is authentically folk, and does it matter? Why are Eastern Europe and Russia associated with the idea of folklore? For the past two centuries, elite writers, composers, and artists have found inspiration in the stories, songs, and beliefs of their grandparents, their servants (or their slaves), and their neighbors. In this class, you will not only learn to analyze folklore but actually develop fieldwork skills as you gather folklore from your own local sources. We begin the course with examples from around the world: the German Brothers Grimm, the Scottish Robert Burns, the Americans Woody Guthrie and Zora Neale Hurston. Then we turn to Eastern Europe and the role it has played in the Western European and American imagination as the home of the archaic and the authentic, from the vampires of Transylvania to the oral epics of the Bosnian Serbs to the nostalgic image of the Jewish shtetl.

**THINK 22. World Archaeology and Global Heritage. 4 Units.**

Who owns the past? Is cultural heritage a universal right? This course interrogates the relationship between the past and the present through archaeology. Increasingly, heritage sites are flash points in cultural, economic, and religious conflicts around the globe. Clearly history matters, but how do certain histories come to matter in particular ways, and to whom? Through close study of important archaeological sites, you will learn to analyze landscapes, architecture, and objects, as well as reflect on the scholarly and public debates about history and heritage around the world. Far from being a neutral scholarly exercise, archaeology is embedded in the heated debates about heritage and present-day conflicts.

**THINK 23. The Cancer Problem: Causes, Treatments, and Prevention. 4 Units.**

How has our approach to cancer been affected by clinical observations, scientific discoveries, social norms, politics, and economic interests? Approximately one in three Americans will develop invasive cancer during their lifetime; one in five Americans will die as a result of this disease. This course will expose you to multiple ways of approaching the cancer problem, including laboratory research, clinical trials, population studies, public health interventions and health care economics. We will start with the 18th century discovery of the relationship between coal tar and cancer, and trace the role of scientific research in revealing the genetic basis of cancer. We will then discuss the development of new treatments for cancer as well as measures to screen for and prevent cancer, including the ongoing debate over tobacco control. Using cancer as a case study, you will learn important aspects of the scientific method including experimental design, data analysis, and the difference between correlation and causation. You will learn how science can be used and misused with regard to the public good. You will also learn about ways in which social, political, and economic forces shape our knowledge about and response to disease.

**THINK 24. Evil. 4 Units.**

What is evil? Are we naturally good or evil? How should we respond to evil? There are many books and courses that focus on the good life or the virtues. Yet despite their obvious apparent presence in our life and world, evil and the vices are rarely taken as explicit topics. We will read philosophical and literary texts that deal with the question of evil at an abstract level and then use other readings that help us focus on more practical implications of the meaning and consequences of evil. By exploring the issue of evil, we will confront larger questions about the nature of humans, the responsibility to address evil as a society, and the moral and ethical ways we might begin to define what is evil.

**THINK 25. Evolution on Earth. 4 Units.**

How does evolution, the foundation of biology, underlie the diversification of life on earth? What are the mechanisms of evolution, and how are they discovered and explored? What are the practical implications of evolution for agriculture, medicine, and the future of life on earth? The history of life on earth is inextricably intertwined with the history of geological change on earth. From a primordial soup containing building block molecules emerged early forms of single-celled organisms, which existed for billions of years as continents formed, moved, and dissolved. Multicellular forms evolved and changed as a result of atmospheric changes, the cooling of the earth, and the contributions of other living organisms. Early ideas about biological evolution came from young people who went on wild adventures. Their observations generated ideas about what must have happened; but since, at the time, little was known about the mechanisms of inheritance, they were never to know how it happened. In time, two major advances came along: a much more comprehensive fossil record that substantiated many of their ideas, and a deep understanding of genetic mechanisms of inheritance. In parallel, the idea of geologic forms as dynamic, especially vulcanism and plate tectonics, provided a new narrative of earth history that informed ideas about spreading and changing life forms. Then mechanisms of developmental biology showed how inherited genes carry out recipes for building bodies with certain structures. We will examine evolution from scientific, historical, and artistic perspectives, including evolution of microbes, plants, animals, and humans, and implications of evolution for medicine. The course will include introductory lectures, some in class and some online, discussion sessions, and three team projects for each student. Student teams will examine topics of their choosing in depth and create reports that will be assembled into a comprehensive book.

**THINK 26. How Do You Build a Nation? Inclusion and Exclusion in the Making of Modern Iran. 4 Units.**

Why were minority religious groups excluded from the majority's vision of a Shi'i Iranian nation? How and when were women included as citizens of a new Iran? In this course, specific attention will be paid to key events of the 20th century that shaped modern Iran: the Constitutional Revolution (1905-11), the 1953 coup, the White Revolution (1963), the Islamic Revolution (1978-79), the Iran-Iraq War (1980-1988), and the post-revolutionary period in general. Through a close reading of key poems, short stories, and films created in this period, this course will identify major inclusionary and exclusionary forces in the process of nation-building in 20th-century Iran. Specific attention will be paid to issues of ethnicity, religion, and gender. In addition to reading texts (poetry and prose) and watching films, students will be called on to present critiques of these literary and cinematic products in the form of brief oral presentations and short writing assignments. The final project will involve interviewing Iranian expatriates on issues covered in the lectures. Students will work in small groups to produce short videos of these interpersonal encounters.

**THINK 27. Human Rights and Humanitarianism. 4 Units.**

Why do certain governments and citizens feel obliged to ease the suffering of distant people in need? How did the humanitarian sensibilities and human rights discourses that now define global politics come into being? In this course, you will consider how contemporary ethical motivations for human rights and humanitarianism have developed. We will investigate the emergence and transformation of these ideas through the study of key historical events in the modern world: slavery and its abolition, colonialism, the World Wars, apartheid, decolonization, and the Cold War. We will then consider how this longer history has influenced the ways activists, NGOs, and governments today draw attention to global crises and abuses. Our ultimate objective is to gain an understanding of how the language and ideals of human rights and humanitarianism emerged from the context of liberalism, capitalism, and imperialism.



**THINK 28. Media and Message. 4 Units.**

How do different media embody information? What are the implications for the ways we understand the world and our place in it? Visual media are conduits for information and narrative but are experienced very differently. We will explore a range of historical and contemporary media, with an emphasis on the ways that different media present, organize, and structure information as forms that are read or experienced. You will be asked to compare, for example, how two different media explore the same or similar content: examples of this kind of comparison might be a film *Western* and the video game *Red Dead Redemption* or the Book of Genesis and R. Crumb's comic adaptation of the same text. We start with considerations of the illuminated book, print, painting, and photography and move to the more recent cinema, television, and interactive and computational media.

**THINK 29. Networks: Ecological, Revolutionary, Digital. 4 Units.**

Why is the word network used to describe the behavior of computers, ants, and people? Do all these networks share certain properties, and what might we learn by comparing them? We like to think of social networks as a contemporary phenomenon. But before Facebook, individuals organized themselves in social networks; before Twitter, revolutionaries used media to communicate and coordinate their messages. In fact, even animal societies are networked. Through project-based exercises, you will learn to study, analyze, and write about networks from the perspectives of a biologist, a computer scientist, and a historian. We will retrace social networks in the 18th and 21st centuries, observe the organization of animal networks, and investigate the structure of online networks. Our goal is to use the concept of the network to deepen our understanding of the natural world, historical change, and our own social lives.

**THINK 30. Race Matters. 4 Units.**

What are race and ethnicity? How do they shape society and individual experience? What role do they play in identity formation? Going to school and work, renting an apartment, going to the doctor, watching television, voting, reading books and newspaper, or attending religious services are all activities that are influenced consciously and unconsciously by race and ethnicity. In this course, we will draw on scholarship from psychology, genetics, history, and cultural studies to understand contemporary racial formations and cultural representations. We will look at how recent research on the human genome has reinvigorated biological conceptions of race and ethnicity, engage in activities that highlight the psychological consequences of race and ethnicity, and analyze selected race-relevant memes that appear in popular media.

**THINK 31. Reimagining America: Cultural Memory and Identity Since the Civil War. 4 Units.**

How have Americans remembered the Civil War, what it meant, what it accomplished, and what it failed to accomplish? How did Americans reimagine the United States as a nation after the war, who belonged in the national community and who would be excluded? In 1865, the peace treaty was signed at Appomattox and the Thirteenth Amendment outlawed slavery, but the battle over memory and national identity had just begun. The questions that the Civil War addressed and failed to address continue to affect our lives today. We will focus on how Americans negotiated issues of cultural memory and national identity through a close analysis of historical texts, novels, poems, films, paintings, cartoons, photographs, and music. Our interpretations will foreground the particular themes of race and nationhood; freedom and citizenship; and changing notions of individual and collective identity. Our assumption in this course is that history is not available to us as a set of events, fixed, past, and unchanging. Rather, history is known through each generation's interpretations of those events, and these interpretations are shaped by each generation's lived experience. What stories get told? Whose? And in what ways? The stories we choose to tell about the past can shape not only our understanding of the present, but also the kind of future we can imagine and strive to realize.

**THINK 32. Subversive Acts: Invention and Convention in the 20th Century. 4 Units.**

Can art subvert social practice and politics? In this course, we will learn how to read art and analyze the ways aesthetic objects can raise larger conceptual questions about culture, society, and change. We will do this by investigating the broad range of artistic, social, and political meanings of the term *avant-garde* in the 20th century. The course looks at some of the key moments in *avant-garde* art in Europe, including Dadaism and Futurism, with a particular emphasis on Russia. Through an examination of various aesthetic case studies, we will be able to ask the larger question of whether art can actually challenge social conventions and established political ideologies.

**THINK 33. The Water Course. 4 Units.**

How can we balance all the competing, and growing, demands for freshwater? When you turn on your tap, where does the water come from? Water is essential for life. But, around the world, governments and citizens are challenged to balance the human demands on our freshwater resources, while protecting the integrity of natural ecosystems. At the core of the challenge is our limited understanding, in many parts of the world, of the watershed-scale hydrologic cycle, the course that the water follows from rainfall, to river, to groundwater, to ocean, to atmosphere, and back again. The Water Course takes students along that course, exploring the role that natural systems and human systems play in impacting both the quantity and quality of our freshwater. We will consider the scientific and ethical questions surrounding decisions about water allocation, and discuss new scientific methods that provide support for science-based decision making in the management of freshwater resources. You will connect global-scale issues to your personal experiences with freshwater through a quarter-long project investigating both water quantity and water quality in your hometown and surrounding watershed. You will produce a numerical model, and make approximations, to describe a complex natural system. Using online resources you will explore the pathway that water takes from rainfall to your tap.

**THINK 34. Education as Self-Fashioning: Building a Philosophical Way of Life. 7 Units.**

From the beginning, philosophers have been interested in education, since both philosophy and education are fundamentally concerned with the development of a person's character and how that prepares her to lead a good life. We will explore a range of philosophical approaches to education and its effects on the project of constructing a self one can call one's own. Central issues will include the proper role of reason in life, what self-fashioning even is, what makes true self-governance possible, whether education can liberate the individual or a group of people, and how we should conceive a philosophical education in an era of increasing professionalization and specialization.

**THINK 35. Education as Self-Fashioning: In Pursuit of Knowledge, Justice, and Truth. 7 Units.**

In what sense does education, the acquisition of knowledge, and reflection make one a better person? This question was at the core of the beginning of European moral philosophy when Socrates is said to have asserted that the unexamined life is not worth living. The Socratic dialogues of Plato explore the link between knowledge and a just character. Yet for many of Socrates' Athenian contemporaries the newly emerging education in 5th c. Athens was subversive and impious. The trial, conviction and execution of Socrates brought into focus profound and enduring questions about the relation of liberal education to traditional authority, especially religious belief. Then 800 years later another intellectual giant of antiquity, St. Augustine, argued that systematic rational thought could never be enough to discover ultimate truths, that faith was essential.

**THINK 36. Education as Self-Fashioning: Learning for a Public Life. 7 Units.**

Can education impart more than bookish learning? This is the question that critics have posed since the European Renaissance. Through their reflections, these critics posited an alternative ideal of education that prepared the student for life outside the academy. Over the centuries, this ideal would evolve into what we would today call an intellectual, but this modern concept only captures a part of what earlier writers thought learning could achieve. In this course, we will focus on how education can prepare students to engage in public debates, and the role that the university can play in public learning.

**THINK 37. Education as Self-Fashioning: Rigorous and Precise Thinking. 7 Units.**

Certain types of learning bring a discipline to the mind that permanently changes the way one thinks. Precise formal reasoning is one example. In this course, we focus on the nature of mathematical invention and learning. What is a formal proof? Why are proofs necessary? How does one construct a proof? How does one invent; how does one find ideas? Participants should be willing to write about the creative mathematical process, and also to (learn to) write formal proofs.

**THINK 38. Education as Self-Fashioning: The Active, Inquiring, Beautiful Life. 7 Units.**

Moving through history from the Rome of the Emperor Hadrian, to the city-states of Renaissance Italy, to the 18th century republic of the United States, we will examine how self-made men fashioned themselves and their surroundings by educating themselves broadly. We will ask how a liberal education made their active careers richer and more transformational. We will also take up the great debate on whether a liberal education or vocational training is the surest path to advancement. We will engage this debate through the works of W.E.B. Du Bois and Booker T. Washington but consider today's struggle over the same issues, a struggle that engrosses both highly industrialized and developing societies.

## Tibetan Language Courses

**TIBETLNG 1. First-Year Tibetan, First Quarter. 4 Units.**

Grammar, reading, and composition. Tibetan culture and the Tibetan view of reality.

**TIBETLNG 2. First Year Tibetan, Second Quarter. 4 Units.**

Continuation of 1.

**TIBETLNG 3. First Year Tibetan, Third Quarter. 4 Units.**

Continuation of 2.

**TIBETLNG 13. Intermediate Tibetan, Third-Quarter. 4 Units.**

Continuation of 12.

**TIBETLNG 21. Intermediate/Advanced Tibetan, First Quarter. 4 Units.****TIBETLNG 22. Intermediate/Advanced Tibetan, Second Quarter. 4 Units.****TIBETLNG 23. Intermediate/Advance Tibetan, Third Quarter. 4 Units.****TIBETLNG 199. Individual Work. 1-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

**TIBETLNG 395. Graduate Studies in Tibetan. 2-5 Units.**

May be repeated for credit. Prerequisite: consent of instructor.

## Undergraduate Advising and Research Courses

**UAR 10. Intellectual Journeys. 1 Units.**

Stanford speakers share their research as well as their intellectual and life paths, including how they chose their undergraduate major, how they found mentors, and what their field offers undergraduates.

**UAR 42A. LSP First Year Seminar. 1 Units.**

For freshmen who participated in the Leland Scholars Program. This seminar supports LSP students in the first year in the areas of institutional engagement, academic empowerment, their sense of belonging to Stanford, and builds their cohort identity.

**UAR 42B. LSP First Year Seminar B. 1 Units.**

For freshmen who participated in the Leland Scholars Program. This seminar supports LSP students in the first year in the areas of institutional engagement, academic empowerment, their sense of belonging to Stanford, and builds their cohort identity.

**UAR 56. Building a Successful Academic Career. 1 Units.**

For freshmen in expanded advising programs. Techniques for honing academic skills for college, and applying those skills to better define intellectual identity in academic pursuits. May be repeated for credit.

## Urban Studies Courses

**URBANST 100A. Pre-field Course for Urban Studies Alternative Spring Break. 1 Units.**

Limited to students participating in the Alternative Spring Break program. See <http://asb.stanford.edu> for more information.

**URBANST 110. Utopia and Reality: Introduction to Urban Studies. 4 Units.**

The study of cities and urban civilization. History of urbanization and current issues such as suburbanization, racial discrimination, globalization, and urban sustainability. Public policies designed to address these issues and Utopian versions of what cities could be in the future.

**URBANST 111. Urban Politics. 5 Units.**

The major actors, institutions, processes, and policies of sub-state government in the U.S., emphasizing city general-purpose governments through a comparative examination of historical and contemporary politics. Issues related to federalism, representation, voting, race, poverty, housing, and finances. Prerequisite: POLISCI 2 or consent of instructor. Same as: PUBLPOL 133.

**URBANST 112. The Urban Underclass. 5 Units.**

(Graduate students register for 249.) Recent research and theory on the urban underclass, including evidence on the concentration of African Americans in urban ghettos, and the debate surrounding the causes of poverty in urban settings. Ethnic/racial conflict, residential segregation, and changes in the family structure of the urban poor. Same as: SOC 149, SOC 249.

**URBANST 113. Introduction to Urban Design: Contemporary Urban Design in Theory and Practice. 5 Units.**

Comparative studies in neighborhood conservation, inner city regeneration, and growth policies for metropolitan regions. Lect-disc and research focusing on case studies from North America and abroad, team urban design projects. Two class workshops in San Francisco Sat Jan 15 and Jan 29. Terms: Win | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP) Instructors: Gast, G.

**URBANST 114. Urban Culture in Global Perspective. 5 Units.**

Core course for Urban Studies majors. We will study urban space both historically and cross-culturally. Urban Studies, by definition, is an interdisciplinary field, where the methodological approaches draw upon a diverse set of analytic tools. Disciplines that occupy a prominent place in this class are geography, cultural anthropology, sociology, history, media studies, and literature. In this context, we will discuss the importance of cities around the world to the economic, cultural, and political well-being of modern societies and examine how forces such as industrialization, decentralization, and globalization affect the structure and function of cities. Same as: ANTHRO 126.

**URBANST 115. Urban Sustainability: Long-Term Archaeological Perspectives. 3-5 Units.**

Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas. Same as: CLASSGEN 123, CLASSGEN 223.

**URBANST 121. Public Scholarship & Social Change. 2 Units.**

Introduces students to the diverse ways of doing public/community-engaged scholarship, including public interest and public policy-oriented research, design research, social entrepreneurship, activist/advocacy and community-based research models. Through a multidisciplinary set of case studies of actual research/action projects in the US and abroad, students will compare and assess research models in terms of methodological approach, academic rigor, control and ownership of the research process, means and modes of data dissemination, researcher subjectivity, depth of community partnership, and relative potential for sustainable, long-term community impact. The course material is designed to provide students with a broad framework and context to imagine how to produce their own scholarship/research as a form of public service and social transformation.

**URBANST 123. Approaching Research and the Community. 2-3 Units.**

Comparative perspective on research with communities and basic overview of research methodologies, with an emphasis on the principles and practices of doing community-based research as a collaborative enterprise between academic researchers and community members. How academic scholarship can be made useful to communities. How service experiences and interests can be used to develop research questions in collaboration with communities and serve as a starting point for developing senior theses or other independent research projects.

**URBANST 127. COMMUNITY PLANNING WORKSHOP. 4-5 Units.****URBANST 127. COMMUNITY PLANNING WORKSHOP. 4-5 Units.****URBANST 128. Community Mapping Practicum. 4 Units.**

Students will use mapping techniques to explore community planning and policy issues in Redwood City. Focusing on building other skills including teamwork, writing, and oral communication. GIS is not a prerequisite.

**URBANST 131. Social Innovation and the Social Entrepreneur. 1 Unitss.**

Invited lecture series. Perspectives and endeavors of thought leaders and entrepreneurs who address social needs in the U.S. and internationally through private for-profit and nonprofit organizations, nongovernmental organizations, or public institutions.

**URBANST 132. Concepts and Analytic Skills for the Social Sector. 4 Units.**

How to create and grow innovative, not-for-profit organizations and for-profit enterprises which have the primary goal of solving social and environmental problems. Topics include organizational mission, strategy, communications/marketing, financing and evaluation. Opportunities and limits of methods from the for-profit sector to meet social goals. Perspectives from the field of social entrepreneurship. Focus is on integrating theory with practical applications. Enrollment limited to 20. Prerequisite: consent of instructor. Email lalitvak@stanford.edu.

**URBANST 133. Social Entrepreneurship Collaboratory. 4 Units.**

Interdisciplinary student teams create and develop U.S. and international social entrepreneurship initiatives. Proposed initiatives may be new entities, or innovative projects, partnerships, and/or strategies impacting existing organizations and social issues in the U.S. and internationally. Focus is on each team's research and on planning documents to further project development. Project development varies with the quarter and the skill set of each team, but should include: issue and needs identification; market research; design and development of an innovative and feasible solution; and drafting of planning documents. In advanced cases, solicitation of funding and implementation of a pilot project. Enrollment limited to 30. May be repeated for credit. Prerequisites: 131 and 132, or consent of instructor.

**URBANST 137. Innovations in Microcredit and Development Finance. 4 Units.**

The role of innovative financial institutions in supporting economic development, the alleviation of rural and urban poverty, and gender equity. Analysis of the strengths and limits of commercial banks, public development banks, credit unions, and microcredit organizations both in the U.S. and internationally. Readings include academic journal articles, formal case studies, evaluations, and annual reports. Priority to students who have taken any portion of the social innovation series: URBANST 131, 132, or 133. Recommended: ECON 1A or 1B.

**URBANST 140. Urban Ethnography. 5 Units.**

Ethnographic research and writing focuses on the ways our lives are shaped by interacting forces such as history, political economy, and creative cultural practices. In the last fifty years, more and more cultural anthropology has been carried out in urban contexts, due to both urbanization around the world and changes in anthropology as a field. This seminar focuses on careful reading and analysis of book-length ethnographies about urban cultures, people and dynamics to consider what the theory and methodological tools of anthropology have to offer us as we seek to better understand the city. Readings include a variety of approaches to ethnographic research in and/or about cities, with a mix from different eras and about different cities around the world. Same as: ANTHRO 102.

**URBANST 150. History of San Francisco. 5 Units.**

This class will examine the history of San Francisco, with a focus on social and political history. Possible topics include Indians and Spanish settlers, the Gold Rush, immigration, public culture, Progressive Era reform, the earthquake and fire of 1906 and its legacy, labor and unionism, race and civil rights, sexuality and politics, and redevelopment.

**URBANST 160. Environmental Policy and the City in U.S. History. 5 Units.**

Looks at the historical backgrounds of current issues in urban environmental policy, including waste, transportation, air pollution, and other major issues. Covers the period 1800 to the present. Explores the relevance of historical scholarship  
Same as: HISTORY 260E.

**URBANST 162. Managing Local Governments. 4 Units.**

In-the-trenches approach. Issues in leading and managing local governments in an era of accelerating and discontinuous change. Focus is on practical strategies related to financing, public services impacted by increasing demand and revenue constraints, the politics of urban planning, private-public partnerships, public sector marketing, entrepreneurial problem solving, promoting a learning and risk-taking organizational culture, and developing careers in local government. Enrollment limited to 25; preference to Urban Studies majors.

**URBANST 163. Land Use Control. 4 Units.**

Methods of land use control related to the pattern and scale of development and the protection of land and water resources. Emphasis is on the relationship between the desired land use goal and geographical landscape, physical externalities, land use law, and regulatory agencies. Topics include the historical roots of modern land use controls; urban reforms of the 19th century; private ownership of land; zoning; local, state, and federal land use regulation; and land trusts preservation. Smart growth, environmental impact consideration, private property rights, and special purpose agencies are related to current issues.

**URBANST 166. East Palo Alto: Reading Urban Change. 5 Units.**

Examines the changes in East Palo Alto's built environment, economy, and civil society since the 1990s. Focus on environmental activism, sustainability, and environmental justice issues. Students use archived film footage to analyze the history.

**URBANST 167. The Automobile and the City. 4 Units.**

This course will examine the impact of the automobile on urban development and the social life of the modern city from three perspectives. First, as Auto-Utopia: a look at the golden age of automobiling during the early and late 20th century when the private car and the truck expanded the full range of opportunities for the economy and for both urban and rural residents of the modern world. Second, Auto-Dystopia: an examination of the negative impacts of the automobile that emerged in the late 20th and early 21st centuries in regard to safety, congestion, pollution, sustainability, and the development of a monoculture of the automobile in urban transportation. And third, Auto-Futures: a look at the ways that urban society -- both in the developed world and in the emerging economies of Asia, Africa, and Latin America -- will plan for and manage a multi-modal transportation system (walking, cycling, transit, and the achievement of a better jobs/housing balance) in which the automobile will be one of many options and will serve both private and public needs.

**URBANST 172. Design Approaches to Mending a City: Rethinking the 101 in East Palo Alto. 4 Units.**

The omnipresence of automobile infrastructure negotiating the urban, suburban, and rural landscapes emphasizes the prioritization of this mode of transportation in the United States. Although the overlap of highway and urban area is sometimes addressed (and re-addressed), it tends to create sub-districts, fragmentation, and unnecessary conditions of separation. While serving as an important circulation network on the west coast, connecting Los Angeles to Seattle, the infrastructure of Highway 101 cuts through various communities, at times creating division at the local scale. One of the more marked manifestations of this division is in East Palo Alto, where the highway separates residents on the west side from schools and activities on the east side, acting as a barrier that must be navigated by car. This studio aims to articulate the issues created by the presence of the highway and study design solutions that not only mitigate the presence of these two systems (highway and community) at a general level, but develop strategic approaches to the issues facing the specific area. In this regard, students will engage with the site, community members, and local officials. They will focus on the issues and impact of transportation infrastructure and offer design oriented ideas and responses for addressing the intersection of urban development and highway systems.

**URBANST 190. Urban Professions Seminar. 1 Unitss.**

Workshop. Contemporary practice of urban design and planning, community development, urban education, public service law, and related fields. Topics depend partly on student interests. Bay Area professionals lecture and respond to questions concerning their day-to-day work, impressions of their field, and the academic background recommended for their work.

**URBANST 194. Internship in Urban Studies. 2-4 Units.**

For Urban Studies majors only. Students organize an internship in an office of a government agency, a community organization, or a private firm directly relevant to the major. Reading supplements internship. Paper summarizes internship experience and related readings.

**URBANST 195. Special Projects in Urban Studies. 1-5 Units.****URBANST 197. Directed Reading. 1-5 Units.****URBANST 198. Senior Research in Public Service. 1-3 Units.**

Limited to seniors approved by their departments for honors thesis and admitted to the year-round Public Service Scholars Program sponsored by the Haas Center for Public Service. What standards in addition to those expected by the academy apply to research conducted as a form of public service? How can communities benefit from research? Theory and practice of research as a form of public service readings, thesis workshops, and public presentation of completed research. May be repeated for credit. Corequisite: 199.

**URBANST 199. Senior Honors Thesis. 1-10 Units.****URBANST 201. Preparation for Senior Project. 5 Units.**

First part of capstone experience for Urban Studies majors pursuing an internship-based research project or honors thesis. Assignments culminate in a research proposal, which may be submitted for funding. Students also identify and prepare for a related internship, normally to begin in Spring Quarter in URBANST 201B or in Summer. Research proposed in the final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Service Learning Course (certified by Haas Center). Same as: SOC 201.

**URBANST 201A. Capstone Internship in Urban Studies. 3 Units.**

Restricted to Urban Studies majors. Students work at least 80 hours with a supervisor, establish learning goals, and create products demonstrating progress. Reflection on service and integration of internship with senior research plans. Must be completed by start of Winter Quarter senior year. May continue for additional quarter as 194. Service Learning Course (certified by Haas Center). Corequisite: URBANST 201 or consent of instructor.

**URBANST 201B. Capstone Internship Seminar. 3-4 Units.**

Students carry out an internship of at least 80 hours with a community organization or government agency. Class meets weekly to discuss related issues, including ethics of service, combining service and research, navigating organizational dynamics, and setting and accomplishing internship goals. Students submit internship agreement and internship-related deliverables, and give in-class presentations.

**URBANST 202. Preparation for Senior Research. 5 Units.**

Required of all juniors in Urban Studies and those juniors in Sociology planning on writing an honors thesis. Students write a research prospectus and grant proposal, which may be submitted for funding. Research proposal in final assignment may be carried out in Spring or Summer Quarter; consent required for Autumn Quarter research. Same as: SOC 202.

### **URBANST 203. Senior Seminar. 5 Units.**

Conclusion of capstone sequence. Students write a substantial paper based on the research project developed in 201 or 202. Students in the honors program may incorporate paper into their thesis. Guest scholar chosen by students.

## **Urology Courses**

### **UROL 199. Undergraduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

### **UROL 280. Early Clinical Experience in Urology. 1-2 Units.**

Provides an observational experience as determined by the instructor and student. Prerequisite: consent of instructor.

### **UROL 299. Directed Reading in Urology. 1-18 Units.**

Prerequisite: consent of instructor.

### **UROL 370. Medical Scholars Research. 4-18 Units.**

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

### **UROL 399. Graduate Research. 1-18 Units.**

Students undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

## **Woods Institute for the Environment Courses**

### **ENVRINST 109. Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision. 2 Units.**

Examination of program-based local actions that promote resource conservation and an educational environment for sustainability. Examination of building-level actions that contribute to conservation, lower utility costs, and generate understanding of sustainability consistent with Stanford's commitment to sustainability as a core value. Overview of operational sustainability including energy, water, buildings, waste, and food systems. Practical training to enable students to become sustainability coordinators for their dorms or academic units.

Same as: CEE 109, EARTHSYS 109.

### **ENVRINST 220. The Social Ocean: Ocean Conservation, Management, and Policy. 1-2 Units.**

This interdisciplinary seminar examines current ocean issues and ideas through a series of readings, discussions, and guest lecturer presentations of seminal works about ethical, physical, and emotional relationships of human beings to the marine world. Through the lenses offered by several classic readings, we will examine and reinterpret the challenges of fisheries collapse, climate change, shipping, marine spatial planning, biodiversity conservation, and the management of land-sea interactions. Though the seminar is open to all undergraduate and graduate students, our course is designed especially for those with a particular interest in studying and solving key issues of ocean policy and management, from coastal adaptation to fisheries management to cumulative impacts assessments. In addition to this interest, students must be willing to take the time to dig deeper into the foundations of environmental thinking about the relationship of human beings and the sea.

### **ENVRINST 260. Water in the West: Challenges and Opportunities. 2-3 Units.**

This 3-unit course explores challenges and opportunities in the management of water resources to protect the economic, ecological, and social values of the American West. Lectures and readings will cover a wide array of subjects and take an interdisciplinary approach to issues affecting water supply, water quality, and ecosystems with an emphasis on applications to policy and practice. Invited speakers from Stanford, other universities, government agencies, business, and non-governmental organizations will discuss relevant topics such as climate change, agricultural and urban water demand, impacts on business, management of freshwater ecosystems, markets and pricing, and other topics to be determined. Class discussion will focus on potential solutions in the areas of policy, markets, technology, and other interventions. Assignments will require students to applying knowledge from readings, lectures, and discussions to practical, real-world scenarios in the form of public comments, editorials, plans, or proposals. Through this course, students will gain an understanding of the complex water landscape of the American West, how decisions affecting water resources in the West are made and may be influenced, and be able to discuss the trade-offs between different various solutions. Limited enrollment. Prerequisite: consent of instructor.

## **Writing Rhetoric, Program in Courses**

### **PWR 1AH. Writing & Rhetoric 1: The Rhetoric of American Multicultural Experience. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of multicultural experience and cultural assimilation, focusing on the theme of social acceptance. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

### **PWR 1AOA. Writing & Rhetoric 1: Music and Making Meaning. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

### **PWR 1AT. Writing & Rhetoric 1: A Mountain for Itself: The Rhetoric of Wilderness. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

### **PWR 1CA. Writing & Rhetoric 1: The Rhetoric of Gaming. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include how gameplay in a variety of genres operates as argument about cultural values and how games function as sites of community building, social networking, and learning. Students produce research-based arguments on these issues and merge practice and production in storyboarding rhetorically persuasive games. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1CG. Writing & Rhetoric 1: Mixtapes & Meetups: The Interactive Rhetoric of Media and Relationships. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of styles of leadership across the globe and communication strategies used to bring about change. Exploration of how global leaders learn cross-cultural rhetoric skills to adapt to dynamic and unfamiliar situations. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1CGA. Writing & Rhetoric 1: Popular Science to Girl Talk: Writing as Adaptation and Remix. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1CK. Writing & Rhetoric 1: Investigating the News: Journalism, Technology & the Future. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1CR. Writing & Rhetoric 1: Writing Nature: Discourses in Ecology, Culture, and Technology. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Inquiry into human relationships with nature and how these influence ethical choices and social justice. See [http://ual.stanford.edu/AP/univ\\_req/PWR/Courses.html](http://ual.stanford.edu/AP/univ_req/PWR/Courses.html).

**PWR 1CS. Writing & Rhetoric 1: Debating the Environment. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1D. Writing Well: An Introduction to College Writing. 3 Units.**

Offered only to participants in the Summer College for High School Students. Develops critical reading, writing, and research skills applicable to any area of study. Emphases include close reading, analysis of varied texts, development of strong theses, revision strategies, and introduction to research-based argument. Classes are small, encouraging extensive interaction between students and instructors. Discussions of readings, peer work, and individual conferences with instructors. Each section has a thematic emphasis developed by the instructor; students choose sections based on their individual interests. Does not meet the Stanford first-year writing requirement.

**PWR 1DC. Writing & Rhetoric 1: Is This What a Feminist Looks Like? Race/Gender in the Obama Age. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the coverage of and activism in a post-racial U.S., including evaluation of the debate over the intersections of racial activism and feminist activism in U.S. politics. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1DH. Writing & Rhetoric 1: The Virtue of Vice and the Vice of Virtue: The Rhetoric of Criminality. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students investigate language and images that construct criminals, analyzing how these representations shape personal and cultural beliefs. Analysis of the costs and benefits of retributive, restorative, and transformative justice systems. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1DW. Writing & Rhetoric 1: Gangsters, Glamour Girls & Gold-diggers: Dialectic of Am. Culture & Hollywood. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of American film and its conversation with American culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1EE. Writing & Rhetoric 1: Wishy-Washy or Wise?: The Rhetoric of Ambivalence. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAA. Writing & Rhetoric 1: Writing Rites: The Rhetoric of Ritual. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAC. Writing & Rhetoric 1: Protest Art!: The Rhetoric of Art as Social Activism. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of art in drawing our attention to social issues such as racism, poverty, sexism, and homophobia and in moving us to social action. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAF. Writing & Rhetoric 1: Little Boxes: The Rhetoric of the American Suburb. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of the suburbs as a site of cultural debate through investigation of the ways that authors and artists imagine the physical landscape of the suburb and the inner lives of suburbanites. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAJ. Writing & Rhetoric 1: The Rhetoric of Eating. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAT. Writing & Rhetoric 1: Size Matters: The Writing and Rhetoric of Short Stories. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAW. Writing & Rhetoric 1: Global Exchange: Rhetoric in a World Context. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. The American cultural apparatus, its limitations, and development of other world views. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GAZ. Writing & Rhetoric 1: From Cradle to Grave: The Rhetoric of Age and Aging. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the history of aging in America; developments in reproductive science; the proverbial mid-life crisis; and how people cope with the ultimate horizon of death. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GBJ. Writing & Rhetoric 1: The Rhetoric of Cultural Memories of Violence. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GBR. Writing & Rhetoric 1: Spill: The Rhetoric of Confessions and Self-Revelations. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GBW. Writing & Rhetoric 1: Deathbeds: Art and the Rhetoric of Disease. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GCA. Writing & Rhetoric 1: AH! Real Monsters: The Rhetoric of Monstrosity in Popular Culture. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GCJ. Writing & Rhetoric 1: El Otro Lado / The Other Side: The rhetoric of real and imagined borders. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. The physical border between the United States and Mexico is the focus of the examination of the artistic, scholarly, and political rhetoric of real and imagined borders. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GCL. Writing & Rhetoric 1: Rhetoric of Ledbetter. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GCO. Writing & Rhetoric 1: To Boldly Go: The Rhetoric of Travel. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GCX. Writing & Rhetoric 1: "I Do": The Rhetoric of Consent. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of the idea of consent and the underlying principles of free will and autonomy in the fields of law, intellectual property, marriage contracts, political philosophy, medical ethics, and sex. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GCZ. Writing & Rhetoric 1: "It Never Got Weird Enough For Me": The Rhetoric of Intoxication. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GDM. Writing & Rhetoric 1: Revolution and Revolt: Political Writing for Political Action. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GER. Writing & Rhetoric 1: The Rhetoric of Social Media. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of the multifaceted and hypertextual rhetoric of social media, the intersection between rhetoric and social media, and how new types of online media have heightened participation, openness, and a sense of community. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GEV. Writing & Rhetoric 1: All the World's a Stage: The Rhetoric of Theater. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students investigate the role theater plays in the rhetorical strategies of various literary and non-literary texts as well as visual materials such as films and cartoons. See [http://ual.stanford.edu/AP/univ\\_req/PWR/Req.html](http://ual.stanford.edu/AP/univ_req/PWR/Req.html).

**PWR 1GGH. Writing & Rhetoric 1: Understanding American Political Speeches of the 20th and 21st Centuries. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Rhetorical analyses of speeches by a range of 20th-century American political figures and the political rhetoric of the present day. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GIF. Writing & Rhetoric 1: Dark Humor: A Rhetoric of Social Taboos. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of dark humor as it deals with the most delicate subject matter, topics we designate as sacred and beyond criticism: violence and bodily damage, illness, aging and death, race and ethnicity, and gender and sexuality. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJE. Writing & Rhetoric 1: Gay Ghettos, Queer Hoods: The Rhetoric of Race and Urban Sexual Subcultures. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the rhetoric of urban sexual subcultures, and how the rhetoric in medical science, journalism, and popular entertainment defines queers of color in intellectual thought and pop culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJH. Writing & Rhetoric 1: Invention and Imagination in the Nineteenth Century. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJM. Writing & Rhetoric 1: The Rhetoric of California. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJN. Writing & Rhetoric 1: Speaking of Dreams. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJS. Writing & Rhetoric 1: Our Warded World: The Rhetoric of Conservation. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJU. Writing & Rhetoric 1: "Surface of Past Time": The Rhetoric of Nostalgia. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GJW. Writing & Rhetoric 1: I Know It When I Hear It: The Rhetoric of the Unspeakable. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GKL. Writing & Rhetoric 1: The Use and Abuse of Civil Debate: The Rhetoric of Collective Thinking. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GLA. Writing & Rhetoric 1: Code Orange: Post-9/11 America and the Rhetoric of Alarm. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GLD. Writing & Rhetoric 1: The Cyborg Body: The Rhetoric of Disability. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of disability, using the analogy of the cyborg, in an era when the human body has become plastic, digitized and surgically manipulated. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GLL. Writing & Rhetoric 1: Wow, that's so postcard: The Rhetoric of Tourism. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of tourism as a way of seeing and representing the rest of the world and oneself, touching on some of the most pressing political, economic, and cultural questions facing an increasingly globalized world. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GLR. Writing & Rhetoric 1: Are you Fuzzy and Techie? The Rhetoric of Art and Science. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GMG. Writing & Rhetoric 1: Love to Hate: The Rhetoric of Misanthropy. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GMK. Writing & Rhetoric 1: Pure and Unadulterated: The Rhetoric of Contamination. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).



**PWR 1GMR. Writing & Rhetoric 1: Fearful Symmetry: The Rhetoric of the Double. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of the fictions of the double and the philosophies of personal identity, and how both anticipate and condition contemporary responses to the twin issues of human cloning and intellectual property. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GMT. Writing & Rhetoric 1: The Shape of Things: The Rhetoric of Design. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GMV. Writing & Rhetoric 1: Don't Take it Personally!: The Rhetoric of The Insult. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of how insults function rhetorically in specific situations and how they have catalyzed prolonged confrontations around race, education, politics, sexual orientation, and national standing. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GMX. Writing & Rhetoric 1: "Too Much Information?": The Rhetoric of Social Networking & Online Privacy. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Critical analysis of the ways in which online life intersects with real life around issues including privacy, authorship, and morality. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GMZ. Writing & Rhetoric 1: The Rhetoric of Institutional Power. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GNA. Writing & Rhetoric 1: Talking Baseball. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GNL. Writing & Rhetoric 1: Punk Rock and Rhetoric of Protest Music. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GRA. Writing & Rhetoric 1: Millions Like Us: The Rhetoric of Crowds. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include symbolic meaning of rock, sports, and political events; virtual crowds online; and use of crowds to shape ideology. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GRH. Writing & Rhetoric 1: 2012 & the Rhetoric of Apocalypse. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of apocalypse as a cultural phenomenon. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GRL. Writing & Rhetoric 1: LGBTQAWTF: Queer Rhetorics. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GRN. Writing & Rhetoric 1: Lasting Only One Day: The Rhetoric of Ephemera and Other Discarded Things. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of ephemera and how they argue for their meaning as they collect and preserve the past while reflecting humantransience. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GRY. Writing & Rhetoric 1: Fashionable Fables: The Rhetoric of Modern Mythology. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GRZ. Writing & Rhetoric 1: Decisions, Rhetoric, and the Art of Choosing. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GSD. Writing & Rhetoric 1: Masters of Style - The Rhetoric of Sophistication. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of how style is mastered and deployed in a range of genres. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GTA. Writing & Rhetoric 1: What Lies Beneath: The Rhetoric of the Underworld. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GTJ. Writing & Rhetoric 1: Rhetoric of the Unruly: Iconoclasts and Their Controversies. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GTM. Writing & Rhetoric 1: The Rhetoric of Taste. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of the rhetoric of taste as the luxurious product of a sophisticated society and as tedious, stultifying, snobby, or outright offensive. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GTX. Writing & Rhetoric 1: 'Making My Way Downtown': The Rhetoric of the City. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Through historic, literary, journalistic, and film portrayals of city life, we will analyze the idea of 'the city' as constructed through media and in the imaginations of its residents, and the way life in cities is really lived. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GVC. Writing & Rhetoric 1: The Rhetoric of Circus. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GWL. Writing & Rhetoric 1: Rhetoric of Winkler. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GWS. Writing & Rhetoric 1: Body Politics: The Rhetoric of Transhumanism. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1GWT. Writing & Rhetoric 1: Money for "Nothing" : The Rhetoric of the Silicon Valley. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1HR. Writing & Rhetoric 1: Fake News and the Rhetoric of "Truthiness". 4 Units.**  
Development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Critical analysis of the fake news phenomenon, considering its impact on the political process and how we discuss important issues of the day. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1JH. Writing & Rhetoric 1: Lies and the Lying Liars Who Tell Them: Rhetoric and Deception. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of untruth, misrepresentation, and deception in journalistic and scientific rhetoric. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1JJK. Writing & Rhetoric 1: The Rhetoric of Futility. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1JL. Writing & Rhetoric 1: Rhetoric and Humanitarian Intervention. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of how media representations of world crises are crafted to persuade us to action, appealing to our senses of justice, pragmatism, outrage, and compassion. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1JP. Writing & Rhetoric 1: The Rhetoric of Consumer Culture. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students explore what consumerism says about the larger culture and the segmented groups within it, analyzing popular and scholarly texts as well as current trends in pop culture, to research how the activities of consumerism shape culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1JPA. Writing & Rhetoric 1: The Rhetoric of Liberal Arts Education. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Engagement with debates and issues related to liberal arts education, including the tension between education as training for a career and as a venue for developing the life of the mind. See [http://ual.stanford.edu/AP/univ\\_req/PWR/Courses.html](http://ual.stanford.edu/AP/univ_req/PWR/Courses.html).

**PWR 1JS. Writing & Rhetoric 1: Beyond DNA: The Omics Revolution. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1JT. PWR 1: RHETORIC HEALTH CARE. 4 Units.**

**PWR 1KB. Writing & Rhetoric 1: Authentic Experience: The Rhetoric of Tourism. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KBA. Writing & Rhetoric 1: On Display: The Rhetoric of Museums and Exhibition Spaces. 4 Units.**  
Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KD. Writing & Rhetoric 1: the Feature Article: Writing and Change. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. How various feature article writers argue the issues of soaring energy and food prices, serious market volatility, climate change, an ongoing war in the Middle East, and how terms like *crisis* or *change* impact the discussion. See [http://ual.stanford.edu/AP/univ\\_req/PWR/Courses.html](http://ual.stanford.edu/AP/univ_req/PWR/Courses.html).

**PWR 1KE. Writing & Rhetoric 1: The Science of Sports. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include sports at the level of cells and psychology, the science of sports equipment and sports spaces, the ethics of performance enhancement, and sports-related research projects on the Stanford campus. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KM. Writing & Rhetoric 1: If These Walls Could Talk: The Rhetoric of Places and Spaces. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Explores the *language* of man-made environments such as universities, theme parks, monuments, shopping malls, museums, and public buildings. Students analyze space through physical exploration and critical inquiry and discover the applications of rhetoric not only to traditional texts but to physical structures and spaces as well. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KMA. Writing & Rhetoric 1: Metaphor and Motion: The Rhetoric of Sacred Space. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KMB. Writing & Rhetoric 1: Cradle to Cradle: the Rhetoric of Sustainability. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KS. Writing & Rhetoric 1: Imagining Others: 21st Century Cosmopolitanism. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of cosmopolitanism, questions related to globalization, nationalism, citizenship, cultural values, aesthetics, and identity. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KSA. Writing & Rhetoric 1: Constructing Childhood. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1KSB. Writing & Rhetoric 1: Health Matters: Health Innovation and Communication. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1MF. Writing & Rhetoric 1: Writing about Cities: Exploration, Observation, Research, Analysis. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1MFA. Writing & Rhetoric 1: Shades of Green: The Rhetoric of Contemporary Environmentalism. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1MG. Writing & Rhetoric 1: The Rhetoric of the American West. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1PB. Writing & Rhetoric 1: Supreme Court Rhetoric. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of Supreme Court opinions, *amicus curiae* briefs, editorials about Court opinions, and pertinent lower court decisions. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1PH. Writing & Rhetoric 1: He Said, She Said: The Rhetoric of Gender Politics. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the ways in which news articles, movie clips, magazine advertisements, television commercials, and other texts present gender roles, and how the roles and bodies of both sexes are presented as objects open to scrutiny, critique, exploitation, abuse, and awe. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1PHA. Writing & Rhetoric 1: Sisterhood, Brotherhood, Solidarity: The Rhetoric of Greek Life. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1RC. Writing & Rhetoric 1: Domestication: How Humans Shape the Natural World. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1RT. Writing & Rhetoric 1: The War Between Wars: the "isms" of modernism. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of modernism in art, literature, and thought between the two world wars. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1RTA. Writing & Rhetoric 1: Modernism and the Wreck of Education. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SB. Writing & Rhetoric 1: The Rhetoric of Technology. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the arguments we make about technology, the arguments various technologies produce about us, and the ways in which rhetoric itself might be productively viewed as a technology for producing arguments. Students explore the social, economic, political, and psychological consequences of rapidly developing technologies. See [http://ual.stanford.edu/AP/univ\\_req/PWR/Req.html](http://ual.stanford.edu/AP/univ_req/PWR/Req.html).

**PWR 1SG. Writing & Rhetoric 1: Body and Mind: The Rhetoric of Gesture. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SH. Writing & Rhetoric 1: Strange Art, Stranger Politics: Absurdism and the Rhetoric of Social Action. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Topics include the benefits and drawbacks of deploying strange art as artistic and political protest, how breaking the aesthetic rules sometimes serves to argue for social change, and how absurdist protests succeed or fail to gain social traction. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SL. Writing & Rhetoric 1: New Media Rhetoric and Web 2.0. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students define new media and debate the ideas of web 2.0; the virtue of Web 2.0 in digital game modifications and the potential subversive effects of web 2.0 on advertising restrictions; and look into the possibilities and limitations of democracy 2.0. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SLA. Writing & Rhetoric 1: "Advertising R Us": The Rhetoric of Advertising. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SM. Writing & Rhetoric 1: The Elephant, the Tiger, and the Cellphone: Rhetoric of India and Indian Film. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the rhetoric of the India of the new millennium, including issues of gender, caste, class, religion, sexuality, nationalism, diaspora, outsourcing, and globalization. Service Learning Course (certified by Haas Center). See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SMA. Writing & Rhetoric 1: Humans and Things: The Rhetoric of Commodities and Commodification. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SMB. Writing & Rhetoric 1: The Jewel in the Crown: The Rhetoric of (Post)Colonialism. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SP. Writing & Rhetoric 1: Growing Up Global: The Rhetoric of Children's Culture Today. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SS. Writing & Rhetoric 1: The Page and the Stage: Writing and Performance. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Students explore identity as a social, political, and cultural performance; how different situations call for particular styles of rhetorical performance; and how people evaluate and analyze different types of performances, including artistic and political performances, as well as the performances of everyday life. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SSA. Writing & Rhetoric 1: Real and Imagined Lives: Narrative, Rhetoric, and Identity. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of the rhetoric of identity as constructed in a range of narrative forms including fiction, memoirs, political campaigns, and social media. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1ST. Writing & Rhetoric 1: The Rhetoric of Biomedical Ethics. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SU. Writing & Rhetoric 1: The World According to Bollywood: Indian Cinema and its Representations. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Analysis of representations of India's culture through Indian film and how such representations have coincided with India's economic success over the last two decades of the twentieth century, giving rise to a new trend in global popular culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SUA. Writing & Rhetoric 1: Such a Long Journey: South Asian Diaspora in the World. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1SW. Writing & Rhetoric 1: Scandals, Private Lives, and Public Faces: The Rhetoric of Stanford. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Study of the early history and rhetoric of the public face of Stanford University, from the post-Gold Rush and Big Four railroad era to the building of the University. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1VS. Writing & Rhetoric 1: Eating-Animals: The Rhetoric of Animals, Food, and the Environment. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 1WG. Writing & Rhetoric 1: Reading Minds: The Rhetoric of Consciousness. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Examination of states of mind ranging from the radical self-possession cultivated through practice to altered states induced through drugs and trauma, illness, and religion. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2AH. Writing & Rhetoric 2: Ethnic Narratives and the Rhetoric of American Identity. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how race and ethnicity in America have become subjects of personal negotiations and public perception. Addresses various topics such as biracial and bicultural identity, acculturation, and stereotyping. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2AO. Writing & Rhetoric 2: Rhetoric and Global Leadership. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of styles of leadership across the globe and communication strategies used to bring about change. Exploration of how global leaders learn cross-cultural rhetoric skills to adapt to dynamic and unfamiliar situations. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2AT. Writing & Rhetoric 2: House Red, Hot Bellies, and High Velocity Lead Therapy: The Rhetoric of Trauma. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2CA. Writing & Rhetoric 2: Networked Rhetoric: Social Networks, Participatory Media and the Future of Wr. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of the issues surrounding participatory media and social networking in contemporary digital culture from the perspective of both theory and practice. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2CG. Writing & Rhetoric 2: Sounds of Stanford: Listening & Writing to Higher Education. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2CK. Writing & Rhetoric 2: Claiming Citizenship: Membership and Rights in Public Discourse. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2CR. Writing & Rhetoric 2: Communicating Science and the Environment. 4 Units.**

Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Examination of the motivations and appeals of environmental arguments, considering underlying assumptions and contexts of time, culture, audience, purpose, and mode of delivery. Participation in Community Writing Project, working with local nonprofit environmental organizations to produce real-world writing, multimedia, and/or speaking projects on these organizations' behalf. Work in the community will form the basis of the major research project. Service Learning Course (certified by Haas Center). Prerequisite: PWR 1. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2CRA. Writing & Rhetoric 2: The State of California: Rhetoric of a Dream. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Service Learning Course (certified by Haas Center). See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2DC. Writing & Rhetoric 2: The Popular Science of Sex. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of the intersection between social debate and scientific research about sex and gender; how social debates draw on, represent, respond to, and influence scientific studies; and how the process shapes our knowledge and beliefs about sex and gender. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2DCA. Writing & Rhetoric 2: Race/Gender in the "Obama Age". 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of perceptions of race and gender seen through the political lens of the 2008 presidential campaign. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2DH. Writing & Rhetoric 2: Me and My iPod: The Rhetoric of Identity. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the message, performance, and construction of identity, electronic renditions of the self, and the constant or changing nature of identity. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2DHA. Writing & Rhetoric 2: P-Sets, Essays and Midterms: Making Time for Social Change in a Busy World. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2EE. Writing & Rhetoric 2: Once Upon a Cause: Producing Picture Books for Local Children. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2GAW. Writing & Rhetoric 2: Crossing Cultures. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Exploration of how rhetoric functions in various cultures, considering body language, symbols, visual media, and the Internet. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2GM. Writing & Rhetoric 2: Unpredictable Dialogue: Art of the Interview, Art of the Essay. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the rhetorical craft of the interview, exploring structure, language, timing, and development in a range of forums, including documentaries, radio, transcription, campus conversations, and television. Research of a Stanford professor's work, including interview. Presentation of findings from research and interview to the class. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2GMA. Writing & Rhetoric 2: Breaking News, Making News 1.0. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JB. Writing & Rhetoric 2: Rhetoric of Ethics in Research and Technology. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the rhetoric of ethical discourse, including the ethical standards guiding research at Stanford and examples of ethical misconduct. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JH. Writing & Rhetoric 2: Cred: Rhetoric and Credibility in Research, Politics, and Everyday Life. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Work on making students more effective researchers and communicators in their areas of interest, with a focus on gaining and projecting credibility. Exploration of how speakers and writers gain and lose credibility, how people evaluate the credibility of others, and how the rules of credibility are different in politics, in scholarship, and in popular culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JL. Writing & Rhetoric 2: Doomsday Rhetoric. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Investigation of how the doomsday epic expresses real concerns emerging from fields like technology, environmental studies, pathobiology, and politics. Consideration of apocalypticism as a mode of argument. Examination of how belief in the imminent destruction of the present world order influences our political decisions and personal behavior. Topics in religious eschatology and apocalypticism illuminate the genre's origins. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JLA. Writing & Rhetoric 2: Speaking About Art: Narrating the Collections of the Cantor Art Center. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration and theory of successful strategies of oral communication, considering how words and images (in this case works of art) work together to create meaning, culminating in creation of an audio guide for the Cantor Arts Center. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JLB. Writing & Rhetoric 2: Rhetoric and Education Reform. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of social, ideological, and pedagogical perspectives on education reform. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JM. Writing & Rhetoric 2: Criminal Matters: Evidence, Detection, Expertise. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2JP. Writing & Rhetoric 2: The Rhetoric of Art and Commerce. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Examination of unspoken rules regarding the separation of creativity and commerce and arguments about how consumer culture influences the work of the artist. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KD. Writing & Rhetoric 2: Un-Performing Ourselves: The Design and Craft of Presentations. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how the application of performance techniques makes academic or professional presentations more compelling. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KEB. Writing & Rhetoric 2: Sports Appeal: Packaging and Promoting Stanford Athletics. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KEC. Writing & Rhetoric 2: It's About Time: Seizing Opportunity in Rhetoric, Writing, and Performance. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KM. Writing & Rhetoric 2: A Planet on the Edge: The Rhetoric of Sustainable Energy. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Focus on the rhetoric and ethics of sustainable energy, investigating both the alarmism and optimism which fuel this debate. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KMA. Writing & Rhetoric 2: Natural Enemies: The Rhetoric of Invasion Biology. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of the use of metaphors and argument in the context of invasion biology and species conservation, especially the effects those metaphors and claims have on practice and policy outcomes. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KS. Writing & Rhetoric 2: Happy Now? The Anatomy of Happiness. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. How the emerging field of happiness studies involves psychologists, economists and policy-makers in defining what happiness is and determining how society might create the conditions in which it can flourish. Exploration of how happiness studies can uncover happiness at the heart of arguments about democracy, religion, and personal lifestyles, exploring what makes people happy across cultural, social, and national contexts. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KSA. Writing & Rhetoric 2: The Rhetoric of Childhood and Children's Culture. 4 Units.**

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2KSB. Writing & Rhetoric 2: The Rhetoric of Design Thinking. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2LK. Writing & Rhetoric 2: Rhetoric in Crisis!. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2MF. Writing & Rhetoric 2: Speaking About Art: Narrating the Cantor's Collections. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of strategies for developing museum audio guides, including analysis of existing guides and behind-the-scenes work in the Cantor Arts Center. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2MFA. Writing & Rhetoric 2: Searching for San Jose: Urban Studies Audio Walking Tours. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2MFB. Writing & Rhetoric 2: Sustainability: Making an Impact with Research and Rhetoric. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2MR. Writing & Rhetoric 2: Technology and the Demonic: Rhetoric Against the Machine. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2PB. Writing & Rhetoric 2: The Power of Political Photography. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Topics include the role of photographers and photo-journalists in helping viewers see the world differently and the political implications of fashion photography, environmental photography, music photography, and fashion photography. Traditional readings as well as archival and field research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2PH. Writing & Rhetoric 2: Equal Treatment: The Rhetoric of Public Health. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of how public health discourses influence policymaking, practitioners, and community members, how the public understands the rhetoric of public health, and how that understanding affects public and government support of health-related research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2PHA. Writing & Rhetoric 2: You Go Girl: The Rhetoric of Gender Equality. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2PHB. Writing & Rhetoric 2: Indecision 2012: The Rhetoric of Politics. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2RS. Writing & Rhetoric 2: The Rhetoric in Memoir. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2RT. Writing & Rhetoric 2: Stepping Out of the Shadows: Music, Bass Guitar, and the Rhetoric of Revoluti. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of how the emergence of the electric bass in the fifties helped usher in a revolution that challenged commonplace assumptions concerning nationality, race, gender, and sexuality. Exploration of the history of the electric bass as a case study of musical revolutions, focusing on how music revolutions reflect emerging ideologies in any given culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2RTA. Writing & Rhetoric 2: Postmodernism and the Rhetoric of Uncertainty. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Inquiry into major theories of the postmodern and analysis of postmodernism's effect on culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2RTB. Writing & Rhetoric 2: The Language and Style of Virginia Woolf. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SB. Writing & Rhetoric 2: Writing 'Science': Fact, Fiction, and Everything Between. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of science fiction and popular writing about science and technology as arguments about where we are headed, where we are, who we are, and what we value. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SG. Writing & Rhetoric 2: Bodies of Knowledge: The bodily foundations of human thought and reason. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SGA. Writing & Rhetoric 2: Lie Detection and the Social Functions of Deception. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SH. Writing & Rhetoric 2: The Ugly American: Tourism and the Rhetoric of Power. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Analysis of the Ugly American in aesthetics and culture, in films and novels, tourist locations and business conferences, to illuminate America's complex role in the world. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SL. Writing & Rhetoric 2: Got Ads: Visual Design in Print Advertising. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Introduction to the rhetorical interplay of visuals, text, and design layout in print advertising, and narrative, classificatory, and dynamic patterns in print advertisement campaigns. Culminates in design and presentation of an original ad campaign. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SLA. Writing & Rhetoric 2: Information Design: The Visual Language of Graphic Communication. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SM. Writing & Rhetoric 2: Dirty, Pretty Things: The Rhetoric of Objects and Objectification. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Study of objects and objectification, from the relationships shared by cultures, objects, and people to how human beings have been objectified through colonialism, enslavement, sex-trafficking, and organ trade. Material objects discussed in terms of staging, collecting, design, location, inheritance, and cultural meaning. Service Learning Course (certified by Haas Center). See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SMA. Writing & Rhetoric 2: Love and Longing in Bombay: Romance and Rebellion in Indian Film. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SPA. Writing & Rhetoric 2: Other Selves: The Art & Science of Friendship. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SS. Writing & Rhetoric 2: Mass Audiences and Modern Communication. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how the ability to reproduce a work for increasingly large audiences has fundamentally changed the nature of art and its effect on culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SSA. Writing & Rhetoric 2: Rhetoric of Reality Culture. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SSB. Writing & Rhetoric 2: Superfans and Scholars: Writing Fan Culture. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).



**PWR 2ST. Writing & Rhetoric 2: Science, Democracy and Social Media. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SU. Writing & Rhetoric 2: Hollywood Bollywood: Rhetoric of India in Global Cinema. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of how the rhetoric of India is constructed for an international audience through films and how such representations have coincided with India's recent economic success to give rise to a new trend in global popular culture. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2SW. Writing & Rhetoric 2: Propaganda of World War II: Strategies of Persuasion. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Through work with the Hoover Archives, exploration of how written, visual, and film sources were used by a variety of countries to influence their citizens during WWII. Topics include the rhetoric of eugenics, political speeches, war posters, and how advertising during WWII pursued clear agendas to support government goals. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 2WG. Writing & Rhetoric 2: All That Jazz: The Rhetoric of American Musical Theater. 4 Units.**

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Exploration of the conventions and strategies that define the genre of American musical theater. Analysis of how contemporary musicals mirror, revise, and even subvert traditional rules while addressing a range of current issues. See [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_ual/AP\\_univ\\_req\\_PWR\\_Courses.html](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html).

**PWR 4. Directed Writing. 3-4 Units.**

Further work on developing writing. Analysis and research-based argument, writing for a range of audiences and in varied disciplinary contexts. Workshops and individual conferences. May be repeated for credit. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

**PWR 5. Independent Writing. 1-5 Units.**

Individual writing project under the guidance of a PWR instructor. May be repeated for credit. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

**PWR 6. Writing Workshop. 1-2 Units.****PWR 91. Intermediate Writing. 3 Units.**

For students who have completed the first two levels of the writing requirement and want further work in developing writing abilities, especially within discipline-specific contexts and nonfiction genres. Individual conferences with instructor and peer workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For topics, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 91B. Intermediate Writing: Digital Rhetoric, New Media, and Transformations in Writing. 3 Units.**

Writing operates in multiple modes (word, image, sound) in the new media environment. Examples of texts - invention, drafting, revision, and communication - governed by the evolving conditions of a new, digital rhetoric. For students who have completed the first two levels of the writing requirement and want further work in developing writing abilities, especially within discipline-specific contexts and nonfiction genres. Individual conferences with instructor and peer workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For more information, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 91C. Intermediate Writing: The Stanford Daily Show. 3 Units.**

Class will study fake news programs such as the Daily Show, the Colbert Report and the Onion, and will produce The Stanford Daily Show, our own version of a fake news program. For students who have completed the first two levels of the writing requirement and want further work in developing writing abilities, especially within discipline-specific contexts and nonfiction genres. Individual conferences with instructor and peer workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For more information, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 91D. Intermediate Writing: Your American Life. 3 Units.**

In this course, you'll read and listen to some of the most moving and insightful pieces of the last decade, explore the important differences between print and oral storytelling, and then script and record your own full-length audio piece. Along the way, we will explore many craft elements that apply equally to print and audio pieces. You will learn, for example, how to organize your material, choose an effective structure, blend dramatization and reflection, ground insights in concrete scenes, create a strong narrative arc, and manage elements such as characterization, description, and dialogue. We will also, of course, explore craft elements unique to the audio form and you will learn how to use your voice and other sonic elements to craft the kind of piece you might hear on This American Life. Through a special arrangement with the Stanford Storytelling Project, in the spring of 2012 this course will feature special sessions with prominent contributors to This American Life. Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For more information, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 91E. Intermediate Writing: The Oral Tradition: Myth, Folklore, and Fairy Tale. 3 Units.**

Contemporary storytelling covers a variety of media - from movies to novels, theatre and beyond. What this course offers is an in depth study of the roots of that practice - the oral tradition. Over the course we will explore many different motifs and structures that arise in the oral tradition, myth, folklore and fairy tale. What universal themes do we detect, and what separates the progression of a pacific north west Trickster story from an Arthurian romance? Why is it that in the early twenty first century many of our most acclaimed art forms carry narrative forms that are thousands of years old? Star Wars, Lord of the Rings and the recent Broadway show Jerusalem, all follow scenic progressions informed by myth. The first encounter with the story will be an oral narrative - the myth told unscripted in the classroom. The stories, which range from the Arthurian romance Parzival to Trickster folk tales, will be told in several sections - with a running exegesis and student response alongside. Many of these stories are now transcripts and have become works of literature. We will explore both the complementary aspects of this development, and areas of tension. During the course each student will embark on a project that demonstrates a thorough understanding of the topics covered, and utilizes those elements in their wider practice of writing and rhetoric. The project will be to research a story handed down within the family - an adventure of some distant relative, or a family migration from one country to another. Factoring in elements from the taught class, the student will mythologize the story: by writing an in depth commentary on its implications - factoring in contemporary, psychological and metaphorical associations. The second element will be to tell the story to the class. In these ways we experience myth as a living principle, not something just from a long time ago.

**PWR 91S. Intermediate Writing: Communicating Science. 3 Units.**

Effective communication of expert knowledge in the sciences to non-specialist audiences. Project-based work on a range and variety of communication challenges, contexts, and media. For students who have completed the first two levels of the writing requirement and want further work in developing writing abilities, especially within discipline-specific contexts and nonfiction genres. Individual conferences with instructor and peer workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For more information, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 191. Advanced Writing. 3 Units.**

Open to undergraduates and graduate students. Crafting nonfiction prose in a range of genres. Focus is on the relationship of genre and form; attention to developing stylistic versatility. Individual conferences with instructor. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

**PWR 192. Projects in Research, Writing, and Rhetoric. 1-5 Units.**

Advanced work on research projects, early drafts of theses, proposals. Shared work, discussions, and examination of methods, rhetorics, and styles in all disciplines. May be repeated for credit. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

**PWR 193. Writing the Honors Thesis. 1-5 Units.**

For students from all majors in the process of writing an honors thesis. Review of key elements of thesis process, including literature reviews, structure, argumentation, style, and documentation. Group and individual workshops. Prerequisite: first two levels of the writing requirement or equivalent transfer credit.

**PWR 194. Topics in Writing and Rhetoric. 4 Units.**

Understanding rhetoric as readers and interpreters of texts and to develop skills as writers and speakers. Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For topics, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 194B. Advanced Writing. 4 Units.**

Prerequisite: first two levels of the writing requirement or equivalent transfer credit. For details, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr).

**PWR 194C. Make Them Laugh: Comedy as Persuasion and Argument. 4 Units.**

Exploration of major theories of comedy and application of these theories to historical and contemporary comedic practice, with particular attention to comedy as a form of argument in a range of contexts. For more information, see [http://www.stanford.edu/dept/undergrad/cgi-bin/drupal\\_pwr/advanced\\_pwr](http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_pwr/advanced_pwr). Prerequisite: first two levels of the undergraduate writing requirement or equivalent transfer credit. Not repeatable for credit.

**PWR 195. Writing Center Peer Tutor Seminar. 3 Units.**

For students selected to serve as peer writing tutors in the Stanford Writing Center and/or at other campus sites. Readings on and reflection about writing processes, the dynamics of writing and tutoring situations, tutoring techniques, learning styles, diversity, and ethics. Observation of tutoring sessions, written responses to readings, and other written work. Same as: ENGLISH 195W.

# Index

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## A

Academic Calendar .....	3
Academic Policies and Statements .....	51
Admission and Financial Aid .....	12
Aeronautics and Astronautics .....	166
African and African American Studies .....	249
African Studies .....	254
American Studies .....	256
Anthropology .....	261
Applied Physics .....	271
Archaeology .....	273
Art and Art History .....	277
Astronomy .....	291
Athletics, Physical Education, and Recreation .....	293

## B

Biochemistry .....	590
Bioengineering .....	172
Biology .....	295
Biology, Hopkins Marine Station .....	295
Biomedical Ethics .....	591
Biomedical Informatics .....	592
Biophysics .....	313

## C

Cancer Biology .....	595
Center for Teaching and Learning .....	87
Centers, Laboratories, Institutes .....	620
Chemical and Systems Biology .....	597
Chemical Engineering .....	176
Chemistry .....	314
Civil and Environmental Engineering .....	183
Classics .....	318
Communication .....	329
Comparative Literature .....	335
Comparative Medicine .....	598
Comparative Studies in Race and Ethnicity (CSRE) .....	340
Computer Science .....	192
Continuing Studies .....	624
Coterminal Degrees .....	36

Course Descriptions .....	631
---------------------------	-----

## D

Developmental Biology .....	598
Division of International, Comparative and Area Studies .....	353
Division of Literatures, Cultures, and Languages .....	355

## E

Earth Systems .....	95
Earth, Energy, and Environmental Sciences Graduate Program (EEES) ....	94
East Asian Languages and Cultures .....	357
East Asian Studies .....	368
Economics .....	374
Electrical Engineering .....	211
Emmett Interdisciplinary Program in Environment and Resources (E-IPER) .....	100
Energy Resources Engineering .....	109
English .....	381
Environmental Earth System Science .....	116
Ethics in Society Program .....	389

## F

Feminist Studies .....	391
Financial Mathematics .....	398
French and Italian .....	400

## G

Genetics .....	599
Geological and Environmental Sciences .....	118
Geophysics .....	125
German Studies .....	413
Graduate Degrees .....	38
Graduate Education .....	90
Graduate School of Business .....	92

## H

Health Research and Policy .....	600
History .....	421
History and Philosophy of Science .....	418
Human Biology .....	436

## I

Iberian and Latin American .....	439
Immunology .....	602
Individually Designed Majors and Individually Designed Honors Program in Humanities .....	445

Institute for Computational and Mathematical Engineering .....	218
International Policy Studies .....	446
International Relations .....	452
<b>J</b>	
Jewish Studies .....	459
<b>L</b>	
Language Center .....	459
Latin American Studies .....	464
Libraries and Computing .....	623
Linguistics .....	469
<b>M</b>	
Management Science and Engineering .....	222
Materials Science and Engineering .....	232
Mathematical and Computational Science .....	472
Mathematics .....	475
Mechanical Engineering .....	239
Medieval Studies .....	480
Microbiology and Immunology .....	606
Modern Thought and Literature .....	480
Molecular and Cellular Physiology .....	607
Music .....	482
<b>N</b>	
Neurobiology .....	608
Neurosciences .....	608
Nonacademic Regulations .....	62
<b>O</b>	
Obstetrics and Gynecology .....	609
Other Offices .....	615
Overseas Studies .....	83
<b>P</b>	
Pathology .....	609
Philosophy .....	491
Physics .....	503
Political Science .....	511
Psychology .....	516
Public Policy .....	521
<b>R</b>	
Radiation Oncology .....	610
Radiology .....	610

Religious Studies .....	528
ROTC .....	88
Russian, East European and Eurasian Studies .....	532
<b>S</b>	
School of Earth Sciences .....	93
School of Education .....	130
School of Engineering .....	134
School of Humanities and Sciences .....	249
School of Law .....	587
School of Medicine .....	589
Science, Technology, and Society .....	536
Services and Programs .....	626
Slavic Languages and Literatures .....	542
Sociology .....	550
Stanford in Washington .....	586
Stanford Introductory Studies .....	79
Stanford University .....	6
Stanford's Mission .....	7
Statistics .....	557
Stem Cell Biology and Regenerative Medicine .....	611
Structural Biology .....	613
Student Affairs .....	615
Symbolic Systems .....	561
<b>T</b>	
Theater and Performance Studies .....	574
Transfer Work .....	49
Tuition, Fees, and Housing .....	17
<b>U</b>	
Undergraduate Advising and Research .....	85
Undergraduate Degrees and Programs .....	23
Undergraduate Education .....	79
Undergraduate Major Unit Requirements .....	32
University Governance and Organization .....	9
University Requirements .....	12
Urban Studies .....	581
<b>V</b>	
Veteran's Affairs .....	50